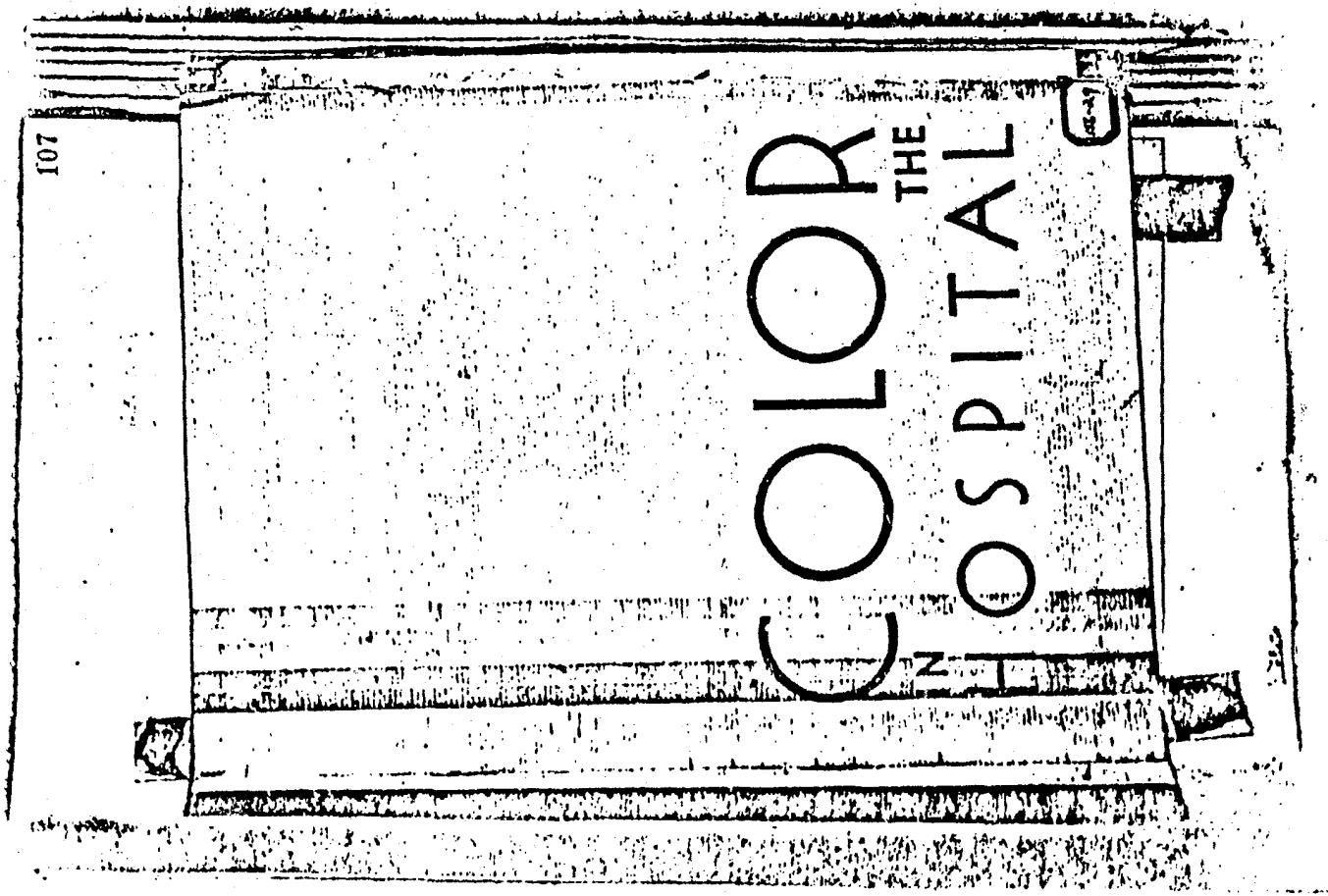
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Introduction

PSYCHOLOGISTS have pointed out that people are unconsciously influenced by the colors with which they are surrounded. In numerous instances a marked change in mental attitude has been observed in perfectly normal persons when harmony has taken the place of strong, unrelated colors that unconsciously irritate, or when cheerful or stimulating hues have been employed to replace plain, cold white or dark colors of a depressing nature.

Color is generally considered as a material thing to be applied on various articles for the purpose of beautification. Strictly speaking, color is not a specific substance but is the sensation arising from the activity of the eye in response to light. When a portion of the light is selectively absorbed by a painted surface, the remainder reflected to the eye produces the sensation of color.

The effect of color upon people is quite distinct and, through a natural sequence, is immediately associated with the emotions, producing sensations that are cheerful, stimulating, soothing or depressing. These in turn influence the physical well-being of individuals to a considerable extent. Since this is true of normal persons, how much more susceptible to impressions must be convalescing patients in their weakened state of health. Attention to color and its intelligent use in hospitals will accomplish much toward placing patients in a proper mental attitude that will aid materially in hastening their recovery.

It is the purpose of this treatise to set down some of the fundamentals of the use of color to accomplish definite psychological results, as well as to discuss some of the more practical sides of the question of applying color to hospital interiors.

