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113.81

DR. ALICE HAMILTON'S REPORTS

DOWN'S COLLECTION
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SCHENECTADY MUSEUM, NEW YORK

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DR. ALICE HAMILTON'S REPORTS

Downs Collection

Box A-15B

Folder 113.81

Schenectady Museum

JUN - 4 '33

NE/ LA PARK, CLEVELAND.
April 13th, 1933.

The day in Cleveland was spent chiefly with Dr. Ralph Edward, discussing the system of physical examination and medical care which he has introduced into the National Lamp Works. I visited the Ivanhoe division where wire is drawn for the welds, but found absolutely nothing to criticize there, either in the works or in the medical department.

The Pitney Glass Works are, on the whole, good; but a plant using artificial gas, with 40 percent carbon monoxide, should not be dependent wholly on natural ventilation, even when this is provided by windows on four sides and a saw-tooth roof. It would also seem more desirable to provide cool air in summer in a plant of this sort than in lamp works. The mixing room is bad. The ingredients for glass, including very fine sand and ground glass, are handled with great carelessness; and there is a fine dust over every surface, showing that it has been deposited from the air. This dust is of the kind which is known to injure the lungs and favor the development of tuberculosis. But such an effect is produced slowly and does not attract attention till the damage has gone pretty far. If it is impossible to do away with the dust, the men employed here should be examined at regular intervals by the physician. There is an impression of driving speed and breathless hurry among the women in the glass blowing room.

JUN - 4 28

GENERAL ELECTRIC COMPANY, BALTIMORE.
February 23, 1923.

The buildings are unusually well lighted, with good natural ventilation, since they are all but one story high, with saw-tooth roof, and the sides are almost all windows. There has been an intelligent effort to avoid glare by putting clouded glass in the windows of the roof and in many of the side windows, with Venetian blinds covering the sunny windows. Unusually good features are the hooded compartments for enameling and japanning which are placed along the outer wall of the building, with a powerful fan in the wall. During spraying the spray is very efficiently removed. Benzol is used only in one varnish, not in use at the time. Another good feature is the acid department, which has a good exhaust. A third is the use of canvas glue wheels, covered with carborundum dust for polishing cast iron. There is no risk of breaking with these wheels -- and the dust which is for the most part carried off by a good exhaust, is far less harmful than that from natural emery wheels.

The poorest feature is the sand-blasting department, where three men are employed. This is completely separated from all other departments -- which is right -- but

there is a bad escape of sand from the revolving machine, and a fine dust is scattered abundantly over all surfaces. The brass foundry is better than the average, but during pouring the fumes are very dense, the crucible is carried down the room along the moulds and there is no possible way for the fumes to escape, for the windows are not open during chilly weather. This is always true in brass foundries and cannot be corrected because the men know that a chilling draft will precipitate an attack of brass poisoning. That is why natural ventilation is of little use in a brass foundry.

Dr. M. J. Hannah made a very favorable impression on me. Indeed, he seems to me to be doing remarkably good work, on a very scant allowance of time. He is supposed to spend only two hours a day at the plant; and during that time, examines from two to twenty-five new applicants for employment. There are about thirty dispensary cases ^{at} today -- about half of them new. These are chiefly cases of minor surgery, including foreign bodies in the eyes. In spite of this large amount of routine work, he has apparently found time to acquaint himself with the actual conditions in the plant, and could tell me about the effect of various varnish and paint sprays before the installation of proper exhausts and of the conditions in departments where carbon monoxide from gas jets was formerly quite troublesome.

It is not, therefore, a criticism of Dr. Hannah to say

the medical supervision in the plant is very incomplete.

Two hours a day for a physician taking charge of twelve hundred men, exposed to the usual hazards of machine shop work, brass foundry, paint and varnish spraying and sand blasting, is certainly insufficient, if one takes as a standard the National Lamp Works with a physician on half-time to take charge of two hundred girls and twenty-five men doing far safer work. Dr. Hannah cannot make a thorough examination of new men but he wisely devotes most of the few minutes he can give to an examination of the heart, for which purpose he has had a special sound-proof room constructed. He does not reject men with compensated heart disease but accepts them for certain less strenuous jobs. However, he has no way of assuring himself that the man will continue to be treated as one handicapped, and will not be shifted to a job too heavy for him, for all further contact with the man is through the employment office. It is of course quite impossible for him to do anything in the way of regular medical examinations of these handicapped men, or of the men engaged in sand-blasting. Dr. Hannah's connection with the University of Maryland Medical School, with its hospital, is of great advantage to the plant, for he can keep accident cases under his own care.

The girls are examined by Dr. Anna Abercrombie, who comes out whenever there are ten or fifteen waiting for examination. The employment department is well arranged and pleasant, and the

toilet rooms for women are excellent.

I visited the plant with Mr. Lawrence and Mr. Martin and had an interview with Mr. Muir. The last named told me that 0.6 percent of the payroll covers all care of the sick and injured, including compensation, court cases and hospital care.

ST. LOUIS, MAZDA DIVISION
March 16th, 1923.

Mr. Dalton took me around the plant. He impressed me very well, indeed. He has evidently gone into every detail of the work himself, for every question I put to him brought out a very well thought out answer.

The factory is excellent, with an elaborate air-conditioning fan for cold washed air in summer, warm in winter. The space is more than abundant. The girls are apparently not rushed, but they have not yet installed the shop unit system -- as they are about to do. The lighting is good. Glare is prevented. The toilet rooms are satisfactory except for the placing of wash basins outside, in the main room, and the provision of roller towels.

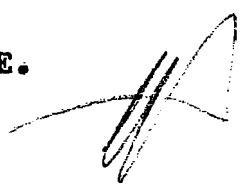
The only features which I would criticize would be the roller towels, the sand-blasting which is still done by two women but which is, I understand, to be given up, and the lack of an exhaust over the carborundum wheel where the ends of glass rods are ground. There is little dust here, but it is dust of a dangerous character.

The medical department under Dr. Dalton is the most elaborate that I have seen in any plant. It is really preventive medicine, highly developed. The physical examination

takes fifteen minutes instead of the customary three to five minutes, and the handicapped girls who are accepted are kept under careful supervision; even anaemia and underweight are treated as handicaps and the girls are given nourishment morning and afternoon, which they pay for themselves. Temperature curves are kept in all cases of suspected tuberculosis. Whether or not this has anything to do with the labor turnover, I do not know; but it certainly seems very low for a plant employing girls. At the time of my visit eighty-seven of the three hundred had been there five years or more.

There is well equipped dental department largely patronized.

GENERAL ELECTRIC COMPANY, FORT WAYNE.
April 26th-1923



The general impression that this plant made on me was very good. There seems to be no driving speed at all. The employees walk about, stop occasionally to talk, pause and look up when a stranger passes by, and seem to be working easily and comfortably. The personnel ^{work} is unusually well planned, being under a group of girl managers selected from the regular workers who take charge of the new girls, select the employee who is to teach her, give her advice about her difficulties, and make themselves responsible for her till she is settled and contented. They also follow up absentees.

Aside from the usual machine shop hazards, there are few risks to health. Benzol is used in three departments but in small quantity, and by only three men, who appear to be immune -- at least they have done it for several years. Lead paint is used in spray form to coat transformers; but the work was not being done while I was there -- so that I could not judge how efficient the protection is.

The features which are open to criticism are the following: In spraying lacquer the objects are hung on hooks, right at the edge of the hood, which is about three and one-half feet deep, with the exhaust at the back. The workman who is

spraying holds the object enough to turn it from side to side, pulling it even farther out from under the hood -- so that a good deal of the spray is not caught and carried off by the exhaust. The equipment is not nearly so good as in Baltimore or Schenectady.

No thought seems to have been given to seating, and the girls' chairs are often poor -- too high -- without proper foot rest -- and they often use treadles which are single instead of double.

The sand-blasting is carried on inside a large cabinet, and the man stands outside but he looks through a window which is covered with only a fine netting -- and a continuous stream of the finest dust comes against his face. Twelve to fourteen men do this. The dust is of a very harmful character, although in most cases the harm would be apparent only after several years' exposure. However, if it is impossible to protect them from the dust, they should be examined at regular intervals by the doctor. I wonder whether mica could not be used to cover the window? Glass would not do because it would be completely frosted in a very short time.

Two unusually good features are to be seen in this plant. One is the protection of the girls' eyes against artificial light. Not only do they have shades over their own lights, but small screens on either side to protect the eyes

against the shaft of light from the flame on either side of them. The second good feature is the prevention of fumes in the brass foundry. This is really the best foundry I have ever seen. I stayed there during brass pouring and convinced myself that at the end of the process the air was almost clear. This result is accomplished by a wide hood which runs along above all the furnaces and is provided with a curtain coming down to within seven feet of the floor. The exhaust under this hood is entirely adequate. The room itself is very high, with a monitor roof, (the windows of which open) and with windows on all four sides.

Mr. Barnes took me over the plant, spending most of two days with me. He seems familiar with every possible detail, and alive to most of the possible risks. Dr. Cartwright is on full time and has a close connection with the largest hospital in the city. I should say that he was giving very adequate care to surgical cases and a careful enough examination of men who apply for work; but, as usual, the system does not provide for enough supervision of physically handicapped men, who are quite rightly accepted for less strenuous jobs, but who should be kept more or less under the doctor's supervision, especially when they are shifted to other work. The system does not provide, either, for possible injury from sand dust, or lead from spray painting, or possible injury from benzol,

naphtha, "turpentine substitute," or denatured alcohol, containing 10 percent wood alcohol. Men and women exposed to these ^{substances} ~~solvents~~ should be looked over by the physician at regular intervals.

I should like to emphasize again the pleasant atmosphere in this plant and the personal, individual attention which seems to be given the employee.

OCT 30 23

Bridgeville Glass Tubing Works. October 18, 1923.

Mr. Aberle conducted me over the plant, and I was much impressed by his ~~solicitude~~ ^{for} the health and comfort of the men employed under him.

Since all the blowing is done by machine, the heat and glare from the furnaces has to be encountered only about once in fifteen minutes, and the rest of the time the men can be over by the windows. The only place in the plant where I should look for any trouble is the mixing room where 450 pounds of lead oxide, litharge, is weighed out and mixed ~~in~~ every batch, and 40 to 50 batches are made every day. The litharge is evidently carefully handled but the color can be seen all over the floor and, while weighing and mixing goes on, the dust is quite thick and is visible for almost five minutes after. The dump is well managed. Three men work here; the oldest has mixed glass for nineteen years and says he has never had lead poisoning although he has seen a great deal of it. It would be a wise precaution to have these men looked over by a physician once a month, as would be required by law in an English or German plant doing similar work.

Seven girls work under good conditions and have a large and abundantl equipped lavatory, rest room, and toilet room. ~~These are the best~~ The men are better ^{so far.} ~~provided~~ for than in any other plant, Their ~~xxx~~ lockers are of the best ventilated type. the lavatories are clean, with sinks provided with a foot release for the water, ^{with} soap, and paper towels, and shower bath. There is a large and very pleasant smoking room. sunny, with easy chairs, and the cafeteria, which is used by men in overalls, is sunny, with window boxes, and gave me the best cafeteria lunch I have had in any plant.

There is no medical care at all. In case of serious accident the

man would be sent to a Pittsburgh hospital, but only one has occurred in four years. First-aid is given by an office girl or anybody else who happens to be around. There is no physical examination of applicants for employment. A Bridgeville physician is on call for injuries too serious for the first-aid ^{person} ~~man~~ to handle.

New Kensington Manufacturing Plant. October 18, 1923.

This plant uses no lead, no benzol, no sandblasting, no red lead paint, and they have had no trouble with cutting oils.

The two buildings that interested me were the pickling shed and the zinc casting. Fourteen pickling tubs, containing sulphuric acid, are in an open shed with a high roof and one side completely open. The pipes are moved up and down in the tubs mechanically. I was told by Mr. Maines that a new building is to go up here which will shut in the pickling room and that they will have to depend on artificial ventilation. This feature ought to be gone into very carefully, for pickling is notoriously an unhealthful process. Ordinary iron is very likely to be contaminated with arsenic, and so is commercial sulphuric acid, and when the two are brought together the conditions are ideal for the production of arseniuretted hydrogen fumes. This poison, when breathed in considerable amount, causes acute symptoms followed by profound anaemia and jaundice; when breathed continually in very small doses, it causes chronic anaemia, loss of weight, and general ill-health.

The pickling tubs in the large building, twelve in number, are better because they are deep and narrow. The surface of the liquid here is covered with "Sunfoam", looking like a thick layer of soap suds, which is supposed to prevent the escape of fumes. Whether or not it does this, I cannot say. There are also two pickling tubs with hydrochloric acid. In connection with all of these the possible risk of arsine poisoning should always be kept in mind.

The enamels and laquers are thinned with gasoline, and I should not expect any particular trouble from the fumes in spraying and dipping.

There are two features on which I should like to comment, although they are not quite in my line. I should think that there must be a good deal of risk of eye injuries in pipe cutting where the red-hot sparks fly far and wide, and I should be almost certain that a grave injury would be done to the ears by the shrill, hissing, and peculiarly trying noise which comes from blowing the scale off the cast zinc.

#3
HADLYME, CONNECTICUT
TELEGRAMS VIA SAYBROOK
TELEPHONE, DEEP RIVER 65-2

11 27 25
July 24, 1925

My dear Gerard :

My work for the General Electric Company for the year from August 1924 to August 1925 has taken thirty days, which at \$ 50 a day comes to \$ 1500. This covers investigations made in Fort Wayne, Youngstown, Harrison, Pittsfield, Schenectady and Erie and West Lynn. and conferences in Schenectady, Erie and Boston. My expenses amounted to \$ 284, which makes the whole bill \$ 1784.

I have only a lame Corona, which is however more legible than my handwriting. Your secretary Miss Marratt has again been most kind in securing for me a passage to Europe, with a cabin all to myself. I sail August 27, to be gone about seven weeks.

Very sincerely yours

Alci Hamilton

42.21

May 15, 1925

Dear Alice:

We are largely interested in a plant over in Hoboken, the Cooper-Hewitt Company, which manufactures Mercury Vapor Lamps and therefore handle mercury. Some time in the future when you are in New York, I would be glad to have you visit this plant and I am enclosing a letter of introduction to the President. Will you please make your bill for the visit to this Company separate from the others.

Possibly you can do this when you come east for the conference, and at that time can come out to the country with us, or later if that suits you better.

Sincerely,

Doctor Alice Hamilton
Hull House
Chicago, Illinois

173 28 25

Fort Wayne, April 25, 1925.

Colonel E. Z. Steever,
Schenectady Works.

My dear Colonel:

Mr. Swone has written to Mr. Goll calling his attention to the good report that Dr. Alice Hamilton made of our seating arrangements here at Fort Wayne and believes that perhaps some of the other plants like Erie, Pittsfield and Lynn and the Radio Department at Schenectady might profit by her observations and experience here.

In talking over this matter with Mr. Goll, it occurred to me that probably at your convention Miss Kinna might have the opportunity to talk with representatives of the other plants about posture, foot rests and similar conditions existing in other Works, after which we would all be in better shape to talk intelligently on this subject.

I have had several lengthy conversations with Miss Kinna regarding her work and she expresses herself as being able to overcome some of these objections that I had raised before in which case, of course, we would look on her continued employment here in a different light. However, I feel that a great deal of new thought and application will come from your meeting and I would, therefore, wish to defer any definite action along these lines until this matter has been considered from this angle.

With kind personal regards, I am

Yours very truly,

EAB:CH

GENERAL SUPERINTENDENT

GSwope -
WSGoll

2725

April 24, 1925.

My dear Dr. Hamilton:

I want to thank you for your letter of April 17 and the suggestions contained therein.

Mr. Barnes and Dr. Garton have already written about your visit and your suggestions made at the Fort Wayne Works have been adopted.

I believe we have the silicosis hazard fairly well in hand in the Company. About a year ago I sent X-ray photographs to those foundry superintendents and plant physicians where we had sand blast hazards. The installation of the newest Pangborn sandblast equipment, which you will be invited to visit on the occasion of your attendance at the conference, and the use of the Burrell dust mask and frequent medical examinations are the practical steps to take care of silicosis.

Dr. Garton has been put down on the program, as you have suggested, for "Prevention of Silicosis in Sandblasters". I am also asking one or two of our superintendents to give us the benefit of their practical knowledge of sandblasting. As a result of your suggestion, we should have a very thorough review of this most important subject.

We are tremendously indebted to you for inducing Mr. Barnes to send the specimen of chair that has been devised as the result of Miss Kinna's research on "Seating".

I am sending to the West Lynn Works for a sample of their low table chair and table also, and suggest that if you can secure a sample of the low table chair from Mr. Kirchner's plant, in Youngstown, we would be only too happy to pay transportation both ways.