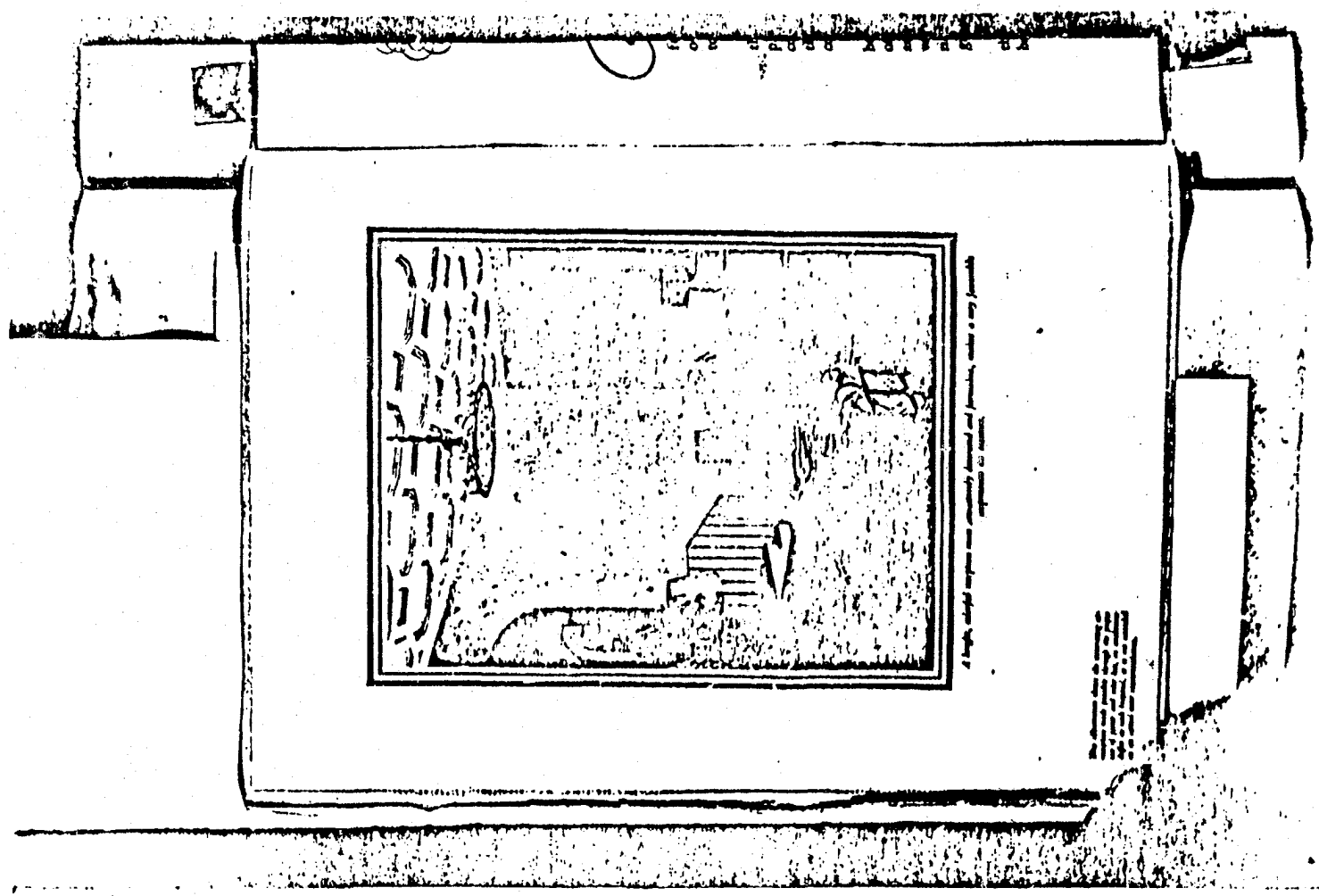
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The Psychological Effects of Color

THE love of color is as natural as the love of art. It is found among all nations and grades of humanity, from the primitive tribes who decorate their crude household furnishings with paint to the great artists of civilization whose oil and water color paintings have brought joy and inspiration to thousands.

Although color has always been the chief adornment of nature and the source of more human pleasure than probably any other natural phenomena, it is only in the last decade that organized use of color has come about in hospitals through tests of its psychological effects on the sick and through careful adjustment of color surroundings to the condition of patients in various forms of illness.

Highly beneficial effects on the condition of patients have been brought about in recent years through the use of color in the treatment of hospital rooms. These effects have been noted by physicians, surgeons and hospital superintendents in all parts of the country. As a result, white, which formerly was the accepted tradition for hospital interiors and which gave them a strong "institutional" atmosphere, has given way largely to color on the walls, woodwork and ceilings.

The designation of the correct colors for the various rooms and the determination of the shades and tints which should give the most beneficial results have been made a subject of exhaustive research by

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color specialists. In these investigations white appeared to be cold and cheerless and tended to give a negative effect on the mind of the patient. It was recognized on the other hand that certain colors, especially the greens and grays, have a soothing and restful effect on excited and unstrung nervous systems while certain yellows have a beneficial and stimulating effect on depressed and morbid patients. During the convalescent period recovery may be considerably furthered by colorful surroundings that have a cheering effect on the mind.

For some years the salutary effects of certain colors on the mind and emotions have been recognized by many among the medical profession. The harmony and beauty found in the colors of nature, the green of the trees, the yellow of sunlight and the many delightful color combinations in flowers and in woodland scenery, have been known to hasten the mental and physical recovery of the sick. The custom of sending flowers to patients is partly an instinctive recognition of the psychological value that these color sensations convey.

In an effort to understand the normal emotional reactions to colors, experiments have been conducted in the past of the type outlined as follows by Luckiesh in his book "Light and Color." Sixty-three college students about equally divided as to sex were asked to indicate their emotional reactions to twelve colors arranged in their spectral order on a gray background. The results were classified in three divisions—"Exciting", "Tranquilizing" and "Subduing":

Color	Exciting	Tranquilizing	Subduing
Crimson	41	0	22
Scarlet	56	0	0
Deep orange	39	0	0
Orange-yellow	55	0	0
Yellow	23	6	0
Yellow-green	14	39	5
Green	18	34	6
Blue-green	32	23	6
Blue	11	21	30
Violet-blue	0	17	45
Violet	0	6	34
Purple	3	1	48

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The noteworthy fact about the foregoing table is the close conformity of these results to the corresponding segments of the spectrum. Every indication points to the existence of fixed psychological and emotional values for colors which produce definite effects through the sensitive mechanism of the eye, regardless of the conscious recognition of these effects by the patient.