Do you know anything about the medical practice at the Pitney plant at Youngstown, Ohio, and also the provision of milk for underweight employees at that plant and the cost? If it is not imposing too much upon your time and good services, I would appreciate your obtaining a description of the work done and the results accomplished there.

Dr. Hamilton-2-April 20-1925.

Referring back to Miss Kinna's work on "Seating", I was very much impressed with the results that had been obtained after discussing the matter with some of the girls who were taking part in the seating experiment. I believe that there are one or two important principles developed as the result of Miss Kinna's work. It was because of this that I put her down on the program.

Please do not hesitate to make suggestions and criticisms on our program as they come to your mind.

We are deeply indebted for your assistance. Our employees will greatly benefit from your wide experience.

Faithfully,

E. Z. Steever.

To
Dr. Alice Hamilton,
800 South Halsted Street,
Chicago, Ill.

EZS/FEB

Gerard Swope

P.S. We will make reservation for you at the Van Curler Hotel. Please let me know the train you expect to arrive on.

S.

April 21, 1925

Mr. Walter Goll
FORT WAYNE

Dear Mr. Goll:

Doctor Hamilton spoke of the excellent work Miss Kinna has done at Fort Wayne and understands from her conversation with Mr. Barnes that Miss Kinna has gotten pretty near the end of her work in Fort Wayne.

Doctor Hamilton thinks it would be a great pity to lose her services and wondered if she could not be of value to some of our other Works. Don't you want to take this up with possibly Lynn or Erie to see whether they would like to try her for a few months along similar lines to the work she has been doing in Fort Wayne.

Yours very truly,

GERARD SWOPE

GS:H

April 21, 1925

Mr. Walter Goll
FORT WAYNE.

Dear Mr. Goll:

I am delighted to receive a report from Doctor Hamilton showing the fine progress that has been made at the Fort Wayne Plant, copy of which I enclose. You will notice that in two instances Doctor Hamilton speaks of the fact that you have the best methods of any observed in the different Works of the Company. I suggest that you call this to the attention of the various factories in order that they may profit by the good work you have done.

Sincerely yours,

GERARD SWOPE

GS:H

Dr. Hamilton

April 21, 1925

Dear Alice:

I have read with interest your letter of April 17th and the report on the Fort Wayne Works, copy of which I have sent to the Manager with my comments as shown on the attached copy of letter. Incidentally, whenever you have these reports typewritten, I would appreciate it if you would send an original with one carbon copy.

The two plants of the Edison Electric Appliance Company and the Victor X-Ray Company in Chicago are not owned by the General Electric Company in the same sense that the others are. We do have a large financial interest in them but the management is quite distinct. I think possibly we will let them wait for a while and I will keep the matter in mind and later on if we can bring it about, I think it will be a good idea to have you visit these, as well as two others in which we are interested.

Sincerely yours,

Dr. Alice Hamilton
Hull House
Chicago, Illinois



ABSOLUTELY FIREPROOF



OPERATED BY
THE OHIO HOTEL OPERATING CO.
M.C. HANNAN, GENL. MGR.

YOUNGSTOWN, OHIO, April 17, 1925.

Gerard Swope, President,
General Electric Co.,
120 Broadway,
New York City.

My dear Gerard:

This will be a supplement to my official report of the Fort Wayne plant. I am really very much gratified to see how persistently and thoroughly Mr. Barnes has carried out every single suggestion I made to him last year. The high-table chair which they have produced is the best I have seen anywhere and Mr. Barnes is going to send a specimen of it to Schenectady to demonstrate before the doctors when they assemble for their conference.

Miss Kinna has done excellent work there. I read her reports ~~on~~ turnover and on the tests she made with different varieties of high and low seats, and I was much impressed. She can do accurate research work of high order. But I believe she has come to the end of her usefulness in Fort Wayne. What Mr. Barnes wants is a woman of the Ladies Home Journal type, and Miss Kinna is a woman of the Journal of Industrial Hygiene type. Mr. Barnes believes that the two types could be combined in one person, but I doubt it. It would be a great pity to lose Miss Kinna. Could she not perhaps be placed elsewhere? Perhaps in Erie or Bridgeport, or the Lynn River Works where the problems are much the same as in Fort Wayne.

Mr. Barnes told me of two plants in Chicago which belonged to the General Electric and which I have never visited. One is at 230 S. Robey Street, making X-Ray apparatus, the other is the Edison Electric Appliance Co., in Austin and here they enamel and sandblast. Do you wish me to visit them?

Very sincerely yours,

Ala Hamilton

77 27 25

Youngstown, O., April 17, 1925.

General Electric Company,
Plant at Fort Wayne, Ind.

This is my second visit to the apparatus plant in Fort Wayne, Ind., It will be unnecessary for me to make a complete report of the plant and I will simply note the changes that have been made during the past year.

It is gratifying to be able to say that every criticism which I made last year has been met and I am now able to state that the danger has been in each instance lessened or completely abolished. The features which were criticized were as follows:

Benzol was used in formula 462 in such a way that fumes escaped into the air. Now they are using formula 457 which is formula 458 with 60 or 70 degree naptha, and not only are the fumes comparatively harmless but it is said to work better as a coating for paper than 462 with benzol.

The sandblasting, especially of large objects, was open to criticism, although it was better done than in some other plants. The workman was not obliged to enter the sandblast room; he could stand outside and control his work by looking through a window. This window, however, was protected only by a very fine screen and the smallest particles, those which do the most harm when inhaled, were not held back by the screen. I asked at the time whether it would not be possible to have a glass window, but I was told that the particles of sand would soon frost it so that it would be no longer transparent. Now I find a glass pane fixed on the outside of the screen holding back all the fine particles so that the man is completely protected, but the screen prevents the frosting of the glass. As the draft is inward no dust escapes even through the opening for the pipe. I believe this is the best method of sandblasting to be found in any of the General Electric plants. The situation is not quite so good in the tumbling work for there is some leaking, but this is probably preventable and the small objects are treated on a turn-table which allows no dust to escape. The only criticism I should make of the sandblast department has to do with the supply room. Here there is a collector for the used sand which is, of course, an extremely fine powder, and when this must be emptied an excessive quantity of dust escapes and takes a long time to subside because it is so light. A layer of it can be seen covering the fresh sand. It would be better to have this collector placed outside the building.

The Third point which I mentioned in last year's report had to do with the spraying of lacquer and of paint. The former is now in excellent shape; the latter will be in all probability when the apparatus is fully installed.

I had called attention to the poor seating for the girls and now I find that as a result of very careful tests a chair has been devised which in my judgement is excellent. The best high-table chair I have seen. I am unable to say whether it is the best possible, but I feel sure it is superior to any high-table chair in use at present in the General Electric Shops.

It is a source of great satisfaction to me to find that the suggestions I made in Fort Wayne were considered reasonable and that the management was willing and able to follow them up so promptly.

Alvin Hamilton

MAY 21 '26

MAY 20, 1926

Received of Dr. Alice Hamilton
the sum of \$10.00 for The West Philadelphia
Post Office, Dr. Hamilton

J. E. BRODERICK

PHILADELPHIA MANUFACTURING PLANT

April 21, 1948.

The first thing I noticed when I visited the plant was the noise. It was a constant roar in my ears. The noise was caused by the grinding wheels and the welding process. The grinding wheels were of a very hard material and they were being used to grind the metal. The welding process was also very noisy. The welders were using a very high voltage and the sparks were flying everywhere. The noise was so loud that I had to wear earplugs. The exhaust ventilation was not very good. The air was very dirty and I had to wear a mask. The conditions were very poor and I was very concerned about the health of the workers.

The noise was a very serious problem. It was not only annoying but it was also dangerous. The welders were not wearing any ear protection and they were suffering from hearing loss. The grinding wheels were also a problem. They were very hard and they were being used to grind the metal. The sparks were flying everywhere and they were causing a lot of damage to the equipment. The motion on the grinding wheels is unusually good.

Caloric is a difficult problem. It must be done in the different parts of the plant and, although it is possible to protect the welders against the light - and they are protected - it is impossible to entirely protect the grinding wheels. At one place I was exposed to three or four times. Apparently it is most difficult in tank welding. Even the screens, but it would be very hard to completely shield every welder. I am also impressed with the expense to which the men in the traveling crane is subjected. It is said that green men suffer most. Certainly, the men who go to the dispensary complaining of irritation of

...the welders, but the men who work near them,

...are most properly employed. I question very
much the effect of the glare. It is
...and I should sug-
...by the foremen to
...looking in the direction of
...possible to induce the

...very much. Mr. Duffy,
...his method of spraying
...pounds, and in this
...point. The
...the brown primer,
...in the wall. For
the which house is placed on a turn table and the man is in-
...it while spraying so
that the birds can catch and carry off the fumes. It is very
...the appearance of the screens in the painting
...that the paint does not fly about, and this is,
of course, a very important point, since it is lead paint
that is being sprayed.

The medical department is the most beautifully
equipped department in any of the plants of the General Elec-
tric, and I mention it only to say that it should be a source
of great pride to the Company.

February 17, 1926

Mr. W. Stewart Clark
Manager
Bridgeport

Dear Mr. Clark:

Maybe Doctor Hamilton has already sent you a copy of her report of her visit to Bridgeport, dated January 4, but at all events I am enclosing a copy.

I am disappointed to see that the illumination, which has recently been modernized, seems to be only partially successful. What is the trouble? He surely ought to do a good job in illumination.

I suppose the question of cyanide case-hardening you are having looked into, as the process at Baltimore seems to be better. I suppose you are also taking up the plans for rest rooms for women.

Very truly yours,

GERARD STONE

GC:H

HARVARD UNIVERSITY
SCHOOL OF PUBLIC HEALTH

700
✓ 7.3

INDUSTRIAL TOXICOLOGY

55 VAN DYKE STREET
BOSTON, MASSACHUSETTS

January 18, 1926.

Gerard Swope, President,
General Electric Company,
120 Broadway,
New York City.

Dear Mr. Swope:

During the last two months I have made visits to the plant in Philadelphia at Willow and Seventh Streets, the one in West Philadelphia, the one in Baltimore, and the one in Bridgeport. I also went, at their request, with Mr. G. W. Stickney and Mr. Ward Harrison, to see the lighting system of the East Boston Lamp Works.

Enclosed you will find brief reports of these visits. From now on, my reports will be usually brief because my visits are more in the nature of a check-up than an investigation and it is unnecessary to comment on anything but a new feature or perhaps an old evil which has not been corrected as yet.

Yours truly,

Oliver Hammett

AH:P

Bridgeport.

January 4, 1926.

On arriving at the plant I found that Dr. Taylor was about to address the foremen on health questions, and later in the day Mr. C. ~~W.~~^{W.} ~~Wilson~~^{Collins} was holding a meeting of the safety committee. I attended both and was much interested to hear the discussions on the two subjects and to see the close acquaintance the men displayed with the problems in their own departments. The health and safety work seems to be in admirable hands.

Mr. W. Stuart Clark, Mr. H. Hunerkopf, Dr. F. A. Taylor, and Mr. C. W. Collins showed me the new developments since my last visit, the most interesting of which is the rubber department. The only risk I found here comes from the litharge used in rubber compounding, for that is the accelerator used in all batches of rubber and no rubber solvent at all is required. One barrel of litharge a day is weighed on open scales and emptied into the mixer. The man works with great care and no dust was evident while weighing, but it was impossible to avoid it when the batch went into the mixer. This department is in course of reconstruction and the feed into the mixer will be through a pipe from the room above. It will be desirable to have some device here to prevent any escape of litharge dust. The use of the mixer is of course a great improvement over the usual method in rubber factories of dumping the dry compounds directly into the open mixing mills. In the panning room great efforts are being made to diminish the amount of soapstone dust in the air.

Certain features which seemed open to criticism had, I found, already been considered by Mr. Hunerkopf and plans had been made for remedying them. Such are the poor ventilation in the department using hot paraffin, "wax", where window fans have been ordered, the steam from the

potash tank, and the hoods over the tanks in the plating room. These last are of the old-fashioned type, low and covering the whole tank, thus tending to hold down the fumes, while in the acid-dipping room the hoods are of the new variety placed at the back, slanting, with a strong suction. Mr. Hunerkopf assured me that the latter are to be installed in the plating room also.

The illumination in several departments has recently been modernized, but seems to be only partially successful, for many of the former lamps, low and providing direct lighting, have had to be retained.

Cyanide case-hardening has recently been moved to a large room where the furnace and the supply of cyanide are out in the open. It may be that this is a temporary situation, but if not, it is open to criticism, and I should advise treating that process as is done in Baltimore.

The provision of rest and comfort for the 1400 women is inadequate. The chairs provided throughout the plant are better than the average, and it would be a mistake to make any change at present before the studies of seating now being carried on in Schenectady are completed. The only change I should suggest here is the provision of ordinary low comfortable chairs for the girls winding spools in 25B whose work requires them to be on their feet, but who could sit down and rest occasionally. It is in the matter of rest rooms that there is decided need for improvement. Up to now, I am told, the buildings have been in a continual condition of change and readjustment, but that is passing over and it is possible now to provide the sort of quarters which are to be found in the better plants of the General Electric. At present there is a matron's room with only one cot, and this is not open at noon although a woman can rest there during the noon hour if she reports to the matron before twelve o'clock. This room, with two straight chairs and one rocker, is all the 700-800 wire and supplies girls have. Buildings 25 and 27 have 160 girls, with no room. Office girls have no rest room at all, but I was shown the

space which is to be devoted to a room for them. The dispensary has a room for girls, with two cots, and the office employees and those in 28 and 29 can go there easily; the others are pretty far away. There is a tiny room for a second matron, but it has only two chairs. Less than half the women go home at noon, so there is no fear that pleasant rest rooms would not be fully used and appreciated. The toilet rooms are well located, easily accessible to all departments, and very good.

Philadelphia

November 27, 1925.

The visit to the plant at Willow and Seventh Streets where I met, W. R. Mr. E. P. Higgs, Mr./Teele, Mr. C. P. Bloomer, and Mrs. E. N. Miller, was rather hasty because my chief objective was the new plant in West Philadelphia to which Mrs. Miller conducted me later.

I found here a change in the coating used for machine parts which is, I believe, a decided improvement. The new Pyroxylin, lacquers, as made at present, contain less harmful substances than did the older lacquers of this class and the resin lacquers. These are free from wood alcohol and usually from benzol. The lacquer ovens in this plant are excellent and there are no fumes from them. It is unnecessary to repeat my former favorable comments on the provision for the comfort and health of the employees in this plant.

West Philadelphia.

Mr. H. E. Kemp took me through those departments which were operating at the time, but a second visit will be necessary if I wish to see the sand-blasting of large machine parts, acid-dipping, and spray-painting.

The employment department and dispensary are large and admirably housed and equipped. I should have no suggestion whatever to make except possibly that a door opposite the entrance door would make the dispensary easier of access for a large part of the plant. The wash-rooms for men are much the best I have ever seen anywhere.

Spray-painting was not in operation during my visit but it is apparently unusually well done, for there was no apparent scattering of spray

droplets, and these would have betrayed themselves, for much of the paint was red lead and would have appeared on nearby surfaces. The truck panels can be sprayed under great hoods, but much of the work must be done out in the general room, and if it were not for the skill with which the spray-gun is handled there would be a risk not only to the painter but to others. My impression at present, from seeing not the actual work but the results, is that the Eclipse gun which is used here is much better than the ordinary gun or else the painters are unusually skilled men. Pyroxylin coatings are used here also. The buildings are large and no criticism could be made of the general ventilation, lighting, and accident prevention.

It may be that there will be some trouble among the men who work near the welders because welding repair work has to be done in different places wherever the heavy machine parts are, and in order to protect other men from the glare of the flame there are heavy metal screens which must be set up as needed, some of them requiring the travelling crane because they are so heavy. A good deal of vigilance will be needed to see that these screens are always used.

A minor point, but one which is worth mentioning because it bears on a situation I have observed in other ^{places} departments, has to do with the bubbling fountains for drinking water. Those selected for the Willow Street plant are of the best approved variety, carefully designed to prevent the carrying of infection. Those selected for the West Philadelphia plant are poor and do not afford the proper protection. It is hard to understand how this should happen. The explanation given me was that the water in the first plant was not cold enough and that the second plant is an improvement in that respect, but obviously this has nothing to do with the drinking piece.

The medical department was not yet in working order and will have to be visited later.

Baltimore.

November 30, 1925.

Mr. J. A. Muir took me over the plant and showed me several new features which are designed to afford protection against fumes or dust or accident. I should like to pay tribute to the close attention to details which is evidenced throughout the plant.

The new glass shield over the grinding wheels is ingenious, does not interfere with work, and prevents flying particles from reaching the grinders' eyes. The exhaust along the edge of the cyanide tank does not prevent the men's approaching it from both sides and yet undoubtedly lessens the escape of fumes. The new brass foundry is excellent, with no escape of fumes during fusing and so large and high that there is good dilution of the fumes formed in pouring. The method of handling the cyanide in case-hardening is especially good and might serve as a model for other plants. It is done in a small separate room which is kept locked, is entered only by two men, and is well ventilated. There is also protection against splashing when the heated metal is dropped into the water. The man in charge is perfectly aware of the necessity for precautions in using and storing sodium cyanide. Welding is not so much of a problem here as in some other plants because the work can be done in one room, and men who are not protected by goggles do not run the risk of eye irritation from the light of the torch.

This plant has very simple and inexpensive equipment both for the dispensary-employment-office and the cafeteria, but they are so satisfactory that it is evident that careful planning may bring about as good a result as the expenditure of a good deal of money. Any plant which has only a small space to devote to the employment office and the physician's quarters might

well copy the arrangement in Baltimore. The bubbling fountains are of unusual type, nickel-plated instead of porcelain-enamelled, of a simple but entirely satisfactory type.

EDISON LAMP WORKS
OF GENERAL ELECTRIC COMPANY

INTERNAL CORRESPONDENCE

OFFICE OF
W. R. BURROWS
MANAGER OF WORKS

Harrison July 9 1925.

Mr. Gerard Swope, Pres.,
New York Office.

Dear Mr. Swope,

I have noted Dr. Hamilton's summary of visits to our various works. I will take up with Mr. Stickney the question of improvement in lighting our plants. I will also make it my business to personally see the factory managers and give them whatever assistance is possible.

I note your comment that 'Dr. Jackson stated lighting conditions at Harrison are not up to what they should be'. I will have this investigated at once.

Yours very truly,

W. R. Burrows

WRB/S

San Francisco, Calif.
June 17, 1935

Mr. . . . ~~Almond~~
Mr. . . . Sch

I am attaching copy of Mr. Hamilton's summary of visits made to our various works during the past year, and copy of my letter to the managers.

I call your attention especially to the paragraphs in connection with the lighting of our shops. Will you be good enough to take this up with Messrs. Harrison and Tickney, who I understand are cooperating with the committee of the National Research Council, and I should like to have a report from them as to what progress is being made and their plans for further work along this line.

Very truly yours,

GERNARD MOORE

GS:H

Mr. Burrows:

I understand that at the recent conference of doctors at Schenectady Dr. Jackson stated that lighting conditions at Harrison are not up to what they should be.

G.S.

11-28

Edison Lamp Works, Harrison - May 18, 1925.

The day was spent in a rapid survey of the plant and a long discussion with Mr. Evans and Dr. Jackson of the problems of preventive medicine as applied to industry, especially the problem of early tuberculosis.

The first visit made to this plant showed that general conditions were unusually good, chairs and foot rests well adjusted to the individual, lighting and ventilation good and no apparent speeding up of the employees. The present visit confirms this impression and apparently the unit system, which had just been introduced on my first visit, is working well without any evident high tension, although the pace is pretty steady. The repeated flashing of lamps in the finishing job is bad, for no protection is provided against the light.

The tungsten wire departments in which mercury is handled in sintering and in annealing are just as at my first visit, with mercury in droplets scattered over benches and other surfaces. These rooms are hot enough to favor volatilization of the mercury, but Dr. Jackson has found no mercury poisoning among the women or men and he assured me that he was on the lookout for it.

Medical service has always been excellent and the level of excellence has been fully maintained during the last two years, if not improved. This is one of the plants in which preventive industrial medicine is provided.

11581
7

COOPER HEWITT ELECTRIC COMPANY

OFFICES AND WORKS: HOBOKEN, NEW JERSEY

WILLIAM A.D. EVANS
PRESIDENT & TREASURER
N. R. BIRGE
VICE PRESIDENT
E. E. DAVIES
SECRETARY & AUDITOR



DISTRICT OFFICES
BOSTON
CHARLOTTE
CHICAGO
CINCINNATI
CLEVELAND
DETROIT
LOS ANGELES
PHILADELPHIA
PITTSBURGH
ST. LOUIS
SYRACUSE

95 RIVER STREET

OFFICE OF THE
PRESIDENT

July 6, 1925.

Mr. Gerard Swope, President,
General Electric Company,
120 Broadway,
New York City.

Dear Mr. Swope:-

I have your favor of July 2nd written at Association Island and enclosing report of Dr. Hamilton's relative to the condition of our plant.

I will go over this report with Mr. Mailey and will then be in a position to communicate with you further regarding Dr. Hamilton's suggestions.

As to the question of a new factory I will be glad to discuss this matter thoroughly again with Mr. Birge on his next trip down here and will be prepared to talk about it after that time.

I will have check for Dr. Hamilton prepared and mailed direct to her at the Harvard Medical School at Boston.

Thanking you for sending this, I am,

Very truly yours,

WADE/G

GE MUSEUM 00094

11
Association Island
July 2, 1925

Mr. J. H. Evans, President
Cooper Hewitt Electric Company
Hoboken, New Jersey

Dear Mr. Evans:

In accordance with our previous correspondence and your request, Doctor Hamilton of the Harvard Medical School visited your factory on June 27th, and I am enclosing her report. I thought you and Mr. Mailey would be interested in what she said in a separate letter to me, reading as follows:

"I have just finished visiting the Cooper-Hewitt Electric Company in Hoboken, which I found under the charge of a very intelligent man, R. D. Mailey, who evidently knows as much about mercury poisoning as I do myself. The plant is not perfect, as you will see from the enclosed report, but the precautions that have been introduced are, I feel sure, adequate to guard against any serious attack of poisoning in an employee. They would have ample warning of the beginning of such trouble and could take steps to remove the individual from danger."

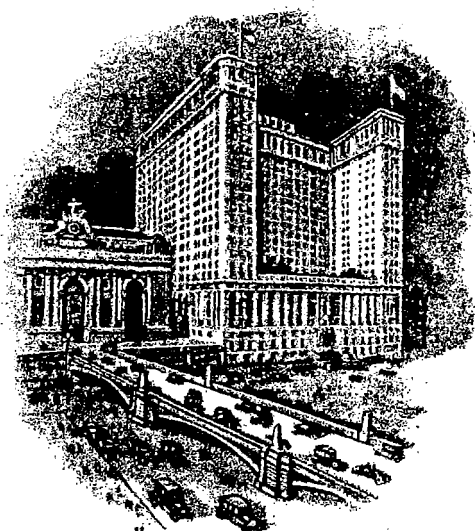
This brings up the question which I raised before, you will remember, that is whether we could not find a better factory for you. We have so many factories available now, where the conditions are better than your own, and I should be glad if you would study this to see whether

or not you could with advantage use one of them.

The charge of Doctor Hamilton for services rendered is \$75.75, which you may send to me at the West or Air at so long in care of the nearest station. Best at Boston.

Very truly yours,

45:7



TELEPHONE - VANDERBILT 6000



THE COMMODORE

FORTY-SECOND STREET AND LEXINGTON AVENUE
GRAND CENTRAL TERMINAL
PERSHING SQUARE
NEW YORK

JOHN MC E. BOWMAN
PRESIDENT
GEORGE W. SWEENEY
VICE PRES & MGR.

New York, N. Y.,
June 27, 1925.

Mr. Gerard Swope,
President, General Electric Co.,
120 Broadway,
New York, N. Y.

My dear Gerard:-

I have just finished visiting the Cooper-Hewitt Electric Company in Hoboken, which I found under the charge of a very intelligent man, R. D. Mailey, who evidently knows as much about mercury poisoning as I do myself. The plant is not perfect, as you will see from the enclosed report, but the precautions that have been introduced are, I feel sure, adequate to guard against any serious attack of poisoning in an employee. They would have ample warning of the beginning of such trouble and could take steps to remove the individual from danger.

You asked me to send you the bill for this particular piece of work. It should include my expenses from Erie to New York and one day's work: that means \$26.75 for the former; \$50.00 for the latter, making \$76.75.

I went to Erie because Colonel Steever wanted me to attend the meeting of the Industrial Service Men on Thursday and Friday of this week. It was very worth while and gave me a lot of information about non-medical matters which I am glad to have. The only thing that seems now left to do is a visit to the Bridgeport Works, which they seem anxious to have me make. After that I shall consider that the investigations for 1925 have been made and that we can discuss what you would like to have me do next year, provided the plans I have outlined do not render my services quite superfluous.

Very sincerely yours,

Abi Hamilton

GE MUSEUM 000

COOPER HEWITT ELECTRIC COMPANY
8th and Grand Streets,
Hoboken, N. J.

June 27, 1926.

I was escorted over the plant by Mr. R. D. Mailey, Factory Manager, with whom I had a long and very satisfactory talk concerning the hazards of the work and the best way of dealing with them. Mr. Mailey is a chemist, familiar with mercury and not only alive to the possible dangers but very well informed about the medical aspects, the symptoms to be looked for and the preventive measures to be adopted.

The building is not an ideal one for the handling of mercury because the floors are of wood for the most part and where linoleum has been used there are worn places or cracks or seams which allow droplets of mercury to lodge and escape the broom. The only proper flooring for such a building is smooth and impermeable with a curve instead of an angle where floor and wall meet - a "cove base" - otherwise there will always be more or less accumulation of mercury in cracks and that means more or less contamination of the air with mercury fumes because volatilization takes place below ordinary room temperature.

The rooms in which the hazard is greatest are the pump room and the mercury cleaning room. The pump room is hot but there is a good deal of air dilution through open win-

REPORT ON GEORGE HEWITT ELECTRIC COMPANY.

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dows. How good the air is in winter I am not sure, but perhaps the heat is great enough to allow of open windows even then. The ideal system of course would be artificial ventilation. The floor here is covered with linoleum in very fair condition and not much mercury is spilled, but there is more on the floor than can be considered quite safe and it is almost impossible to sweep it up from under the pumps and other apparatus.

The mercury cleaning room next door depends on open windows altogether. There is more mercury spilled here and the floor is harder to keep clean. It would be a good thing to give this floor a fresh covering of linoleum and to curve it into a "cove" base, for as it is now, it cannot be kept really free from droplets. I am even more doubtful about the ventilation of this room in cold weather and much more mercury is exposed to evaporation here than in the pump room.

The finishing department has a good wooden floor, not worn, and it is kept very clean but close inspection shows droplets of mercury in the cracks. The room is large and probably the mercury fumes are amply diluted in summer when the windows are open; about the condition in winter I cannot speak. The same thing can be said of the shipping room which also has a good wooden floor with droplets of mercury in the cracks and with natural ventilation only. The room for final tube testing also has mercury in the cracks of the floor.

REPORT ON COOPER HEWITT ELECTRIC COMPANY

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by the nurse.

I want to commend very highly the intelligence and solicitude shown by Mr. Mailey in his management of this dangerous trade.

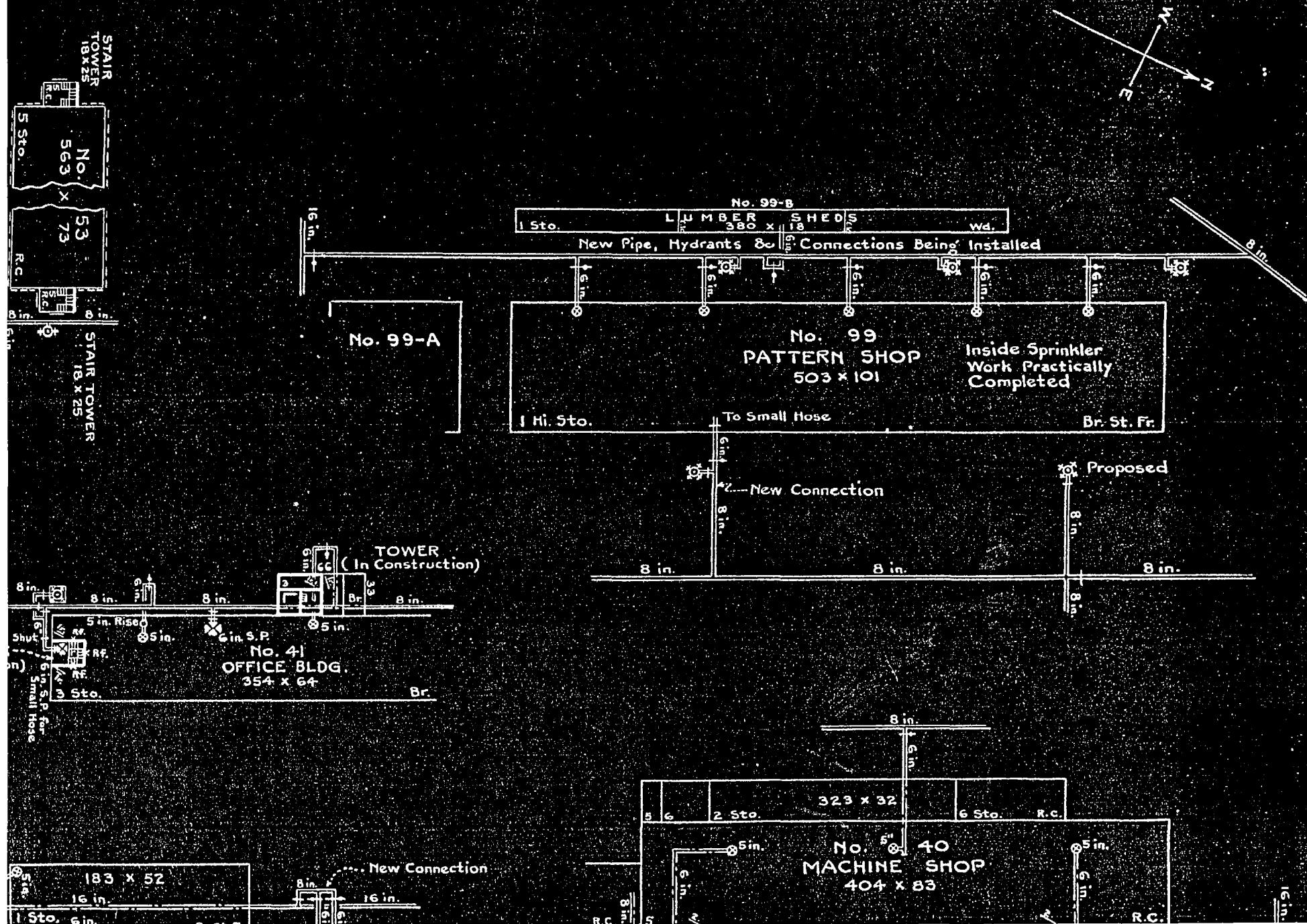
REPORT ON COOPER HENITT ELECTRIC COMPANY.