Much has been written in recent years by medical men about the psychological effects of color sensations. A typical description of response to color impressions by a normal observer is expressed by Dr. J. H. Parsons in his book "Color Vision" as follows: "The physical sensations are material phenomena that, on coming in contact with the sense organs, set up sensory, neural, and physiological changes which may be transformed into, or accompanied by, mental processes leading to psychological sensations."

A recent article in "Modern Hospital" says: "In fulfilling its function of prolonging life the hospital must keep pace with the tremendous strides that constantly take place in surgery and medicine and be familiar with discoveries of proved therapeutic value. The potentialities of color in healing the sick invite the serious consideration of modern hospital executives. Of the five senses sight is without doubt the most important as it is responsible for more than sixty per cent of all the impressions taken into the mind. Primarily the eye sees color only—that is, all ideas gained through the sense of sight result from certain color relationships."

These instances typify cases in which the psychological value of color has been recognized by scientists, members of the medical profession and hospital executives.

Color Analysis

It is logical that sick persons are even more susceptible to the colors which surround them than healthy ones. It is also admitted that nearly everyone reacts to color in the same general way although the extent of the reaction varies in each case. It is generally known that impressions produced by single colors can not be changed but produce

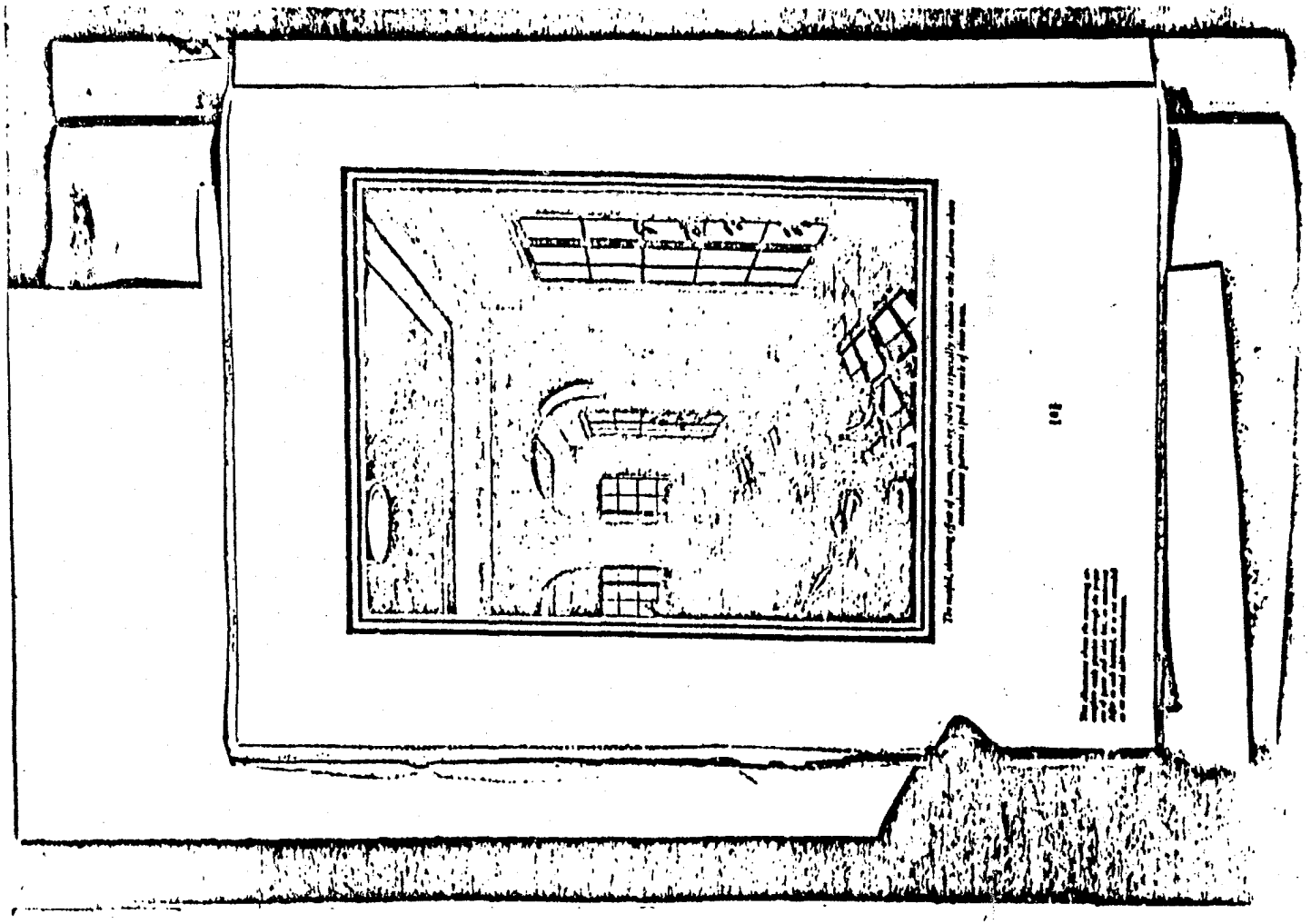
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specific states in the normal eye and cause similar and corresponding influences on the mind.

In order to have a subject experience these influences completely he was placed in a room treated entirely with one color, where the results were somewhat similar to those obtained by wearing glasses of a single color. The reaction was found to be always cheerful, stimulating, exciting, tranquilizing or depressing according to the color used and the extent of the reaction varied with the amount of saturation of the color. The speed of the response was seen to depend on the intensity of light used and on the sensitiveness of the patient which, of course, is always a variable factor.

With the mental reactions to specific colors established, it is possible to adjust the surroundings of patients accordingly. For instance, from the preceding table it is apparent that orange is the most exciting, yellow-green the most tranquilizing and violet the most subduing of colors. When a patient is depressed a cheerful and stimulating atmosphere should prevail, when nervous the surroundings should be soothing and restful. Before a definite and wholly suitable color scheme can be decided upon, however, it is necessary to consider such factors as the height and size of the room, the amount of illumination received, the use to which the room will be put, its relation to adjoining rooms, and so on, since they all have a direct bearing on the color selection.