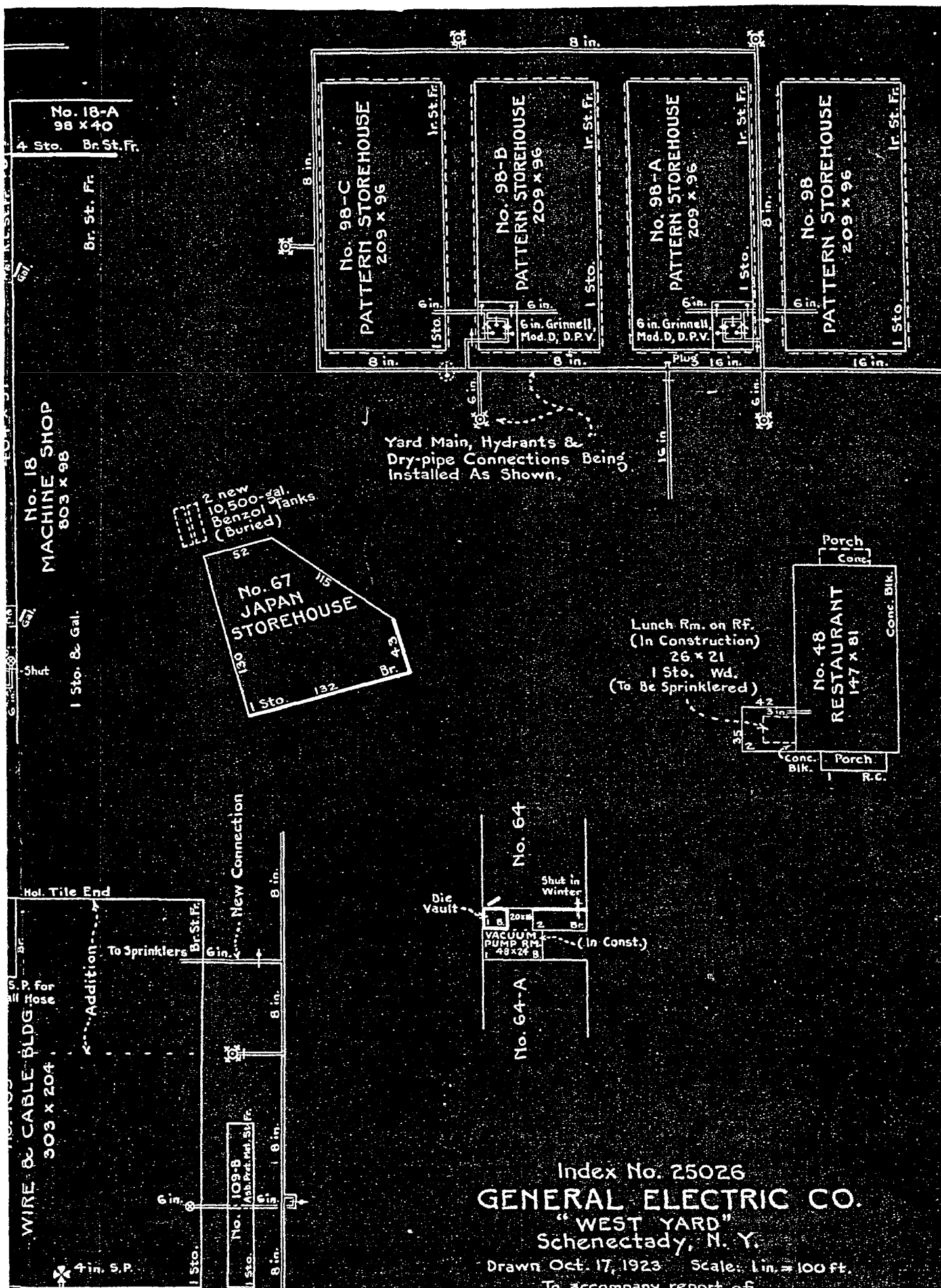
-3-

The medical service is very good. Dr. H. E. Matthews of Orange, N. J., who has had much experience with mercurialism among hatters, comes to the factory once a month and looks over every employee who works with or near mercury. Between times, the dispensary is in charge of a trained nurse who gives mouth treatment to these employees twice a week. The company provides shower baths, soap and towels, toothbrushes and toothpaste, to the same class of employees.

To sum up: There is a very real risk of mercury poisoning in this plant because we have ample evidence that mercury scattered over the floor and lodging in cracks can contaminate the air sufficiently to bring about mercurialism if the supply of outside air is not great enough to dilute the fumes past the point of danger. To do away with the danger entirely would require new flooring, a system of artificial ventilation and some measure for preventing breakages and spilling. However, I do not believe that the risk of mercurialism is anything but very slight in this plant because of the close supervision maintained by the dispensary. Mercury poisoning does not come on suddenly and the people who are exposed are seen twice a week by the nurse who would note not only a change in the mouth, but also the development of a tremor. The monthly visit of the doctor means a thorough examination and it would be a very exceptional case which would develop in serious form between two visits and without being detected

TOP HALF





Bottom HALF

Index No. 25026
GENERAL ELECTRIC CO.

"WEST YARD"
Schenectady, N. Y.

Drawn Oct. 17, 1923 Scale: 1 in. = 100 ft.

To accompany report of

Full-House, Chicago, Illinois.
June 4, 1928.

Mr. Francis E. Pratt, Vice-Pres.,
General Electric Company,
Schenectady, New York.

Dear Mr. Pratt:

My visit to the Pittsfield Plant was rather brief, taking only one day, and was made for two purposes only: To talk over with the chemists some new compounds about which they had consulted me by letter and to pay another visit to the lightning arrester department, including Building 41.

Mr. Chesney was absent, but Mr. Insull took me in charge and accompanied me on my visit to the lightning arrester department. Mr. F. M. Clark was also away but his assistant, Mr. Endicott took me through the capacitor department and I discussed the various problems arising in connection with certain chemicals with Messrs. Branson, Cox, Grain and Dobell. Mr. Grain went thoroughly over the situation of the lightning arrester building with me.

To take up the capacitor situation first: They are contemplating the substitution of nitrobenzol for the transil oil which is used at present. Already they have had trouble from the transil oil because the men necessarily have their hands and forearms continually covered with it. If nitrobenzol is to be used in the same way, skin contact cannot be avoided. Nitrobenzol is notoriously a dangerous poison which enters the body primarily through the skin. Fumes will cause poisoning, but the serious cases which have occurred in industry have come from the splashing of nitrobenzol over the skin or from soaking the clothing or boots in nitrobenzol. During the war, when aniline was manufactured on a large scale for rubber vulcanization, I had a good deal of experience with nitrobenzol, and later on with the same poison in the making of coal tar dyes. It is a poison to the blood and the central nervous system causing the formation of methemoglobin in the place of oxyhemoglobin and producing depression of the centers controlling respiration, heart action and temperature. A chronic form of poisoning causes anemia, emaciation, loss of strength and impairment of sight and hearing. Absorption of nitrobenzol is encouraged by hot, moist air which flushes the surface vessels, makes the skin moist with sweat and also helps to vaporize the nitrobenzol.

The capacitor work is carried on in rooms a little below the level of the ground, only 9 ft. high, with many treating tanks at 100°C. These rooms are hot, even on a crisp, cool day, partly because the windows are screened with cheese cloth to keep out the soot from the locomotives continually passing by. There is a fan to blow in air but even the comfort of the men in summer weather

1. Henry ... - ...field Plant 2/1/38

would require more forced ventilation, and it is quite unfit for use as a decontaminant where poisonous work is to go on.

The method will be the following: Nitrobenzol, which may have to be vacuum-distilled first, will be piped from a tank to a vacuum-treating tank in which the capacitor has already been placed. However, the best results in the laboratory have been obtained by a preliminary treatment which consists in soaking the capacitor in a pan of nitrobenzol and repeatedly squeezing and soaking it until it is impregnated. The nitrobenzol will be run slowly into the vacuum-treating tank and when the capacitor is saturated the heat will be turned off and the fluid cooled down to about 50° C. ~~It is then run into a tank where the capacitors are placed.~~ A table on wheels is then run in and the full pans containing the capacitors are lifted out with hooks to the table. No contact is needed here and care ~~will~~ **can** prevent spilling. The table goes into the next room, the nitrobenzol almost inevitably being splashed out over the metal covered top of the table as the transil oil now ~~does~~. It goes to the transfer tank, a galvanized iron tank about three feet long, 18 inches wide and 18 to 20 inches deep, open, filled with nitrobenzol. The can with the capacitor is placed here under nitrobenzol, the capacitor slipped out, and various slight adjustments made taking about five minutes, all under nitrobenzol. One man would do about 100 two or three times a week. A tin can is then put in and the capacitor slipped into it under nitrobenzol. These tin containers then go to the soldering table which is covered with galvanized iron which has raised edges to catch the drip. The solderers get their hands and arms smeared and their clothing soaks unless it is protected. Possibly this elaborate transfer method may be simplified or eliminated as the system is better worked out I am told, however, that the Schenectady chemists advise them to do it in a big, open tank which, of course, would be even more dangerous.

for washing
The provision even now, when transil oil is used, is inadequate. Ten wash bowls for fifty men are sufficient but the water is only warm and neither soap nor towels are provided nor protective clothing for the men. They tie rags around their arms and also use them as towels, these rags being provided by the Company instead of waste. They should have a bland, non-irritating, liquid soap or soap powder and cotton, not paper, towels, and they should be given castor oil and instructed to ~~anoint~~ **anoint** the hands and arms before work and after washing. In this way they can be protected against the trade dermatitis from which there has been a good deal of complaint.

If nitrobenzol is used instead of transil oil there must be much more than this. Baths will have to be provided; ~~because if~~ ~~nitrobenzol is splashed over the skin the men ought to strip at once and take a full bath using a weak solution of acetic acid to remove the nitrobenzol.~~ The men will have to learn to do the work without getting nitrobenzol on their hands and arms. The problem of protection

Mr. [unclear] - Pittsfield Plant 2/3/28

clothing is difficult because it is not impenetrable and seems
as the nitrobenzol is not as a medicine and is worse than useless

It will also be necessary to have close medical super-
vision of the department by a physician who is either on full time
or makes daily visits to the plant.

This may seem to you an exaggerated forecast of what
will happen if nitrobenzol is used in making capacitors but I
assure you it is not. If you will consult the safety experts
of the DuPont Company or of the Schoelkopf Company in Buffalo,
they will tell you of their experience with this compound and
yet neither in dye works nor explosive manufacture nor in the
making of aniline have I ever seen nitrobenzol handled in as
dangerous a fashion as it is proposed to handle it in Pittsfield.

The lead hazard in the lightning arrestor department has always been a problem, and at this visit I find matters not at all improved, rather the reverse. From beginning to end of the process there is dust, chiefly of the brown peroxid lead. My reason for making the visit at this time was that I have just finished inspecting storage batteries, the largest factory in Germany, the four largest in England and the eight principal ones in this country. Inasmuch as the work in the lightning arrestor department resembles very closely that in the pasting department of storage battery manufacture~~s~~, I wanted to compare the ~~precau-~~ tions taken in the former with those which I found in the best plants of the latter; namely, the Willard, the Prestolite and the one connected with the Union Switch and Signal Company near Pittsburgh.

I am sorry to say that the department in the Pittsfield plant measures up to the very worst of the storage battery plants, the U. S. Light & Heat in Niagara Falls, except that there is a very good ~~condi-~~ tion of washing facilities. But in construction and upkeep the Department is very bad, nor do I see how it could be brought up to modern standards without radical changes. It is impossible to keep the floors dust free, they are so rough, broken and, above all, so encumbered with cases and old tables and other things that dust collects in inaccessible places and real cleansing is out of the question. The use of hand work instead of mechanical conveying and dumping and tamping greatly increases the danger. As a result, the men have no standards of cleanliness; ~~they~~ could not have in such surroundings, and one finds lead peroxide dust in empty pans, all over benches, in heaps on the floor and, of course, covering window sills and other surfaces.

Mr. Crain, who acted as my guide, was very ready to accept suggestions but I found it impossible to make any. The reforms to be worth anything must be very far reaching, and if they are to be undertaken I hope that you will not depend on suggestions from me, but will let Mr. Crain and Mr. L. A. Thompson have an opportunity to visit the Prestolite plant in Indianapolis and see for themselves what can be done for cleanliness and the substitution of mechanical for hand work.

Before leaving the lightning arrestors, I ought to emphasize the fact that Building 41, where pellets of oxide are poured into the porcelain cylinders should be regarded as a lead department because the pellets fly around on benches and floor and there are fine coatings of brown oxide dust over these surfaces. In this same building are the radio arrestors. Colonel Steever had consulted me as to possible risk in this Department from radium--barium chloride. Only four persons are employed here and it would be a simple thing for a physician to discover whether the radium was exerting any effect since it only requires a few white blood cell counts.

Mr. Pratt Page 5 - Pittsfield Plant 6/5/'26

The chemists talked over with me the prevention of poisoning from certain chemicals they are using or experimenting with. I cannot speak too highly of the conscientiousness with which they have assumed the duty of protecting the workmen against these dangers. They have written to various chemical companies for information about the symptoms of poisoning and about the way to avoid the dangers, but this is a duty which should not be left to chemists. It is a medical problem and is so recognized almost everywhere. It is the exception nowadays to find in an industrial plant the chemist in charge of the protection of health. The problems about which they consulted me included: The prevention of trade eczema, from the effect of transil oil on the skin; a situation which Dr. Smith had already dealt with successfully; the protection of the skin against the irritating effect of hexamethylenetetramine; the possibility of aniline poisoning from grinding, melting and spreading on paper on a hot plate, resin containing 5% aniline; and the physiological effects of formaldehyde, phenol, tetraethyle and the possibility of chronic lead poisoning from long continued work in a room with a lead floor.

in Schenectady

A brief summary of this long letter would be as follows: The substitution of nitrobenzol for transil oil will mean the substitution of a poisonous process for one that is relatively harmless. It will necessitate better ventilation, much greater precautions in the handling of the fluid, more abundant washing facilities and careful, constant medical supervision. The lightning arrestor department is poorly constructed and the work carried on in a way and under conditions which constitute a continual hazard. The changes needed here are fundamental, including the introduction of mechanical processes for hand work. Building 41 should be regarded as a branch of the lightning arrestor department and treated accordingly. The problems of industrial poisoning are greater and more complicated in the Pittsfield works than in any other works of the General Electric Company, yet this is the plant least under medical supervision. Even a small lamp works employing 300 girls in non-poisonous work has more medical supervision than Pittsfield has.

I have written very frankly as you see because Mr. Swope has always urged me in my reports not to mince matters but to say exactly what I think. I hope you understand that my criticisms have been based, not on an imaginary standard, but on the practice of the best industrial establishments with which I am acquainted.

Very sincerely yours,

AH/AKR.

June 10, 1925

Mr. C. C. Chesney
PITTSFIELD

Dear Mr. Chesney:

I know you will be interested in the attached report from Doctor Hamilton in regard to the Pittsfield Plant. I am glad to see the progress that has been made and haven't any doubt you have in mind bringing all of the work up to those standards.

Yours very truly,

GERARD SWOPE

GS:H

H

Pittsfield Manufacturing Plant - May 15 & 16, 1925.

This was my first complete visit to the Pittsfield Works, for in the spring of 1923, when an investigation was made by the Harvard group of physicians, my attention was turned only to the relatively small number of departments in which poisons are handled. The report which was sent by this group to the General Electric Company contained certain recommendations and suggestions with regard to specific features in connection with manufacturing processes and also more general recommendations with regard to the medical service in the plant. The specific risks consisted in the use of red lead in the manufacture of lightning arrestors, the use of benzol in some departments, offlead paint in spray form and the exposure of sand blasters and porcelain workers to silica containing dust. The more general recommendations concerned the organization for the care of the health of the employes, which was found to be inadequate and not based upon the principles of sound industrial medical practice.

In this visit I have tried to cover the same ground as was covered by the Harvard group two years ago. In general it may be said that there is a distinct improvement in the matter of industrial poison and dusts. The lightning arrestor department is much better. The filling benches are now equipped with grated tops opening into suction pipe which draws down the dust. There is also suction at the spinning machine. The men who have the dustiest work, filling the pans from the bins and carrying them to the benches, do that sort of work only one day in the week. The floors are washed with the hose twice a day and although they are impregnated with red lead, they are not dusty. The benches, especially those on which the fillers stack their finished material, have too much red lead dust and should be cleaned oftener and probably with water. A new bathhouse is to be built, the present one

being considered inadequate. The management provides clean, washable union suits and overalls which are kept in a separate room and are laundered by the Company. The men in this department are sent once a month to Dr. Tracy at Hillcrest Hospital for examination and no case has developed, according to his report, for a number of months. I think that under this system it should be entirely possible to protect these men against anything but a mild and early stage of lead poisoning even though they are engaged in lead work which is distinctly more dangerous than the average.

Sublimed blue lead paint is sprayed by men who also are examined monthly for lead poisoning and who work with a sponge respirator to protect them from breathing droplets. Nevertheless, it would be better to apply the paint from a hose as is done in Erie.

Very little benzol is used. Formula 187 paint contains benzol, but it is used only in the machine shop where small parts are built.

A visit to the new porcelain works shows that there is very little danger there from breathing flint-containing dust. Only three men weigh and mix the flint for the body and glaze and work only about an hour a day at this job. The dust in connection with the finishing work is carried off by a very good exhaust apparatus. Dry sweeping at the end of the day is doubtless very dusty, but wet sweeping is impossible, because of the slipperiness and the sweepers are given respirators. They are planning to use vacuum cleaners. The exhausts for glaze spraying and for paint spraying are excellent.

There is much more danger of dust in sand blasting. This is done with the usual Pangborn equipment in a room with a slotted floor and exhausts and the men are obliged to work in the room for it is said that the castings are too large to permit of using the Fort Wayne closed chamber with the turntable. They are experimenting with

the Burrell mask with which they are very favorably impressed. It would be a great improvement if they could introduce the shot blast equipment which is used in Erie and Schenectady, instead of the sand blast and the hydraulic method of shaking out castings, which was devised in Erie. Whether this is feasible or not I am quite unable to say. At present the men from the sand blasting department are examined monthly and at the end of six months they are shifted to other work, even if the doctor's examination has revealed nothing in the way of a lesion in the lungs. This seems to me rather drastic, and I hope to see the system supplemented by one which does away with the source of trouble, the sand dust.

In commenting on the medical service it must be said that our report of March, 1923, still holds good. It is still true that the problems of industrial medicine and hygiene deserve more serious attention than they now receive. Although much thought and care has been given to accident prevention and to the general welfare work, such as education and recreation, a more extensive and effective organization of medical service should be introduced. Surgical care for minor and major injuries seems entirely satisfactory, but no attempt is made to deal with illness or to carry out a program of preventive medicine, except in connection with the periodical examination of the groups of employees mentioned above.

The so-called emergency hospital is lamentably small and inadequate. It consists of three rooms only. The first is a waiting room for men probably large enough. Into it opens a small surgical room for men and next to that, opening directly into it, is a tiny room for women which must be used both as a waiting room and a room for surgical dressings. These three rooms must serve 6500 employees with an average

107 cases a day. During the last month, April, 1925, there were 659 new accident cases and also 33 compensation cases. In 25 days 1837 dressings were made and 95 eye cases were handled by the nurse. During this same time 143 cases went to the hospital and 30 eye cases were sent to the oculist.

If a sick girl comes to the "emergency hospital" she must go to the room in which surgical dressings are going on and where she must see those that are going on in the men's room also, for the door is always open, since the nurses must pass back and forth between the two rooms. There are two chairs in this room and one cot in a corner. There would not be space for any more furniture. The only toilet room opens directly into the men's surgical room. The nurses have to go to the floor above. The surgical room for men is very small and crowded. There are three trained nurses and a young girl assistant and there is also a Visiting Nurse. One of the three nurses is not employed in the dispensary, but is in charge of a little branch first-aid room where she takes care of minor injuries only. The Visiting Nurse, however, helps out with surgical dressings for the first hour of the morning.

Very little illness comes to the dispensary. During April 75 women out of the 800 employed came to ask for medicine, Only 68 men out of 5700 employed. The nurse deals with these cases as well as she can. The women come chiefly for menstrual difficulties for which the head nurse gives them a proprietary medicine. She says that she cannot talk to the girls and give them advice, because there is absolutely no privacy. As a usual thing people who are ill go home without seeing anyone in the dispensary.

The medical work of the porcelain factory is under the same management and the Visiting Nurse makes a daily trip for surgical

dressings. She works in an inside corner of the main room behind a screen where there is a small sink with cold water, an old table and a chair. It is recognized that this is a very poor provision for her work and she has been promised better quarters and a good equipment. The nurses connected with the Pittsfield Works seem to be giving admirable service under^a very heavy handicap.

There is surprisingly little provision for the comfort of the 800 women employed in the Pittsfield Works. That the seating is poor is not to be wondered at, because the same thing is true of all the manufacturing plants, and the question will have to be carefully studied by the General Electric Company before it can expect any of the individual plants to introduce reforms on an intelligent basis, but the lack of rest rooms in the Pittsfield Works is striking as compared with the other manufacturing plants and does call for prompt improvement. Women are doing a good deal of work in some of the departments which requires standing all day and in some cases, as in winding transformer reels, they stand most of the time on one foot pressing the treadle with the other foot. Another fatiguing piece of work is the punch press for which the woman is obliged to sit poorly on her high chair pressing down to one side all the time. The foot rests are of all kinds, not apparently planned with much thought.

It is true that the majority of the women go home at noon, but in other plants, where the same thing is true, the cots and easy chairs are used by tired women who ought to be allowed to rest if they wish to. These are a few instances of the scanty provision which is found in Pittsfield. In Building 43, 200 office girls have one small room which contains 5 water closets, 6 basins, a cot, one easy chair, and 2 straight chairs. The factory girls, 100 to 250, are better treated for they have a good wash room with adequate facilities and a tiny

room adjacent which, although it has nothing but a cot and three straight chairs, is at least separate. There is another room for 129 office girls, about 10'x 10', but a raised place on the floor takes up part of this scanty space. This room has four toilets, four basins, a cot, two straight chairs and one old easy chair. About fifty girls from the blue print room belong in this group and they must come the whole length of the building and down a flight of stairs to reach a water closet. In Building 5 are the women who wind reels, standing all day and using the treadle. They have one cot and one easy chair in the room which contains the water closets and wash basins.

The usual objection to providing rest rooms for women employees is that it would encourage loafing, wasting time, but this objection would not have any force in Pittsfield for there is already a matron in charge of each one of these little wash rooms. These matrons seem well selected and they could certainly take charge of much larger premises.

My suggestions may be summed up as follows:

A stricter standard of cleanliness in the lightning arrestor department.

The substitution, if possible, of the shot blast for the sand blast.

More adequate medical care.

Better quarters for the dispensary.

Better and more numerous rest rooms for the women.

I should also advise the management to cooperate with the management of the other manufacturing plants in working out a proper program for seating women employees.

GE MUSEUM 00114

Albi Hamilton

Harvard Medical School.

gent Improvements" - Continued.

(considerable exposure to #10), Pump Room west of #12, 13-C, 13-E, Platforms at 23 and 28, in Instrument and Measuring Rooms in #18, in Addition to Office at end of Gallery and under Storage Deck near center stairs in #16, under wood ceiling in Driveway between #22 and 23, two heads outside of partition of new Test Room in #27, in 29-E (contract let), under Platforms Tower of #28 and one extra head in small section of Office of #29. Sprinklers under the Gallery of #16 are too low (deflectors 24 to 25" down). Lines should be raised. Sprinklers now shut off in winter in #23-B and 24-B should be on a dry pipe system. Much of the above work has already been ordered.

- (3) Provide shields in #8 to prevent hydrogen flame from large Brazing Furnaces coming in contact with combustible material.
- (4) Provide fire curtains in #16.
- (5) Make enclosures at stairways in #14, 23 and 26 double boards and complete (openings between stairs and windows would now present ready passage of fire from the first to upper floors). Plain glass in doors should be replaced with wire glass (It is understood wire glass has already been ordered for all stairway doors throughout the plant).
- (6) Provide non-combustible enclosures and drains from the enclosures for inside transformers where outside locations are not feasible.

nor Improvements"

- (a) Protect wood partition in #12 against open gas flame (Understood to have been done before inspection was completed).
- (b) When extinguishers are next charged, provide tags showing date of charging (To be done).
- (c) Provide extinguisher near moving picture machine temporarily located in Room 527 of Building 5 (to be done), and enclose machine in metal booth when permanently located.
- (d) Replace missing sheet in fire curtain at north end of #12 (To be done).
- (e) Replace wood door at Cable Tower Building #5 with fire door (To be done).

neral Remarks"

Two ordinary cans of gasoline noted in #12 were removed during inspection.

A few fire doors need minor repairs and some attention to provide for prompt automatic closing.

A number of Foamite extinguishers and 40 gallon engines are in use.

Sprinklers are shut off in winter in #27 Loading Shed, #23-B including Box Shop, B, Bridges between #26 and 28 and at rear of #5, Monitor #29-A and Excelsior Stairs at #12.

her Unsprinklered Rooms"

Stair Towers, Vaults, Automatic Telephone Rooms of #2, 4 and 6, #22-A, 23-A, 25, presser Room at #7, 1/2 of #13, 1/2 of #13-C (all non-combustible) and #30-C (to be removed).

cent Changes"

Storage of moulds is being removed from lower story of Building 30 and this or will be used for a Tin Shop.

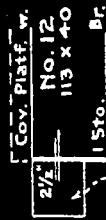
A small Metal Cutting Room has been erected south of #12 and sprinklered (innell heads) by Mill pipers. Work is good except that two hangers should have been provided on the end lengths.

A new story is being erected on a part of Building 23 (Sketch). It is stated work will be an extension of the work in the floor below (Sketch).

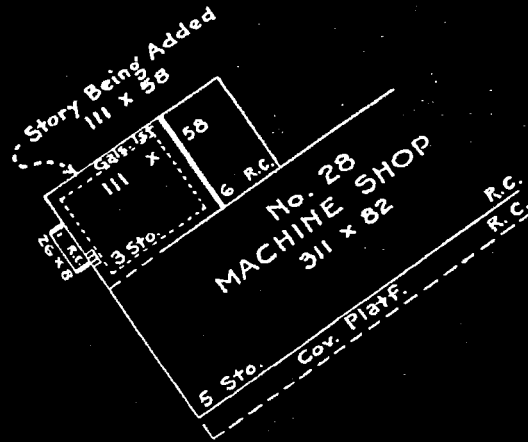
ght Work"

283 men throughout manufacturing departments five nights a week.

(Sketch)



SHEAR SHED
28 x 28
1 Sto. M.L. & P. Wd. Fr.



Index No. 25025
GENERAL ELECTRIC CO.
"EAST YARD"
Schenectady, N. Y.

Drawn Oct. 17, 1923 Scale: 1 in. = 100 ft.

To accompany report of
W. B. Plumer dated Sept.
26 to Oct. 4 inc., 1923.

IN DEPARTMENT
1890.
ry Mutual
nce Companies,
Distance Tel.
ain 4314.
BOSTON, MASS.

RECOMMENDATIONS REGULAR INSPECTION.

Factory of General Electric Co., et al.

Index No. 23026

"West Yard,"

Inspected by Wm. E. Plumer

Oct. 1, 2, 3, 5, 6
on 8 and 9, 1923.

Hours Time in Mill Yard 44
After Insp'n Mr. Story, Asst. Sec'y
conferred with Mr. O'Connor, Fire Chief.

Schenectady, N. Y.

Grinnell Glass, Mfrs. and Esty.

IL ORDER and NEATNESS—Neglected. Fair. Good. Excellent.
us'le Waste Stock—12 removed before night. Floors—oil soaked.
ASTE—Neglected. Well cared for. Receptacles—Scant. Poor. Good.
S, Etc.—Too many. Mostly disorderly. Neat.
AM PIPES—Examined. Combustibles in contact. All clear.
Leating pipes,—Mostly all, at side, overhead.
ED DOORS—Pattern—Defective—Fair—Good—Self-closing.
More needed. Repairs needed. In good repair.
ORS, STAIRS, BELTS—Cut-offs at floors—Poor. Fair. Good.
ILLS—Supply scant, good. Neglected. Well filled.
HOSE—In Throughout important buildings.
SE—Condition suspicious. Good. Supply—scant. ample.
ined. tested. apparently good.
S—Supply scant, good. Mostly All, poor, good.
RS, Fire-axes, Bars, Ladders, Straps—Supply scant, good.
RE BRIGADE—Unorganized. Undrilled. Osgood. Drilled.
ble Efficiency: Doubtful. Fair. Good.
IAN {Service & record}—None. Poor. Fair. Good. Round-made.
HEN—In yard available for fire. 70. 720. Both yards.
NS {Watch & repair}—Open. Risky. Fair. Good.
-Kerosene. Gas,—retort, gasoline. Electric—insured, arc.
IC EQUIPMENT—Old style. Modern. Poor. Fair. Good.
IL Gasoline or. Well arranged. Dangerous.
TEAM FIRE ENGINES—2 in 10 min. 3 more in 30 min.

AUTOMATIC SPRINKLERS—Grinnell Glass, Mfrs. and Esty.
Fed from: Tank Pump. Auto. gov'n'r. Priv. reserv. Public mains. Shut off.
Pressure: on highest spr. lbs. from Pub. Supply, Priv. Resv. 42 lbs. with
On highest sprinkler. 12 lbs. from bottom of Tank or tank full.
Shut off in winter—None. Shut off in Remarks. Mainly.
Valves shut in winter: Location poor. Doubtful. Convenient.
Dry Pipe System. Grinnell Story. - Remarks.
(Kind of Dry Pipe Valve.)
Arrangement of Pipes: Poor. Fair. Good. Improper circulation.
VALVES—Examined. All inside sealed. All found open.
Inspection Records: 1,036,000. Poor. Fair. Good. nearly.
TANK or Private Resv. 1,036,000 gals. empty. 85 lbs. at yd.
Used for: M'fg. Toilets. Spe. Duty. Hyds. giving. 85 lbs. at yd.
YARD SYSTEM—Outside shut-offs on all pipes over 2 1/2" enter'g bldgs.
YARD HYDRANTS—Con. to Pub. Supply. Old styled dry. Frost proof.
All examined. Tested. All apparent good order.
FIRE PUMPS—Used objectionably for mfg. Power nights & Sundays.
Started how often? Weekly. Turned over to day.
PUBLIC WATER SUPPLY—Direct pump press only. Gravity delivery.
Not connected into yard. Gate kept shut. Obstructed by meter.
Diam. Main into Yard, 8" 8". Diam. street main, 8" 8".
Special fire pres. lbs. Ord. pres. by day. lbs. Tested.
PROB. NO. GOOD 1 1/4" STRMS. all sources (pmp. pubic. & res.) capable of
taneously furnish at any point in yard (first alarm only). 8-15

In addition to the general report bearing this same date, a copy of which has already been sent you direct from the Inspection Department, the following recommendations were also made by the Inspector regarding improvements which were in his judgment desirable.

Your consideration of these points is invited.

If you see a better remedy, or if there is good reason for delay, or if your own judgment is different, kindly favor us with your comments.

CORRESPONDENCE REGARDING THIS REPORT TO BE ADDRESSED TO

GE MUSEUM 00118

(1) Provide sprinklers under Platforms upper story of #40, in #40-A and 40-B, in roofed over space between #42-B and 42-A, in Flour Store Room in Basement and new room on roof of #48, under Platform at oil switches in #52, also in Measuring and Transformer Rooms in #52 (or better, replace these rooms with non-combustible construction), outside of new Office, one head in Oil Separator Room and three in unprotected pockets in "Stock Room for piping turbines" in #60, one head outside of Office partition and one under Fan Platform in #64, in Vacuum Pump Room between #64 and 64-A, outside of Laboratory partition, one head outside Office partition and under enlarged Platform in #60-B, under Air Compressor Room Platform in #64-A, in 66-B, under Platforms and four extra heads in Office of 70-J, in (See other side)

1-2-1/2" Open Hydrant Butt. 74 - 37 1,000 Gauge on Hydrant near Subway.
90-1-1/8" Pumps running 80 74 2,900 50 C.R.L. Gauge on Hydt. 8 of Bldg. #50.
90-1-3/4" Pumps stopped, 62 47 4,185 6-1-2/4" 48 Tests made by Knodle 6/6/23

ION.	MAKE OF PUMP.	SIZE.	RATED CAPACITY. Gals. per Min.	GREATEST SPEED TRIED Revs. per Min.	NO. OF STRMS.	SIZE OF STREAM.	WATER PRESSURE. Lbs. per Sq. In. At Pump At Hydt.	LENGTH OF HOSE. Feet.	SIZE OF HOSE.	KIND OF HOSE.	APPROX. BALLONS DELIV'D.	SMOOTH-NESS OF ACTION.	GENERAL CONDITION.
-S.	Worth. Und. Ample	20x12x15	1552										
-S.	Worth. Und. Ample	20x12x15	1552										
-S.	Worth. Cent. Steam Turbine.	2-Stage	2000										
-M.	Worth. Cent. Steam Turbine.	2-Stage	2000										

Two 7,000,000 gallon electrically driven Alberger Centrifugal Mill Use pumps maintain 80-85 lbs. on yard system with overflow to Tank. Pumps at 225025 connected.
Directly friction, sliding r. Direct conn. Turbines.
All steam properly contr. in Boiler & in 100% Boiler feed reliable.
Not liable to obstruction. Section is reliable.
One valve is on discharge inside outside.
If possible, with 1 1/4 inch smooth nozzle, if fine nozzle is used, subject to loss from boys in recording size of stream. In Public Water Trials give largest number of streams tested first. Ge.

"Urgent Improvements" - Continued.

Laboratories in #70 (can supply from fire hose system), under Platform at 70-B, in Coal Storage Room, under Platform near Dryer, and extension to Intermediate Floor southwest corner of #68 (being installed in latter location), in new rooms and passages between #68 and 68-A, complete the installation in 70-E (connection now in), in Addition to 72-B, in 76-A, 76-E, 51, over Elevator and in one unprotected Bay 2nd story of #69 Addition (Mixing Room), also under Platform northeast side of #69 3rd story, in top of hand hoist near North Tower and where Office partitions in the upper story interfere with sprinkler distribution. Sprinklers should also be installed under Fan Platform and in new Monitor of #57, under floored over Passages, between storage racks in Stock Room of #73, in Calibration Room in #77, under Platform in #89, one head in Office Extension in #95, under Galleries at Ovens in #65, in 69-G and in New Addition to #45 and 50 Annex Addition. Orders have already been given for quite a little of the above work. Contract understood to have been let for sprinklers in Additions to #85 and 109, also in Pattern Store Houses and 40-B.

Sprinklers should be replaced in the Passage between #77 and 77-C and in the South Section of #105 (To be done). The Platform in the northwest corner of #49 should be sprinklered or the under side of the Platform thoroughly fireproofed. Four 360° sprinklers in the Tool Room (Form Department) of #40 should be replaced with lower degree heads.