It may be interesting at this point to list some of the major colors and their attributes and mental effects as they have been determined by various authorities.

RED

Red is a decidedly warm, aggressive and energetic color, combining the stimulating and forceful impressions of heat, passion and fire. It is distinctive in hue and has relatively great saturation. Many instances of the effects of red on people are cited by Professors Fere and Giardini. A normal man when exposed to the influence of a saturated red has been said to develop fifty per cent greater muscular power than when exposed to the effect of a quieting blue.

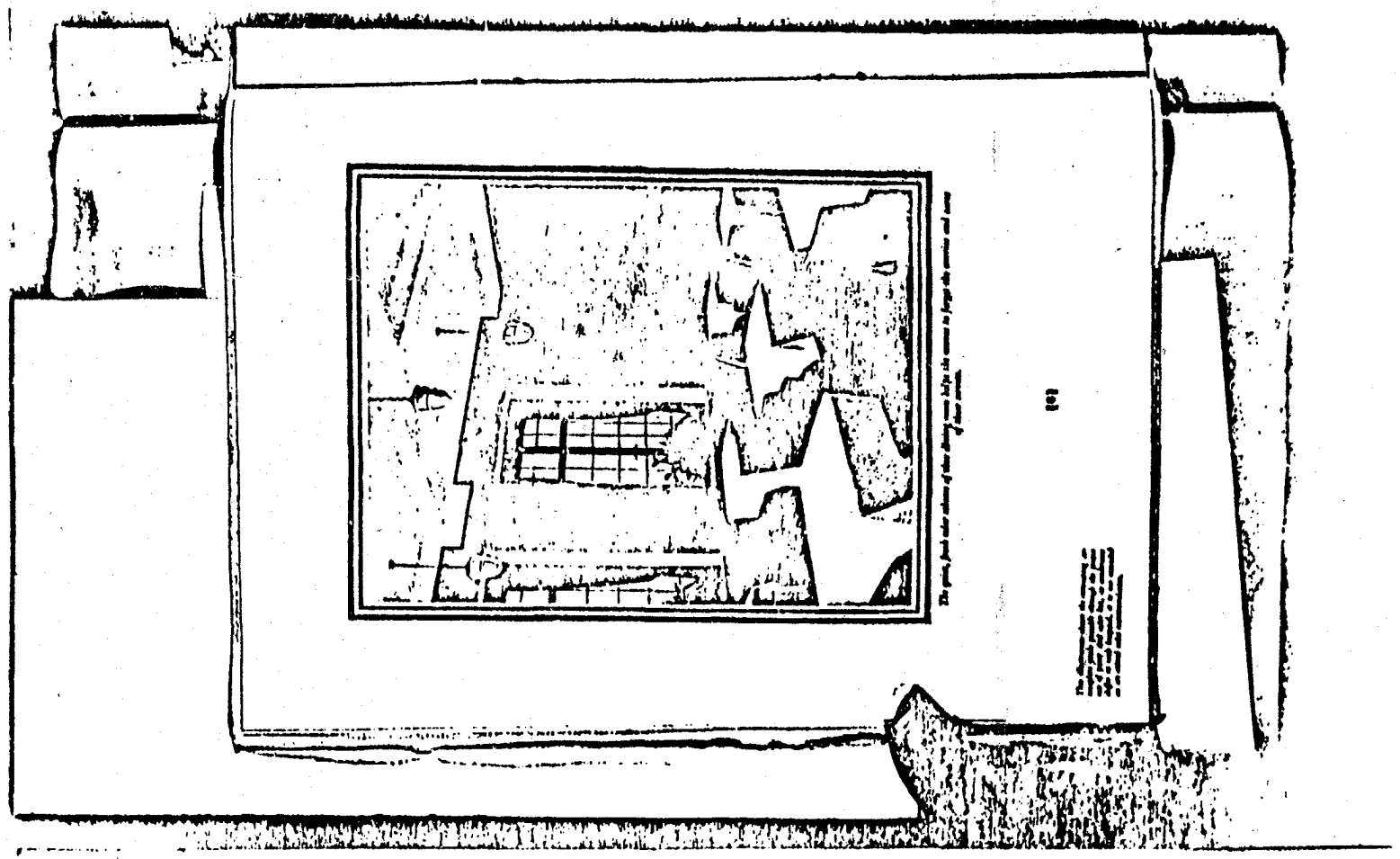
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When red is used for purely decorative purposes care should be taken not to have it in a saturated or pure state except in very small areas such as in a design. When applied in this way it should be properly balanced by the introduction of other hues. Red is indispensable as an admixture to other colors to obtain life and add the necessary glow of warmth. Because it has such great stimulating properties red, in a fairly strong tint, is used in certain special rooms in the modern hospital, such as those where depressed or melancholy patients are temporarily placed.

YELLOW

Yellow is the color most like that of natural illumination. It has warm brightness and a mildly exciting character. It has high luminosity and is associated in the mind with the life-giving energies of the sun. The agreeable effect of yellow is plainly apparent when a landscape is observed through a yellow glass on a dull gray winter day. The mind is stimulated by the cheerful glow.

Yellow with its various admixtures is probably more used in hospitals than any other color. When properly reduced with white-lead, it is suitable for large wards which otherwise would appear cold and barren and to corridors which are brightened by its high reflective power. As a buff it is extensively used in the entrance lobby, waiting rooms, general offices and dining rooms. When deepened to a tan, so it will hide mechanical injury, it is employed in hospital diet kitchens, laundries, basements, and store rooms.

Yellow, however, produces a very disagreeable effect if it is sullied or improperly combined with certain of the other hues. For instance, a yellowish citron composed of yellow with a trace of blue and black is particularly harsh and unpleasant as are certain yellows that slightly favor a cold green. For these reasons care must be taken when yellow is used in admixture with other tints.

ORANGE

Orange is a combination of red and yellow which is the most active of the colors. When looking at highly saturated orange, the color seems to penetrate the eye and impress itself strongly on the mind. Because

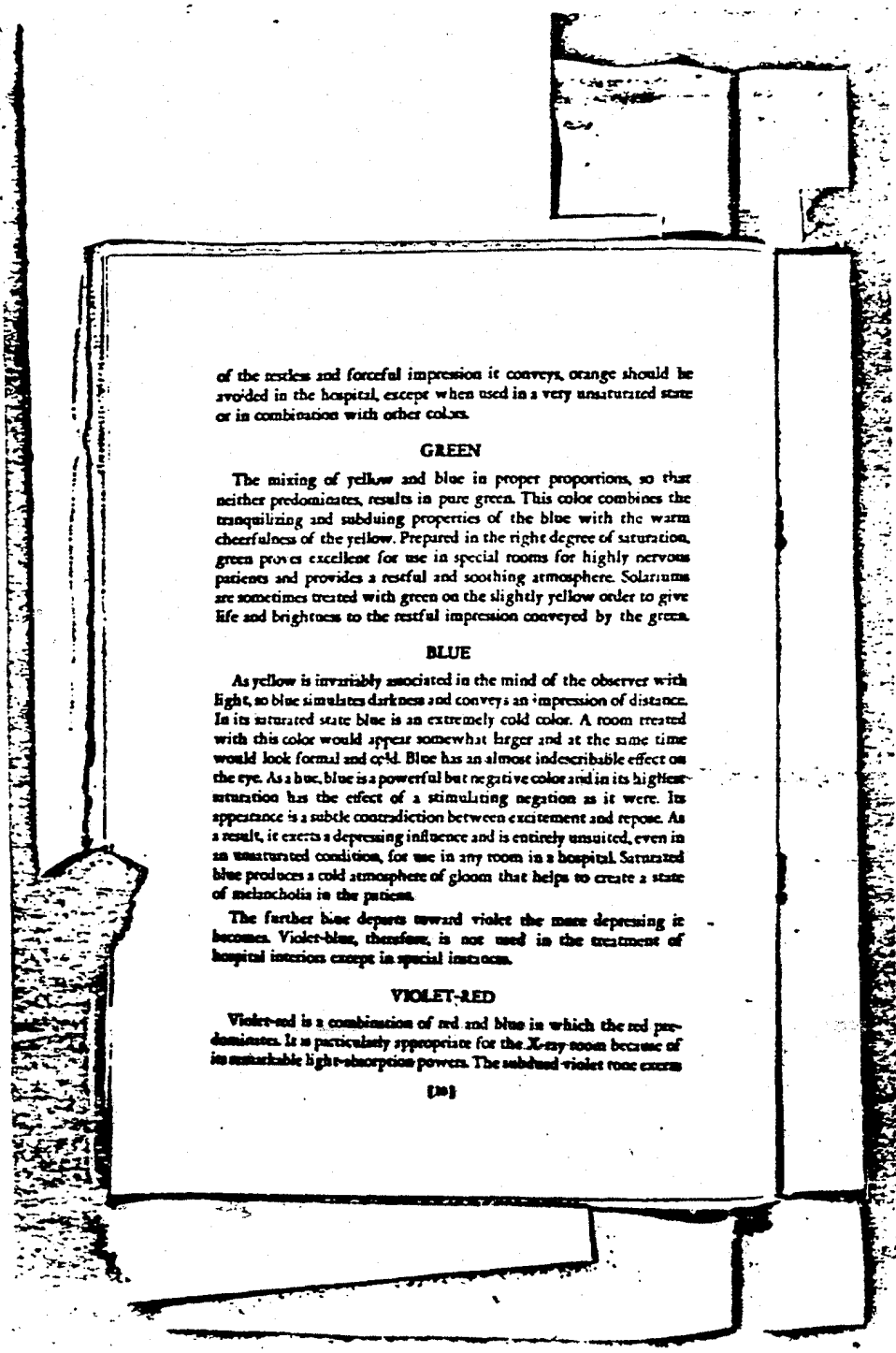
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of the restless and forceful impression it conveys, orange should be avoided in the hospital, except when used in a very unsaturated state or in combination with other colors.

GREEN

The mixing of yellow and blue in proper proportions, so that neither predominates, results in pure green. This color combines the tranquilizing and subduing properties of the blue with the warm cheerfulness of the yellow. Prepared in the right degree of saturation, green proves excellent for use in special rooms for highly nervous patients and provides a restful and soothing atmosphere. Solariums are sometimes treated with green on the slightly yellow order to give life and brightness to the restful impression conveyed by the green.

BLUE

As yellow is invariably associated in the mind of the observer with light, so blue simulates darkness and conveys an impression of distance. In its saturated state blue is an extremely cold color. A room treated with this color would appear somewhat larger and at the same time would look formal and cold. Blue has an almost indescribable effect on the eye. As a hue, blue is a powerful but negative color and in its highest saturation has the effect of a stimulating negation as it were. Its appearance is a subtle contradiction between excitement and repose. As a result, it exerts a depressing influence and is entirely unsuited, even in an unsaturated condition, for use in any room in a hospital. Saturated blue produces a cold atmosphere of gloom that helps to create a state of melancholia in the patient.

The farther blue departs toward violet the more depressing it becomes. Violet-blue, therefore, is not used in the treatment of hospital interiors except in special instances.

VIOLET-RED

Violet-red is a combination of red and blue in which the red predominates. It is particularly appropriate for the X-ray room because of its remarkable light-absorption powers. The subdued violet tone exerts

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a quieting influence on the patient while there is just enough deep red in the mixture to stimulate slightly. Violet-red increases the efficiency of the operator and obviates the feeling of depression caused by constantly working in the customary black-painted dark room.