- (2) Advise emergency overflows for dip tanks in second floor of #40 and for Quenching Tanks in #105, also advise Foamite engine for latter location.
- (3) Enclose Elevator 3rd to 4th story in North Section of #69, provide enclosure or hood for stairs (2nd floor level) in Mixing Room Addition to #69 and improve cut-off at stairs in #44.
- (4) Advise fire cut-off between Building #109 and the Addition to be used for Wire Enameling, providing fire door and bricking up windows or providing wire glass in metal frames (To be done). Also provide fire door at south end of #64 (To be done).
- (5) Advise fire curtains in Building #49.
- (6) Advise enclosing large inside Transformers where outside locations are not feasible in substantial non-combustible walls and, where use is more or less continuous providing drains from enclosures to the sewer.
- (7) Provide higher and more complete dike at above ground fuel oil tanks and carry dike inside of Pump and Valve Room. Latter room is said to be not needed and will probably be removed (To be done).

"Minor Improvements"

- (a) Provide drop shutter at #73 end of conveyor enclosure between #69 and 73 installing fixed filling piece at bottom extending up between the rollers (To be done).
- (b) Advise wider space between Box Shop #76 and lumber on west side and south end maintaining at least 50 ft. and preferably a wider clear space (Building now considerably exposed and hydrant blocked).
- (c) Protect (all) all pipes where exposed to breakage, notably in #42, 66, etc.
- (d) Provide metal containers for waste material in place of barrels in upper story of #69 (Mix. Room) and metal cabinet for oils and varnishes in #70-J (To be done).
- (e) Deck or Platform in the upper story of #68, said to be no longer needed, should be removed or sprinklered.
- (f) Suggest that consideration be given to enclosing the two rooms used for varnish and paint spraying and paint mixing in Building #77 with a light non-combustible partition.
- (g) Suggest hose connection headers for steam pumps in #61.

(Continued)

"General Remarks"

The two tanks for benzol, mentioned by the last inspector, have been buried east of #75 and north of #67.

The large amount of construction work and lack of help has resulted in an accumulation of more or less old material at a few points and attention will be given to cleaning up.

Several indicator posts are operated with considerable difficulty and the main gate on the 20" tank discharge could not be moved. The latter valve was loosened up before inspection was completed and others will be given attention.

The north steam pump in #61 showed excessive slip, but the loss may possibly be due to leakage through the valve on the discharge pipe.

Sprinklers are on the dry system in #42-A, Platform at #50, Sheds east and Platforms west of #52, #77-A, #101-A and Platform at #105.

Sprinklers are shut off in winter in Mica Room, #69-F, #49-B, Sawdust Hoppers and Paper Store Shed at #80, Monitors of 60-G and #80, first floor of North Stair Tower and Platform of #69, Shaving Bin at #41, Sand Shed #42, Passages #72 to 72-B, Bridge #46 to #50, Oil Room at #64, Searchlight Tower in #46, Toilet and Babbitt Room in #97, over Ovens in #91 and, in extreme cold weather, in Building #71

"Other Unsprinklered Rooms"

Clay Bins at #68, #53-A, Passage under #56, part of #72-B, Boiler House and Condenser Room adjoining #60, #60-E, most of #61, #63, 73, Die Storage at #77, #95-B, #64, Lime Rooms, #70, part of #70-A, #228, 260, Towers of #46, 56-A, 68, #93 Extension, #60 Annex Extension (non-combustible construction).

"Recent Changes"

#41 has been vacated and is being remodeled for an Office Building. A Stair and Elevator Tower is being erected at the south end and a new Toilet Tower on the west side. A few sprinklers are disconnected and the south standpipe shut off due to construction work.

Building #40-B is being erected between #18 and #40, one story with a concrete and steel trussed roof. Connections for sprinklers have been installed and the connections to Building #40 relocated (See Sketch).

A small roof house is being built on the roof of #48 Wing, to be used for a Dining Room.

Patterns have been moved out of the two lower stories of Building #53 and these stories are to be used for manufacturing. An Elevator and Stair Tower is being built at each end of the building. The Stationery Department has been located in a part of the upper story.

The Addition to the Dispensary at #45 is nearly completed and is to be sprinklered.

A Vacuum Pump Room has been built between #64 and 64-A, one story brick and roof plank on steel beams.

The Extension to #60 Annex is completed and occupied and it is understood that sprinklers are to be installed.

The Extension to #85 is nearing completion and pipe is on the ground for a line east of the building for hydrants and sprinkler connections.

Pattern Shop #99 is completed and occupied. Sprinklers are installed except in Toilets and the small Office. Yard pipe and connections to sprinklers are being laid. An exhaust system for shavings is to be provided. Sprinkler work and yard piping are being done by the Grinnell Company and, as far as completed, appear to be satisfactory. Sprinklers have also been satisfactorily installed by the Grinnell Company in Building #66. It is probable that a high temperature head will be needed over the oil-heated furnace. The building is partly occupied and a fire wall has been provided at the south end of the one story section.

The Pattern Storage Buildings west of #99 are completed and partly occupied. Sprinklers are to be installed. The underground pipe is being laid.

The North Addition to Building #109 is completed and occupied and connections for sprinklers have been installed. The sprinkler work will be done by the Grinnell Company.

(Continued)

GE MUSEUM 00120

"Recent Changes" - Continued.

The Southwest Addition to #109 is to be used for Wire Enameling and a few of the enameling ovens are being installed.

Small hose has been replaced in Automobile Storehouse #225.

All pumps, motors, fans, etc., formerly in Building #75, have been placed outside. The mixing tanks are filled through fixed pipe, but four tanks are still filled with the covers open. Change promised to provide for filling with the covers entirely closed.

"Night Work"

720 men throughout five nights a week.

(Sketch)

C O P Y

Erie Manufacturing Plant

October 3, 1923.

The report concerning this plant is favorable so far as any serious menace to health is concerned. Whatever criticisms are made concern the use of certain possibly harmful substances, the medical supervision and care, the seating provisions for women, the provision of rest rooms for women, the distribution of washing facilities, and minor faults of ventilation and lighting. All these assume greater importance in view of the large number of employees, some 6300 in all with 600 or 700 women.

The industrial poison which is used in such a way as to make it a possible danger is benzol. The substance known as 211 which is used by girls on the first floor for building 6, taping field coils contains, I was told, benzol. On the second floor eight girls use benzol in mica pasting, and thirty girls use it in wrapping coils with varnished cambric. No one in charge seems to recognize the risk involved in this sort of work, and there is no sign that any particular attention is given to these girls nor that there is any likelihood that an early case of benzol poisoning would be recognized and properly dealt with.

Less serious is the use of wood alcohol in the pattern shop where about five men or boys apply shellac containing wood alcohol with a brush. The room is large enough to provide a good deal of dilution of the alcohol as it evaporates in drying. There is good natural ventilation and the exhausts which carry off the shavings act as air removers also, nevertheless it would be better to substitute denatured alcohol and I was told that this would be quite possible.

The naphtha fumes in dipping armature coils are very heavy, but only two men are employed there. Naphtha is also used as a thinner for 459 and 460, and the dipped objects are dried in the workroom. In both these cases it would be well to provide better removal of the fumes, for naphtha, although not nearly so poisonous

as benzol, is capable of setting up a condition of chronic ill-health.

The protection given the men against the dust in sandblasting is unusually good. They wear a Pangborn sandblast helmet which keeps out much of the dust. I found fine sand inside the helmet but was told that the men wear a respirator with a sponge, as well as the helmet, and that they work only four hours in half hour shifts. The brass foundry also is superior to most, the crucibles being in what is practically a separate room, although the pouring is done in the large workroom. Probably in winter the ventilation will not be adequate as it depends entirely on natural drafts.

About one half of the women must stand at their work. The seats which are provided are for the most part poorly selected, too high, and not provided with proper foot rests. I have already referred to the ventilation in connection with brass pouring and the use of compounds containing naphtha. There is a particularly bad place in the center of the second story of Building 6 where eight girls were putting varnish on mica tape. A strong odor of benzol was recognizable here and because the work is so placed a good many girls who are not handling this varnish are forced to breathe benzol fumes.

It is the first time that I have visited a plant of the General Electric Company which did not furnish for its women even the usual provisions for comfort. Without exaggeration, it must be said that a girl who is tired or ill is not given even the barest comforts. These are the conditions I found in the various buildings; Building 6 (this is the building with the pattern shop on the first floor, I may have made a mistake as to its number, has only one hard couch with no pillow or cover, in a very forlorn room on the fifth floor, which is supposed to suffice for three floors with 75 to 100 girls on each floor. It must be remembered that about half of these girls stand all day. There is not even one chair in the toilet rooms or rest rooms. One girl who had an attack of abdominal cramps was found lying on some newspapers on the cement floor of the second story toilet room because she felt too ill to go out of the building across the street to the medical department, and the couch on the fifth story was little

better than the floor. The impression made by all of the rest rooms in Building 6 where 400 women are employed is that the management wishes to discourage the girls from using them. The walls are bare, the windows dirty, the floors rough, the girls' clothes hang in the open. Even the room on the second floor for office help is very shabby and ugly, but it is better furnished, with five rocking chairs, six straight chairs, and one hard cot covered with a thin cotton pad and with a dirty lumpy cushion for a pillow. This room serves twenty-five girls. In Building 10 there is a bare, ugly rest room for fifty girls which has nothing to recommend it except that there are fourteen rocking chairs and three couches, but the latter are hard, have no pillows, one has not even a head rest, and no blankets. Building 14, with about 125 girls, has two long, narrow rest rooms, both very crowded, with bare cement floors. The walls are covered with the girls' street clothes and coats, and the four rocking chairs take up practically all the free space. Next to this room is a little inside room with two rocking chairs and a hard leather couch with no pillow or blanket.

The toilet rooms are all excellent and the provision is more than adequate in every case. The wash basins are poorly distributed. For example, I found one basin for five girls; one basin for ten girls; one basin for 12 $\frac{1}{2}$ girls; one basin for 20 girls. The two last do not comply even with the requirements of the Department of Labor of Pennsylvania, for 100 girls should have 7 basins instead of 5, and 25 girls should have three instead of two. Mr. Delack explained this curious distribution of basins as being caused by the continual changes going on in the plant, with a shifting of the women employees from one floor to another.

The Welfare Department is housed in a small separate building near the gate and seems to be far too small for its purpose, but I cannot speak positively for I did not visit the plant at the hours when this department is busy. A still smaller frame building houses the Medical Department which includes a full-time

doctor, a non-medical assistant who makes the physical examinations, a first-aid man who does the dressings and the minor surgery and eye work, and a trained nurse.

The first room is very tiny, used for physical examinations which are made by a man without medical training although he has had seven or eight years experience. He examines about 35 men a day, sometimes 100, calling in the doctor in case of doubt. He seems to know his job well so far as it is a job requiring common sense, not medical knowledge. He has instructions from Schenectady as to rejections for physical defects, but evidently follows his own judgment. The man who applies for work comes with a card telling just which job he is to have, and all transfers to other jobs must take place through this department, a better arrangement than obtains in most of the manufacturing plants. On the other hand, men who are laid off or absent on account of sickness need not report here unless the absence was more than eight weeks.

There is a small waiting room for the men who come for examination, and beyond this is a larger room in which practically all the medical and surgical work for more than 5,000 men is carried on. The patients sit on one side of the room, and behind a screen at the other side the surgical work is done. I found a man nurse in full charge, as the doctor was in Buffalo attending the National Safety Council. This nurse seems a kindly and faithful person, but quite untrained, especially untrained in the first principles of aseptic surgery. Indeed, it would be impossible to do aseptic surgery in that room. There is, indeed, a sink with hot running water, but the soap machine is of the wrong kind, there is no scrubbing brush for hands, the plumbing is old, the sink is used as a table for dressings, the only sterilizer is old, rickety and rusty, the instruments are half rusty, and the floor made of some rough composition, could be kept clean only by repeated washings. Even the chairs have lost their paint, and the waste cans are dirty. Yet, here come all the accidents and this first-aid man handles an average of 100 cases a day. He also takes charge of the eye cases, over 2,000 in six months. He averages 17 minor and 3 major cases every day, these being new cases, not retreatments. A major case

means one requiring the use of cocaine and more than one treatment. Cocaine and atropine are entrusted to this man nurse. The room in which the eye work is done has no running water at all, and it seems too much to expect that a nurse as busy as he should go to the sink in the next room after each case.

In the tiny office for the doctor there is a narrow bed which could be used for a serious accident case, but such cases must be taken four miles to the city hospital for they could not be kept over night. There is an adequate X-Ray room and a small, clean, properly equipped operating room with a good sterilizer, but only serious emergency operations are taken to this room and the sterilizer is not ordinarily used; they use the old one in the dressing room instead. Dr. Little is apparently a homeopathist, at least the remedies in his office are homeopathic.

The women's department is better, although not nearly up to the standard of the General Electric Company. It is, however, clean; there is new lin oleum on the floor of the waiting room and all the vessels and furniture and plumbing are new and clean. The only provision for sick girls are two beds in a stuffy corner, screened by white curtains. Mrs. Humphries, the trained nurse, says that these are quite sufficient to meet the demand of the 600 women, and this is probably true for the building is too far removed to be easily reached by a girl in pain. There is a small waiting room for the girls separate from the dressing room, and the latter is fairly well equipped except that there is no sterilizer and the old one in the men's dressing room is the only one that can be used. Mrs. Humphries is in entire charge of more than 600 women and, in addition, is supposed to examine applicants for employment. She tests their eyes, looks at the throat, listens to the heart through the clothing, and accepts them not for any specified job nor does she have anything to do with transfers. She takes charge of eye cases as well as other injuries. The first-aid man relieves her when she has to go off for any reason, and he helps out in emergencies.

The accounts which were shown me of the expenses of the Medical Department include the salaries of Dr. Little, Mrs. Humphries, John Newbeck, the first-aid man, and Dr. Little's assistant who makes the examinations of men. They include the supplies, the fees of outside doctors called in consultation, and the expenses incurred at the city hospital. They seem to me very low, especially in some departments. I have condensed them as follows:

Bldg. 10. For 35 weeks \$2318. or \$3708. for year. Locomotive and engine dept. 1236 employed, making \$3.00 per capita per year.

Bldg. 6. For year, \$2182. 1620 employed. Motor dept. with 600 women, making \$1.36 per capita per year.

Bldg. 5. For 35 weeks \$190. or \$281.84 for year. Turbines 450 employed, making \$0.62 per capita per year.

Malleable Iron Foundry. For 35 weeks \$2118. or \$3146.50 for year. 450 employed, making \$6.99 per capita per year.

Brass foundry. For 35 weeks \$59.00, or \$88.36 for year. 68 employed, making \$1.29 per capita per year.

Grey Iron foundry. For 35 weeks \$5440. or \$5110.56 for year. 500 employed making \$10.22 per capita per year. This large sum is explained as due to a severe crushing abdominal accident with almost fatal injuries. The man was in the hospital many weeks and is still under treatment.

Pattern shop. For 35 weeks \$127. or \$188. 24 for year. 132 employed, making \$1.42 per capita per year.

Total yearly expense in these departments, \$14705.50. Total employed 4456, making \$3.30 per capita per year.

I should suggest a reorganization of the Medical Department, bringing it up somewhere nearer the standard found in the National Lamp Works, or at least up to the standard in the manufacturing plants of Fort Wayne and Baltimore. This could not be done without providing much larger quarters and a new, modern equipment, nor could it be done without employing more trained personnel. At present the staff is so small that practically nothing can be done except first-aid work and even this not of a high standard.

The rest rooms for the women should have cots, with springs and mattress

and pillows and blankets or soft couches, and the rooms should be made a little more cheerful; easy chairs, enough to allow as many girls to rest during the hour as may wish to, should be provided.

At least one person, preferably a physician or a trained nurse, should be continually visiting the different departments of the plant so as to become familiar with all of the processes and all possible health hazards. He should be familiar with the nature of every job and should be able to help in selecting an applicant for any given job. The seating arrangements should be intelligently studied and an effort made to provide every woman who can sit at her work with a comfortable chair and foot rest and to see that women whose work requires them to stand have an opportunity to sit down for a few minutes now and then.

The Cleveland Wire Drawing Works.

The nature of the work in this plant makes it impossible to have conditions as pleasant as in the lamp works. It is for the most part clean and dust-free as possible, and the ventilation is good except in the room where graphite cleaning is done at one end and shipping at the other. In spite of the supply of air through pipes in the ceiling, this room is hot.

The wire-drawing room is dark, the window panes painted dark green and the entire dependence is on artificial light. Those provided for the individual machines are good with proper shades but there is some glare from the lights in the ceiling. I wonder why it is necessary to shut out the daylight from this department. The ventilation of the room is very good, and the arrangement for seating the girls on moveable chairs seems very good and comfortable. The swaging room is hot and full of jets but there is ample space and ample window ventilation so that there is probably no need for any criticism.