GRAY

Neutral gray is distinctly restful and has no power to create an atmosphere either of cheerfulness or gloom. It is neither warm nor cold, stimulating nor depressing and therefore has many decorative uses in the hospital.

In an ordinary room that receives a normal amount of natural illumination, a gray having a light-reflection factor of approximately forty to forty-five per cent should appear pleasing. Some rooms, however, do not receive a normal amount of light while others have an overabundance. Gray, to serve as an efficient side wall treatment, must therefore be lightened or darkened to suit the requirements of each individual room so that the color will properly reflect the required degree of illumination without unnecessary glare.

When a suitable gray has been selected for a starting point, innumerable effects may be worked out by the addition of small amounts of certain hues. In brightly lighted rooms, such as the operating room, a gray tinted slightly with green would in some instances work out well, while warm grays made by adding a touch of red would relieve many large walls and corridors of their apparent coldness.

A darker gray dado is sometimes found useful in this connection, particularly in corridors, as it takes up much of the mechanical injury without destroying the pleasing decorative appearance of the wall color.

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SPECIAL SERVICE FOR HOSPITALS

Department of Canoe Repairs and Decoration,
Central Lead Company Laboratories,
111 Broadway,
New York, N. Y.

Date .....

Please furnish us with your specifications for color treatment of the following marked OO:

Name of Institution .....

City Address .....

State .....

Name of Officer .....

Title .....

TYPE OF HOSPITAL

- ☐ General
- ☐ Surgical
- ☐ Maternity
- ☐ Psychopathic
- ☐ Female Mental
- ☐ Tuberculosis
- ☐ Sanatorium
- ☐ Children's

WARDS

- ☐ Operating
- ☐ Sterilizing
- ☐ X-Ray
- ☐ Dispensary
- ☐ Eye, Ear, Nose and Throat
- ☐ Dental
- ☐ Drug
- ☐ Hydro-Therapy
- ☐ Maternity
- ☐ Surgical Ward
- ☐ Medical Ward
- ☐ Receiving Ward
- ☐ Dormitory
- ☐ Observation Ward
- ☐ Convalescent Ward
- ☐ Contagious Ward
- ☐ Disturbed Patients' Ward
- ☐ Disposal Patients' Ward
- ☐ Private Ward
- ☐ Solarium
- ☐ Day Room
- ☐ Ambulance
- ☐ Door Erections
- ☐ Elevators
- ☐ Dining Hall
- ☐ Corridors, Halls and Toilet Rooms
- ☐ Supervising Nurse
- ☐ Matron's Office
- ☐ Medical Staff
- ☐ Superintendent's Office
- ☐ Administration
- ☐ .....

Also for the care of rooms marked (X), please designate exposure: E.Exp., W.Exp., etc.

.....

CHECK IT, DON'T GUESS IT

This data to be supplied by all concerned above

a. Type of material used for floor or base covering and color of same:

☐ Linoleum..... ☐ Wood..... ☐ Tile.....

b. Height of ceiling.....

c. Woodwork—☐ Stained Finish or ☐ Painted.

d. Wall materials..... ☐ Plaster ☐ Composition panels.....

e. ☐ Wood Shutters ☐ Wood Casements ☐ Plain Walls

Also: Where blueprints are available it is requested that they be forwarded, as same is very advisable and helpful in giving final and exact information and completeness of the specifications desired by us.

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A Special Hospital Service

AFTER a careful study of the use of color in hospitals, the Department of Color Research and Decoration of National Lead Company several years ago inaugurated a service for the purpose of making exact color recommendations for the treatment of hospital interiors.

It was found impossible to make general recommendations that would fit every hospital. The amount of natural and artificial light, the direction in which the windows faced, the height of the ceilings, the size of the rooms, the location of the rooms in relation to each other, the use to which the rooms were put, the nature of the climate where the hospital was located—these and other important factors which form the basis for determining the best color plan were different in various hospitals. The department therefore makes no general color recommendations but considers each hospital and its particular rooms as an individual problem.

It is obvious that to render this special type of service there are many facts that it is necessary to know about the specific hospital or institution. To make it convenient to furnish this needed information and, at the same time, to make sure that the facts are complete, a printed form similar to that shown on the opposite page was developed. On this form the types of hospitals and the types of rooms are listed so that the proper ones can be checked by the hospital authorities desiring the service.

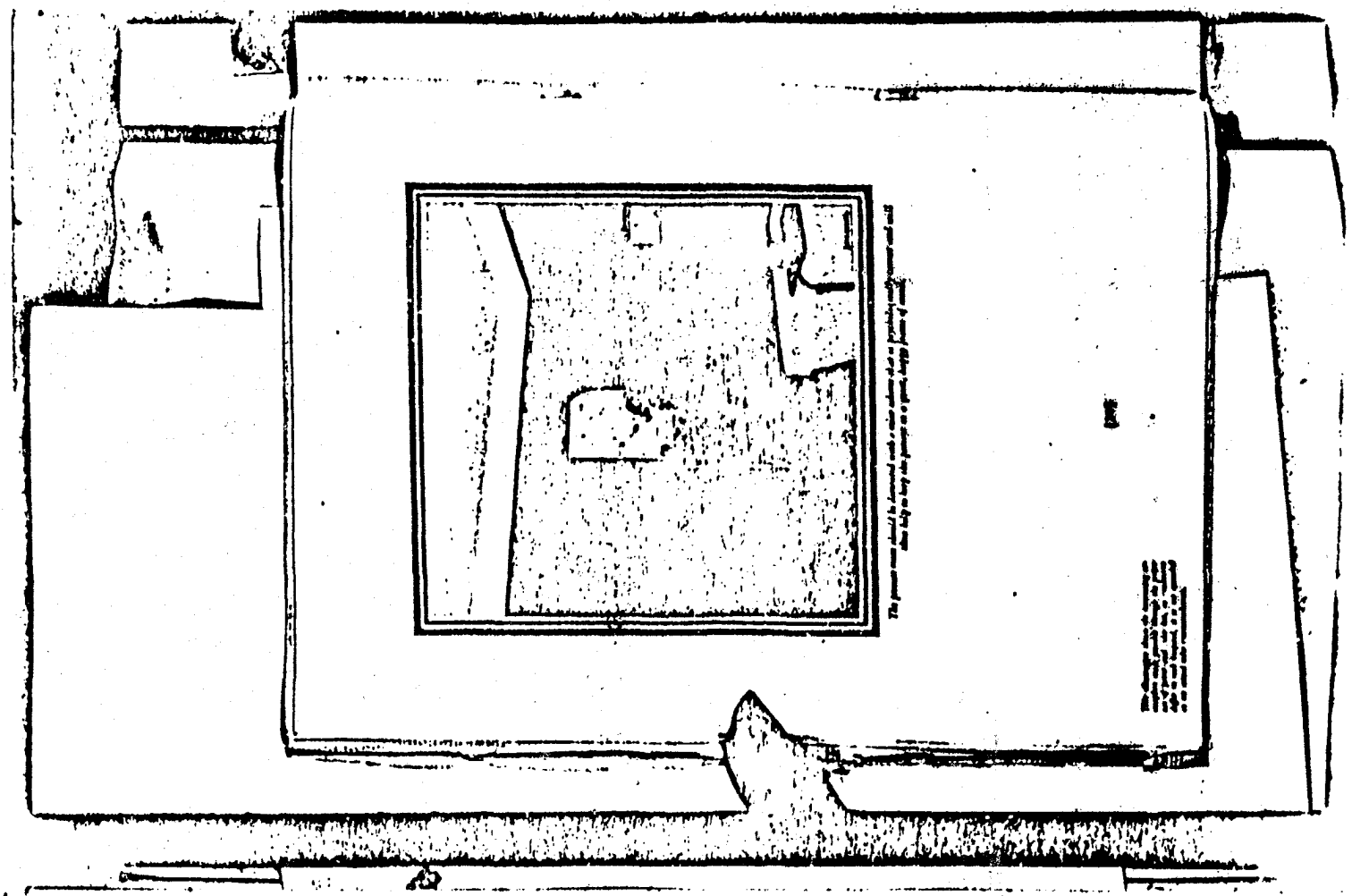
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The general information required includes the type of material used on the floors, the height of the ceiling, whether the woodwork is natural finish or painted, whether the walls are painted or unpainted, and whether there is a wood wainscot, a wood chair-rail or a plain wall. To supplement this information a complete set of floor plans of the building is also requested whenever available.

Armed with this information the department is able to make up complete and individual color and paint specifications for any hospital building.

The hospital color specifications are bound as a complete set. There is an introduction explaining the general objectives sought in hospital treatment and an index listing all rooms in the particular institution for which the specifications were prepared; also a cross index which gives a ready reference to the color scheme intended for a certain room.

Next come actual color samples with paint formulas and tinting materials for each room, all the rooms of similar treatment being grouped together. A duplicate set of colors is provided for the painter's use. At the end of the booklet are given a summary of the formulas and directions for producing all the finishes recommended. The specifications thus give complete recommendations to cover preparation of all paints used on any interior hospital surface.

Since this color service was started more than six hundred hospitals have received color specifications and advice about the treatment of rooms. As a result the use of color is an accepted practice in many hospitals and the results obtained in the improvement of the conditions under which the patients are treated have been testified to by physicians and hospital staffs.

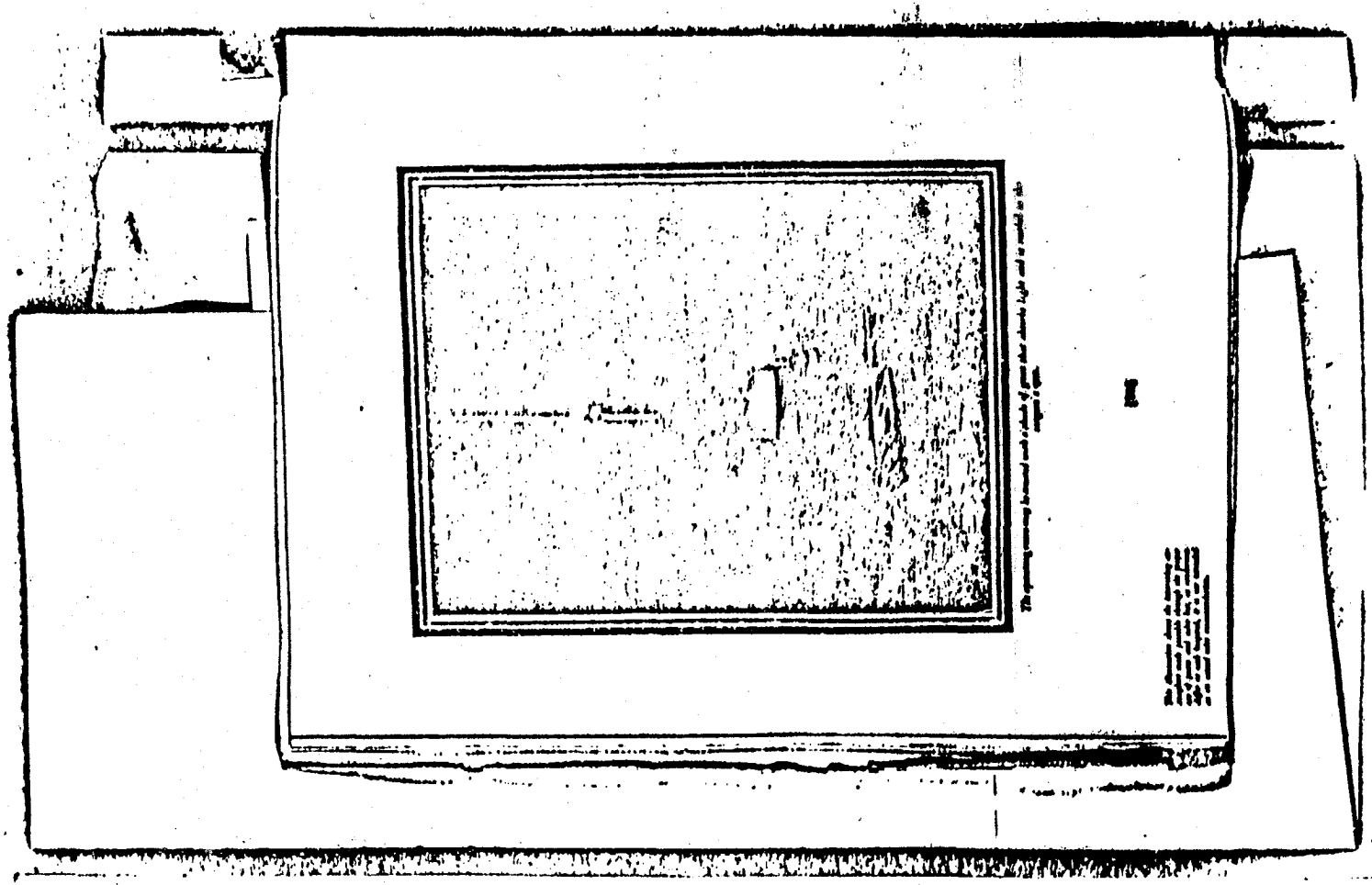
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The Protective and Sanitary Value of Paint