Of the various chemicals used in this plant, the ammonia and the hydrochloric acid seem to be managed in such a way as to obviate any danger. Tungstic acid is, so far as I know, harmless, and this leaves only the sodium hydrate and metallic mercury, the handling of which is not as careful as it should be. The former comes to the plant in powder form in large drums. The workmen must empty this drum through a rather small opening in the head into a tank containing water. It would hardly be possible for him to do this, especially to get out the last of the powder, without any splashing, and splashing caustic soda solution may give rise to a serious accident. As a matter of fact, they have had

one eye injury already. I should suggest emptying the caustic soda fi into the tank and later adding the water in such a way as to avoid any splashing.

The mercury is used in the graphite cleaning department, and, as I understand, it is possible to so handle it as to prevent any risk of mercurial fumes in the air. But the pouring is evidently carelessly done for globules of quicksilver, small and large, are scattered all over the benches. The benches are cleaned every night so that what I saw represented the accumulation of the first hours of the morning, for I visited the room at ten o'clock. There are 16 persons in this room, the temperature is over 75 degrees, and, as I have said already, the ventilation is not abundant. Quicksilver volatilizes readily at a temperature far below this and these people are running a very distinct risk of mercurial poisoning. The risk is greater because they are not under any medical supervision.

The rest room, dressing rooms, and toilet rooms for girls are very good, and the medical department is well equipped, but it is all under the charge of a nurse only. She was not there at the time, and in her absence a young girl typist takes her place, handling cases of minor surgery or whatever else turns up. There is an unusually large variety of drugs in this office, certainly too many to be entrusted to untrained people. There is no physical examination of the 155 men employed, and the nurse simply looks over the 87 women.

May 15, 1934

Dr. Alice Hamilton
School of Public Health
Harvard University
55 Shattuck Street
Boston, Massachusetts

Dear Dr. Hamilton:

I have read with interest your letter of May 11th, regarding your investigation of the method of handling asbestos at our York, Bridgeport and Schenectady plants, and have forwarded it to Mr. Burrows, Vice-President in charge of manufacturing, for his consideration.

Very truly yours,

GERARD SWOPE

GS:H

WRBurrows (with letter)

New York
May 15, 1934

Mr. W. R. Burrows
Vice-President
Schenectady

Dear Mr. Burrows:

You will remember I talked with you
about engaging Dr. Hamilton to investigate our methods of
handling asbestos in our plants.

I am enclosing Dr. Hamilton's report
of visits to York, Bridgeport and Schenectady, which I
assume you will want to take action upon, and also her
bill for services.

Very truly yours,

GERARD SWOPE

GS:H

P. J. H.
San Francisco, June 17, 1936.

MAN 2245 OF 000001

I know you will be interested in the attached summary of visits made by Dr. Hamilton to our various plants during the past year, and I was delighted to read of the progress that had been made during that period, which gives hope that continued improvement will be made, which will lead to increased efficiency because of better conditions in the shops.

I call your attention especially to the remarks made on Page 4 in regard to lighting. I realize that we cannot make all the improvements in lighting at once, but with the work we are doing with the National Research Council we ought to come to some definite conclusions as to the best methods of lighting our various types of shops, which will result in the least injurious effects upon the working people and the increase in efficiency and production in so far as lighting can accomplish this.

I am calling these paragraphs especially to the attention of Messrs. Harrows and French so that they may take them up with their lighting experts, especially those in contact with the committee in charge of the improvement of lighting industry of the National Research Council. I am sure you will agree with me that it is important and desirable from every standpoint that we should have the best lighted shops in the world.

OKLAND SHOP

Messrs: Mr French - Cleveland
Mr Harrows - Harrison
Mr French - Cincinnati
Mr Pratt - "
Mr Hoover - "

16
Harvard School of Public Health
Boston, Mass.

June 1, 1925

Gerard Swope, President,
General Electric Company,
120 Broadway
New York City.

My dear Mr. Swope:

In accordance with your request I have made a brief summary of the visits I have paid to various of the plants of the General Electric Company during the past year. Most of these were follow-up surveys of plants which I had seen the year before, the ones in Erie, in Lynn and West Lynn, Fort Wayne, Harrison and East Boston and Youngstown. I also visited the Decatur works and the little foundry in Windsor and made a more general survey of the Schenectady and Pittsfield works than at the time of my first visit when I was one of the Harvard group of physicians and confined my attention to industrial poisons only.

It was very gratifying to find in every plant which I visited for the second time, that all or almost all of the suggestions I had made on my first visit had been carried out. Decided progress has been made in one very important field, the prevention of silicosis in sandblasting and shaking out castings in foundries. Wherever this work is done an excellent system of medical control has been put in force. The physician selects the men who are to do the work and rejects any who show a dubious X ray picture of the lungs. After acceptance, the man is required to present himself once a month for a similar examination and he is at once shifted to other work if the doctor so advises.

GE MUSEUM 00134

It is clear that much thought has been given to the prevention

dust in sand blasting and shaking out castings and different plants have worked out different schemes. Fort Wayne, with its comparatively smaller castings finds it possible to sand blast the largest pieces in a chamber with a turn table, the man standing outside and controlling his work by looking through a window, the glass of which is protected by a fine copper wire screen. In Pittsfield the castings are much larger and they find this scheme impracticable, so they are depending on the new Burrell mask and a shortened period of exposure. At the end of six months the sand blaster is shifted to other work, regardless of his condition as determined by the physician. This rule seems to me hard on both employee and employer, and I believe it is not necessary, in view of an excellent method which has been successfully introduced in Erie and is being tried out in Schenectady. This the substitution of shot for sand which eliminates at a stroke all danger of silicosis. They believe in Erie that it can be used for all sorts of castings, with perhaps a few exceptions.

The second process in foundry work which produces large quantities of silica-containing dust is shaking out castings. This is done with the air hammer, "core gigger", followed by sand blast. It is very dusty and the nature of the work, with castings scattered all over the foundry, does not permit of any effective kind of protection for the men, less than in sandblasting. To substitute shot for sand in this work will be an improvement, but there will still be the dust from the sand in the mold. In Schenectady this work will probably be done as well as is possible by the present method. The chambers have a slotted floor through which falls the shot and heavy sand, the lighter is carried by a strong draft up through pipes, which open a little above floor level, and thus, it is hoped, the fine particles will

be kept down below the level of a man's face.

But much better than this is the hydraulic method introduced in Erie, that is, so far as dustlessness and ease of operation are concerned. The chamber there has four standpipes, one at each corner, and the sand is flushed out with a hose and runs out through a drain. The fact that there are four pipes obviates the use of a turn table. It is not for me to say how generally applicable this method is, but certainly there can be no doubt as to its advantages, for what is usually a dangerously dusty job requiring many protective devices is turned into a perfectly safe and easy one.

Another feature with regard to which there has been a decided improvement, is the use of benzol as a solvent. This has diminished decidedly during the past year, and in some plants very little indeed is used. The girls in mica pasting, who still are exposed to benzol, are now given periodic medical examination in most plants.

Lead paint is still sprayed in many places and always the work is accompanied by the formation of a heavy cloud of fine droplets from which it is difficult to protect the painter. In the Erie works they squirt the paint from ^a the hose instead of spraying it and this is a distinctly more ^{beneficial} ~~helpful~~ method of work.

The only serious lead hazard is in the lightning arrestor department in Pittsfield and here the danger is recognized, the men are examined monthly by the physicians and are provided with clean underwear and overalls. A new comfort house with showers, washing facilities, dressing rooms and a lunch room is to be built for them. The only suggestion one could make is that an even stricter standard of cleanliness be adopted in the work itself, that benches and other ~~surfaces~~ be washed frequently to keep the dust down to a minimum.

~~Another~~ department which attracted my attention during my first

visit to Schenectady was the compounding room in the rubber factory. At that time I thought that there was the usual risk from litharge dust, both in the weighing and mixing of rubber, but at this second visit I found a new mechanism installed which does away almost entirely with this possible danger.

There is a new source of possible lead poisoning in lamp works from the base finishing machine with automatic soldering, as I saw it in Youngstown. The lead is at 780 C. in uncovered pots which are slightly agitated all the time. Therefore, it is impossible to say that lead fumes do not come off, but the exposed surface is small and in Youngstown, the room where the machine has been installed is amply ventilated. It is probably that the fumes will be diluted to a harmless point, but Dr. Bunn is taking the wise precaution of examining the blood of these girls from time to time to guard against lead anemia.

In the matter of lighting, a good deal of attention has been paid to the prevention of glare, by means of frosted globes or accurately placed shades, but the whole field of lighting is still dealt with in a hit-and-miss way. There are no established standards, either for natural or artificial lighting. In the same plant there may be two rooms with windows along the sides, and in one the benches run across so that no worker faces the glare from the windows, in the other the benches run lengthwise and half the workers must face the glare. I should suggest that Dr. Knabe, the eye specialist in the Schenectady plant, be given an opportunity to comment on the lighting in that plant at least, if not in other places.

The choice of seats is in an even^{more} chaotic state, but it is gratifying to see how much interest some work's managers are taking in this problem. In Fort Wayne and West Lynn and Youngstown a close study of the problems of seating has resulted in the production of model chairs for both high

and lot bench work. Specimens of the Fort Wayne and West Lynn products were shown to Dr. Joel Goldthwaite of Boston at this Schenectady conference and he gave high praise to the research work which had been done. He was also favorably impressed with the chairs, especially those from West Lynn, but it was evident that, in his opinion, the General Electric Company had reached the stage when it would be wasteful to do any more scattered experimentation. A study should be made under expert guidance of the seating problems, including foot rests and tread~~62~~s, in all the different plants.

The provision of rest rooms for women employees is still far from adequate in some of the large manufacturing plants. These rooms should be fairly easily accessible, clean, comfortable, with easy chairs and seats sufficient to allow tired women to rest if they wish to. It may be necessary to employ matrons to see that these privileges are not taken advantage of by girls who are not in need of rest and ought not to waste time there, but I believe that this risk is not great, in view of the fact that almost all of them are on piece work. The Erie plant has recently provided rest rooms for all its women, an ample supply pleasantly furnished, easy to reach and very well maintained.

When new wash rooms are to be installed, it would be wise to select the large sinks instead of the individual basins. Good examples of these can be seen in Youngstown and in Pittsfield, to mention only those plants recently visited. The white enameled sink has a supply pipe running at a convenient height above the center of the sink, the faucets being placed on either side, so that the girls may stand on both sides. Spray nozzles deliver warm water and the girls wash their hands in running water. They can pass along far more rapidly than when they ^{have} ~~stop~~ to put the stopper

in the basin, turn on the water and wait for the bowl to fill. Moreover the saving in labor is enormous, for individual basins can be kept clean only with unceasing care and sinks need practically no care.

There has been an improvement also in the medical service. I have already spoken of the periodic examination of men exposed to silica containing dusts, and the same care is provided for the small number of employes who come in contact with poisons. The medical personnel has been increased in some places, diminished in none, and better quarters have been provided, such as branch dispensaries, making it easier for the injured operative to get attention quickly, and also larger and more modern central dressing stations. The most outstanding instance of this is in Erie, where a beautiful new building now houses the industrial relations service and the dispensary. The latter is admirably equipped and adequate in every respect. It should serve as a model for the other large manufacturing plants, which at present are not ~~all of them~~ up to modern standards.

The result of this second year's survey is very encouraging and leads one to believe that the necessary improvements which still remain to be made, can be put through as promptly and with as little difficulty as the others have been.

Yours sincerely,

Albi Hamilton

GENERAL ELECTRIC COMPANY

MANUFACTURING WORKS

This is a summary of the essential features in the reports I have sent in from time to time to the General Electric Company of investigations made in the manufacturing plants in the following cities:

Fort Wayne
Erie
Baltimore
Philadelphia
Bloomfield
Lynn River Plant
West Lynn
Bridgeport
Oakland
Providence
New Kensington
Cleveland, Ivanhoe Works
Cleveland, Wire Drawing
Cleveland, Pitney Glass
Central Falls, Rhode Island Glass
Niles
Bridgeville
Everett
Taunton

Investigation of the plants at Schenectady and Pittsfield was made in collaboration with a group of physicians from Harvard Medical School and my part was restricted to only a small field. Those reports have already been summarized and are not included in this discussion.

In this summary I wish only to indicate the things that are essential for the health and comfort of the men and women employed in the manufacturing plants, and those that are desirable though not essential, and to illustrate what I mean by selecting the best instances of protective devices and provisions for comfort that are to be found in these manufacturing plants. If all the good features in all the plants could be combined in a single plant it would be a model working place, but as it is the experience gained in one establishment seems to be of benefit to that one only and does not serve to arouse another to the necessity for improvement nor even to save it from the trouble of doing its own experimenting. Every problem of safety and comfort has been intelligently dealt with in at least one of the manufacturing plants, but so far as I can see the advantage of an improvement is confined to the place that has originated it. Nor is there any exchange of knowledge concerning risks to health. If a certain cutting oil used in one plant proves to give less

trouble than any used before, that knowledge does not seem to be passed on to the others. One machine shop has given up the use of white lead as a lubricant in threading castings in the screw department, because the physician in charge found that it gave rise to lead poisoning. Another machine shop, with no physician in charge, is using twenty-five pounds of dry white lead each week for this purpose and has never suspected that there could be any harm in it. There should be some way of pooling the knowledge that has been gained. There are certainly ways of supplying natural light and artificial lighting so that there shall be the least possible fatigue to the eyes, there must be one kind of adjustable seat which provides the most comfort, one kind of hood and exhaust to carry off fumes from spraying which works most efficiently.

GENERAL CONSTRUCTION OF PLANT

Bridgeport, Bloomfield, Baltimore, Providence, Oakland and Philadelphia would stand at the head of the list for space, cleanliness, natural ventilation, light. There are, however, very good features in some other plants. Building Q in West Lynn has on the top floor a room which is a model in all these respects. Building 74 in the Lynn River Plant has a room which, in addition to good natural ventilation, has individual electric fans on the benches.

The lighting is not so all-important a feature as it is in the lamp works, and yet some plants, notably Bridgeport and Lynn, have many operations which are very similar to those in lamp works and it is important to see that poor lighting does not add to the fatigue of a very exact, monotonous occupation. Poor lighting means not so much insufficient light as glare from unshaded, clear-bulb lights which provide the general illumination in many places. It is practically a universal rule to provide the individual light at the bench with a shade, but this shade usually protects only the eyes of the worker sitting in front of the lamp, it does not prevent the glare escaping at the sides to annoy other workers. This can easily be prevented by a proper shade, such as the ones now being introduced in Building Q at West Lynn, or perhaps by light muslin screens such as are used in the Fort Wayne works. The Oakland shop uses only frosted globes for all its artificial lights, which is an excellent thing.

SEATING

The greatest variety of chairs and stools and foot rests are to be found in these plants and sometimes in the same plant. In most places it seems plain that no real thought has been given to the question, and yet it is one of decided importance, especially for the women. The work-day is eight or nine hours and fatigue is a very important element in production and nothing influences it more than the posture of the worker. If you give a woman a

chair that is all wrong she will adjust herself to it somehow, but she will be using for that adjustment muscular energy which ought to go into her work.

The first rule about seating is that every woman should be provided with a chair even if her work must be done standing. She must be allowed to sit down for a few minutes when she feels like it, and she cannot do this unless she has her own chair. This provision has been made at Lynn, West Lynn, Bridgeport, Philadelphia, and Providence. A movable chair running on rails is provided for women who have to tend more than one machine in Lynn, in West Lynn, and in the Cleveland Wire Works, and although the shape of the seat in the two first named plants is poor, the plan is a good one and could well be introduced for similar work in other plants. Much the best seating for ordinary work is to be found in the West Lynn plant in Buildings Q and V. These chairs are of wood, with adjustable back and adjustable seat, the legs spread so that the seat is firm, and the front edge is slightly low and rounded, preventing pressure against the thighs. Another great improvement in building Q is the lowering of the benches so that the woman sits with her feet on the floor and there is no need of the foot rest which, with the ordinary high bench or machine, presents a difficulty almost as great as the seat.

Another good feature in the West Lynn plant is in Building W where a number of girls must keep watch of a row of machines. A long, narrow seat runs between each two rows of machines, so placed that the girl can lean back against it or perch up on it for a few minutes and still keep watch of her work.

The seating of women at punch presses is still an unsolved problem. Nowhere are these women comfortably provided for. They must sit on high chairs or stools, and the use of the treadle means that they are always bending down on one side. To a certain extent this is true of the women using treadles on other processes, as in screw assembly and tapping. It is a question that should be taken up from the mechanical side, and perhaps it can be solved only by making the machines low, as are the heavy punch presses used by the men. This would do away with the unsatisfactory foot rests and enable the woman to really sit on her chair instead of perching on the edge of it.

In connection with the use of treadles on machines when the foot must be pressed down with force, I should like to mention a device in the Providence Base Works on the machine pressing eyelets. The treadle has been so adjusted as to allow the operator to kick it forward easily instead of pressing down.

DUSTS AND FUMES

The real hazards to health from dangerous dust and dangerous fumes are comparatively slight in these plants. They may be briefly summarized as follows:

Metal grinding, and metal polishing if an abrasive is used, and sandblasting give rise to dust which is injurious to the lungs. In metal grinding it is the dust from the abrasive that is of importance, not the metal. According to British authorities the dust from natural emery is more harmful than artificial abrasives, and it is fortunate that carborundum or alundum grinding wheels are in almost universal use in the General Electric Company's plants for everything but brass polishing where, it seems, emery is necessary. We know nothing about the effect of alundum dust when inhaled but recent experiments made with carborundum dust show that it is only slightly injurious to the healthy lung, but if there is even a small focus of tuberculosis in the lung, carborundum dust will decidedly favor its spread. Therefore all metal grinders and polishers, if the polishing is done with an abrasive, are exposed to some occupational risk and this should be recognized and the men protected, not only by good local exhausts to carry off the dust, but by periodic physical examination. The dust removal is good in all plants, but it is perfect in none, and the harm done by such dust is so slow in developing that attention is not called to it as a usual thing before the involvement of the lung is quite far advanced. That is why a regular physical examination is the only sure way of preventing harm in such an occupation, but probably once in six months would be quite adequate.

The work of the sandblasters carries much more risk. The smooth particles of sand are quickly broken up and reduced to fine powder so that presently it has to be rejected and new coarse sand supplied. The finer the dust the more dangerous it is. This fact has been recognized in all the sand blasting departments and some effort is always made to protect the men using the sandblast, but I doubt whether any protective device, even the helmet supplemented by a sponge respirator, is sufficient and I should therefore recommend that all the works adopt the system introduced in the Lynn plant and at Everett where the sandblasters present themselves for examination every three months. Another group of men who face a similar, but less pronounced, danger are the foundry men who use a pneumatic hammer and a stream of compressed air to clean the dry cake sand from molded machines. They should be classed with metal grinders.

POISONS

Lead is used in molten form very generally but the risk attending its use is slight, although it would be well to provide exhausts over all receptacles containing it. A very good

arrangement of this kind can be seen in the soldering department of the Philadelphia plant. Lead paint is not infrequently used, both with brush and spray gun. This work should always be done in a separate room as it is in the Oakland plant, especially if the spray gun be used. Men using the latter are engaged in a specially hazardous work and should be treated accordingly. A strong exhaust should be provided to carry off the spray but it must not be assumed that this will completely protect the man against poisoning unless the objects he is painting are quite small. In painting larger objects there will always be a flat surface which will send the spray back against the painter because the draft cannot catch it. It is probably useless to try to protect him with any kind of respirator or helmet because the paint spray would clog it up very quickly. Here is another class of men who must be examined at regular intervals if they are to be protected from lead poisoning.

Litharge is used in making lightning arresters and in the mixing departments of the glass works. In all of these it seems practically impossible to prevent decided contamination of the air with litharge dust. The only thing to do is to make the hours of exposure as short as possible and to subject the men to periodic medical examination.

MERCURY

Metallic mercury is used in Harrison, Cleveland, and West Lynn. In all these places it is spilled more or less over wooden benches and wooden floors where the droplets find their way into cracks and sink in because the metal is heavy and are probably not completely removed even by careful sweeping. Mercury volatilizes far below ordinary room temperature, and in the departments in which it is used the temperature often is at least 75 degrees. This means that there must be a contamination of the air with mercury vapor. In the West Lynn plant the risk is recognized and controlled so far as possible by providing for dilution of the vapors. The work room is very large and high, the space per employee is unusually great and there is a good system of artificial ventilation. In the other plants I should advise more scrupulous attention to the handling of the mercury and regular examination of the women employed. The work should be done in a separate room, so as not to expose more people than is necessary.

PICKLING IN ACID

This process should be regarded with suspicion whenever the metal, iron chiefly, is left for more than a few minutes in a solution of hydrochloric or sulphuric or mixed acids. This is because ordinary iron and zinc and commercial sulphuric and hydrochloric acids are very commonly contaminated with arsenic and when metal and acid are brought together, conditions are favorable for the evolution of arseniuretted hydrogen fumes which do not betray

themselves by any odor and which are extremely poisonous, although if they are much diluted they would show their effect only by producing a profound anaemia with a yellowish skin and vague symptoms of ill-health. The longer the metal is left in the pickling tub the greater the risk, of course. If the tubs are large it is much safer to place them in an open shed, smaller ones can be safeguarded by a hood and exhaust.

PLATING WITH CYANIDE SOLUTIONS

Cyanide baths from which bubbles can be seen rising should always be protected by a hood with an exhaust. Any case of unexplained ill-health in a pickling or plating department should be brought to the attention of the plant physician in order to see whether arsenic or cyanide fumes are at the bottom of the trouble.

The plating room in the Philadelphia plant has very excellent arrangements, and the "bright dipping" room in the Providence Base Works is amply large and very well ventilated.

BENZOL

I have not been able to obtain formulas for all the solvents used in these plants and therefore do not know exactly how many employees are exposed to benzol fumes. Unfortunately my ignorance is shared by a number of foremen and even some department managers. It is an important point, for this is the only decidedly poisonous solvent used except wood alcohol which has been largely abandoned. The benzol-containing solvents are not handled by any plant in a way that can be recommended for imitation. The work should always be done in a special room, otherwise people will be exposed quite unnecessarily to fumes which are not produced by their job but by the job of the workers near by. Local exhausts should be provided wherever this is possible, and if it is not possible the fumes should be diluted by abundant ventilation. It would be well also to provide a break in the morning and afternoon as is done in the mica department of Building 50 in the Lynn River Plant. The girls on mica spreading machine are sent out into the fresh air for fifteen minutes twice a day.

The risk of benzol poisoning is greater in women than in men and is in proportion to the youth of the victim. Benzol lessens the number of blood elements, producing anaemia, lowering the resistance to infection, and it also weakens the walls of the small blood vessels, encouraging hemorrhage which is usually from the nose or gums but in girls may show itself by an excessive flow at the menstrual period; sometimes the hemorrhage is just under the skin and bruised spots appear over the body. The recovery from benzol anaemia is very slow. It is therefore important that employees who are exposed to benzol fumes, especially girls and young lads, should be given periodical medical examination.

WOOD ALCOHOL

If this is used, the same precautions should be applied as in connection with benzol. It should be remembered that denatured alcohol may contain 5 per cent, 10 per cent, or even 20 per cent of wood alcohol, and that susceptible individuals will suffer from quantities as low as these.

NAPHTHA, GASOLINE, AMYL ACETATE, BUTYL ACETATE

These are none of them dangerously toxic although they may set up chronic ill-health in susceptible persons and therefore the fumes should be removed. There are very good devices to provide for this; in dipping at Oakland and Lynn and in spraying at Baltimore, Oakland, and Philadelphia. The baking departments in Lynn and Philadelphia deserve specially favorable mention, and so does the ventilation of the wire insulation room in Building 50 in Lynn. Bridgeport has placed individual hoods over the little pitch and resin machines in the wiring department.

PROVISIONS FOR CARE OF EMPLOYEES

The work done in manufacturing plants is decidedly dirtier than that done in lamp works, but there is not nearly so generous a provision for personal cleanliness in the former as there is in the latter. Moreover, if there are any wash rooms completely equipped with hot water, soap and towels, they are likely to be assigned to the office employees who are doing clean work and not to the factory employees whose hands get very dirty. It is, of course, impossible to get one's hands clean with cold water but some of the largest plants employing thousands of men and women provide only cold water. The ideal is hot water, soap, paper towels, and sufficient washing space. Bridgeport, Providence, Oakland, and Bridgeville have long enameled sinks with hot and cold water, which seems to me much better than individual basins, so hard to keep clean in the rush hours. The best of all are the sinks in Bridgeville where the water is controlled by a foot release. Paper towels for both sexes and for factory help are provided by the plants in Erie, Philadelphia, Niles, and Bridgeville. Philadelphia also gives soap. Roller towels are deplorably common in New England plants and should not be allowed because they are very likely to carry infection, especially from inflamed eyes.

Few plants have the proper kind of bubbling fountain and some still use coolers with a common cup although these are rapidly giving way to the bubbling fountain. In choosing the type of bubbler there are two things to be borne in mind: the stream must curve a little so that the water does not fall back over the nipple, and the nipple must be protected in such a way that the drinker's lips cannot be pressed against the edge. The West Lynn plant has several models, one of which is very good.

The toilet rooms are all excellent and well maintained but not always well placed. Sometimes it is necessary for a worker to go a long distance and up and down several flights of stairs to reach a water closet. This is bad because it almost inevitably encourages constipation by making the worker postpone till the noon hour a call which should be responded to at once. Putting locks on the doors of the water closets seems an unimportant detail but it really is not; people have a right to demand that degree of privacy.

Apparently work in the manufacturing plants is not considered as exacting for women as work in the lamp factories, for there is nothing like so ample a provision of rest rooms and couches in manufacturing plants employing large numbers of women as there is in lamp works employing a quarter as many or even less. I believe that this is a mistake. Some of the work on small machine parts is quite as meticulous and monotonous as that in the lamp works, and prevention of fatigue must be just as important a factor in good production. In other departments many women, sometimes more than half, must stand all day at their work, and there is also the fatigue of work on the punch presses. Yet it is certainly true that the majority of the manufacturing plants which employ women fail to give them enough opportunity to rest comfortably when they are tired. The objection to providing easy chairs and cots is, I am told, that it encourages loitering when the girls ought to be back on their jobs. In Bridgeport and in Philadelphia there are matrons in charge of the rest rooms whose duty it is to see, both that girls who are not tired go back to their jobs and that girls who are tired may rest comfortably. It is a mistake to lock the rest rooms during the lunch hour, for girls who are not robust and older women and women whose job keeps them standing should be encouraged to lie down or at least rest in an easy chair during this interval. Loss of time may result from a lack of a rest room as well as from loitering. In two different establishments where provision of this kind is poor I asked girls what they would do if they felt ill, had abdominal cramps, or a bad headache, and they said they would go home, for the dispensary was too far off, there was no other place to lie down, and if they quit at all they might as well go home.

It is not, of course, essential to have a rest room attractive, but it is pleasant and once the necessity for resting is admitted there seems no reason why a little effort should not be made to take away the forbidding aspect of most of these rooms, with their cold cement floors, dark walls, clouded or dirty windows, bare cots and straight chairs. It can be done with little expense. In the Philadelphia works they have taken an unpromising room which has only one outside

window, and that looking into a well, a high ceiling, and big windows leading back into the factory, and have made it very attractive by chintz window curtains, soft chintz covered cushions on the cot and on the easy chairs - plenty of them -, a chintz table cloth, a pretty lamp, and a few pictures. The Providence Base Works has a large and delightfully furnished room quite up to the standard of the best lamp works. This plant also provides a pleasant smooking room for the men, as do also Niles and Bridgeville. The Lynn plants have rest rooms for men but not so comfortable and attractive.

In the Providence Base Works the girls stop work for 20 minutes at nine in the morning and at three in the afternoon. They leave their benches, walk about, and in the morning recess most of them eat a second breakfast. These girls are mostly from Italian families and are following their national customs in thus breaking, but at the same time lengthening, the working day which begins at seven and ends at 5:50. It is doubtful whether this system, wholesome as it is, could be introduced in all plants but a shorter break in the working hours certainly would not be impossible. The undernourished girls in Bridgeport have five minutes off morning and afternoon so that they may go to the matron and get a glass of milk. In the Rhode Island Glass Works the women inspectors relieve each other so that each works only 45 minutes out of the hour.

MEDICAL CARE

It would be a mistake to close without pointing out the fact that many of these recommendations can be followed only if there is a physician in the plant with time enough to do more than attend to cases of accidental injury or to acute illness and to the examination of new employees. Something more than emergency surgical and medical care is necessary. It is not enough to treat an occupational illness after it has developed, for workers should be protected against risks which are known to be connected with their employment, such as the risk of lung disease from inhaling certain dusts and the risk of poisoning from certain vapors. This means that the workers in certain departments must be specially supervised by a physician. The obligation to prevent illness which cannot be directly traced to occupation is less clear, but experience seems to show that it is good policy for the employer to extend some form of preventive medical care to the whole force, at least enough to provide for the recognition of acute infections in their early stage when they are likely to spread, of early tuberculosis which can perhaps be arrested, of open tuberculosis which is a danger to others, and of malnutrition and chronic ill-health which impair efficiency. Dr. Wright's recommendations will cover the details

of what would constitute such a service, and I will confine myself to a few comments on features which I have noted in certain plants.

Most of the plants are equipped only to give first-aid to accidents and perhaps first-aid of a more or less dubious character to acute illness. Yet in his report on the Pittsfield plant Professor E. B. Wilson of the Department of Vital Statistics of the Harvard School of Public Health estimated that illness was probably responsible for more absenteeism than accidents, and this is in all likelihood true of other plants doing similar work. To insure proper care for cases of illness and for chronic ill-health, the medical department must be conveniently placed for if the sick person has to go too far for relief, especially if he has to go out-of-doors, he will probably decide to endure till noon or till quitting time and then go home without a physician or a nurse knowing anything about it. The lamp factories have in several instances provided branch dispensaries to meet this need. In the absence of such provision, the plan followed by Bridgeport is a good one. The rest rooms are in charge of matrons who have orders to report to the doctor every complaint of ill-health however slight, for repeated complaints mean that the woman needs an examination. If the illness lasts as long as an hour the matron summons the doctor.

The examination and placing of applicants for employment is very well carried out in Bridgeport. The physician makes all the examinations and classifies the applicants according to their fitness for all jobs or for certain jobs only. He keeps the records and all men in the handicapped class must report back to him if they change their job. Every employee who is taken ill while at work must go to the doctor's office before he leaves the plant. As a usual thing the examination of women applicants for work is very superficial, but in the Providence Base Works the same thoroughness is used with women as with men and the trained nurse assured me that even the Italian and Portuguese girls made no objection for she was careful to guard them against any exposure.

Only three manufacturing plants give the same attention to chronic underweight and malnutrition as is given in several of the lamp works. In Bridgeport, in the Cleveland Wire Drawing Works and in the Pitney Glass Works the employees who are selected by the doctor or nurse are given milk and biscuits morning and afternoon.

The question of first-aid boxes and of entrusting first-aid treatment to employees will be discussed by Dr. Wright.

The comparatively hazardous jobs which should require the

special attention of the physician do not involve more than a small proportion of the workers in any plant, and the medical department should be well enough organized to permit of periodical physical examination of these groups of employees. The departments are as follows: sandblasting, dry mold cleaning, metal polishing and grinding, spraying lead paint, use of benzol and of wood alcohol as solvents, and the use of mercury.

These are the plants which have an adequately equipped medical department: Lynn River Plant, Bridgeport, Fort Wayne, Bloomfield, Baltimore, Philadelphia, Providence, Niles, and the Cleveland Wire Drawing Plant. Those which have the most nearly adequate medical service are Providence, Fort Wayne, Bridgeport, Philadelphia, Central Falls (Glass), Niles, and Baltimore. Six plants have a very unsatisfactory medical service or practically none at all.

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York Insulated Wire Works, York, Pa.

C. F. Obermaier, Manager.

The buildings are large, high, well ventilated from windows in sides and roof. There is a very good arrangement for catching and removing the fumes in enamelling wire with a benzol-containing mixture, so that I could not detect any odor of benzol at all in that end of the building. The wire is baked in small ovens each of which has at the top an exhaust pipe which carries the vapor to meet a spray of water and this runs down into a tank, with no effort to recover it. The ovens are in the large room, the platform at the top is open, there are open windows in the roof and a large pipe for air intake.

Another good feature is the guarding of machinery, which has been done with unusual attention to detail and includes every possible hazard. It is really admirable.

The furnaces for boiling enamel seem very well constructed for the removal of fumes, but were not in operation.

The work with asbestos produces some dust, but this is not of a dangerous character and needs no more precautions than are now in use.

About 30 or 35 girls in all are employed. The wash room for factory girls might be more attractive and have hot water, but the essentials are provided, soap and paper towels, and very good water closets. There is a fully equipped First-Aid box and Mr. Obermaier and a master mechanic have taken the Y. M. C. A. course. Accidents of any severity are sent to the hospital, or a near-by physician is summoned.