HOSPITALS for many years have insisted on painted surfaces because of their sanitary possibilities both from the standpoint of ease of washing and smoothness of surface. It has been found that well painted surfaces offer excellent protections against the growth of bacteria and other micro-organisms.

A prominent pathologist connected with a large hospital and medical school in Washington once attempted to prepare vaccine and serums in a laboratory where all sanitary precautions were observed except that the plaster walls were not painted. The cultures became contaminated again and again. It was not until the walls were painted that successful results were obtained.

In every modern hospital, the wards and private rooms are regularly painted throughout. It is probable that this practice has done much toward reducing cases of infection in hospitals through the maintenance of sanitary conditions.

Dr. M. C. Steinhof, who was for thirty years Health Commissioner of St. Louis, once said in an address: "In a certain lying-in hospital of which I know, there has been in a given period more than one hundred

cases of puerperal fever with a high death rate. After the walls were painted it was noted that in a similar period following, cases of puerperal fever had become almost nil. Undoubtedly paint was largely responsible for this saving of many lives."

Now that it is no longer considered desirable for painted walls to be white in order to obtain thorough sanitation it is the modern tendency to introduce a much needed note of color and decoration in hospital rooms. This growing use of color makes even more important a problem that has existed since the days of dazzling white rooms and corridors—the need for standardizing on painting materials as well as on proper colors.

Standardizing on Materials

Standardization is not new in the hospital field. A large part of hospital equipment and materials is already standardized. Furniture, linens, medical supplies, kitchen equipment, or what not, are all decided upon by the brand or make and all necessary replacement, or additions handled almost automatically. There is no wholesale securing of bids and samples every time a clinical thermometer is dropped or a hot water bottle leaks. It takes but a few seconds to order a duplicate because all these supplies and similar equipment have been standardized.

It is just as logical that standardization should be extended into the paint shop. The benefits will be correspondingly great. Any hospital superintendent who decides on white-lead as the one and only paint to be used in his institution saves himself a great deal of unnecessary trouble. There are several very good reasons why this is true.

In the first place white-lead is a basic paint material. It makes an equally satisfactory paint for exterior wood, stucco and brick or interior plaster and woodwork by simply varying the type and proportions of ingredients with which it is mixed. Furthermore, by the simple addition of one, two or three colors-in-oil white-lead paint can be tinted to any desirable color.

The many institutions who have adopted white-lead as their standard have found that it is not necessary to clutter up the paint shop with a miscellaneous assortment of "special paints." With white-lead

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the painter can mix his own paint, quickly and easily, to suit each job, and can tint it to the exact color required. There are few left-over batches of paint and what there are can be thrown together and used because the base, white-lead, is the same in each case.

Once the paint shop has been standardized on white-lead, it is possible to reduce the material inventory to a minimum. White-lead, turpentine, linseed oil, *flatting oil*, varnish, *drier* and *eight colors-in-oil* (Venetian red, English tuscan red, medium chrome yellow, French ochre, lemon chrome yellow, medium chrome green, lampblack, Prussian or Chinese blue) comprise the entire list of ingredients needed to paint any type of surface, inside or outside, in any color desired. With a competent painter to mix and apply the paint, good painting results are a practical certainty.

It is interesting to note in this connection that, as a general rule, the reliable and competent painter prefers to use white-lead. Of course, the reason for this is not hard to discover. Not only does the use of white-lead give him the opportunity to make use of his knowledge and to mix the paint to suit the surface but he knows that its durability and long-wearing qualities will uphold his reputation as a painting craftsman.

Standardizing on Colors

It is equally as important from the superintendent's point of view that he be able to standardize on the colors to be used in the various rooms and departments of the hospital as it is to decide upon white-lead as the basic paint. This, too, is not only possible but easy to accomplish.

As explained in the previous chapter, National Lead Company's hospital service is available to any hospital superintendent. Through this service he will be able to determine the most suitable color for each room and department of his institution. Once this is done it will no longer be necessary for him to consume valuable time discussing with his painter the proper color or colors to use on a given interior. He will be able to order a room redecorated just as simply and quickly as he orders a new bed by referring the painter to the filed specifications. He can do this with perfect confidence that the room in question will be

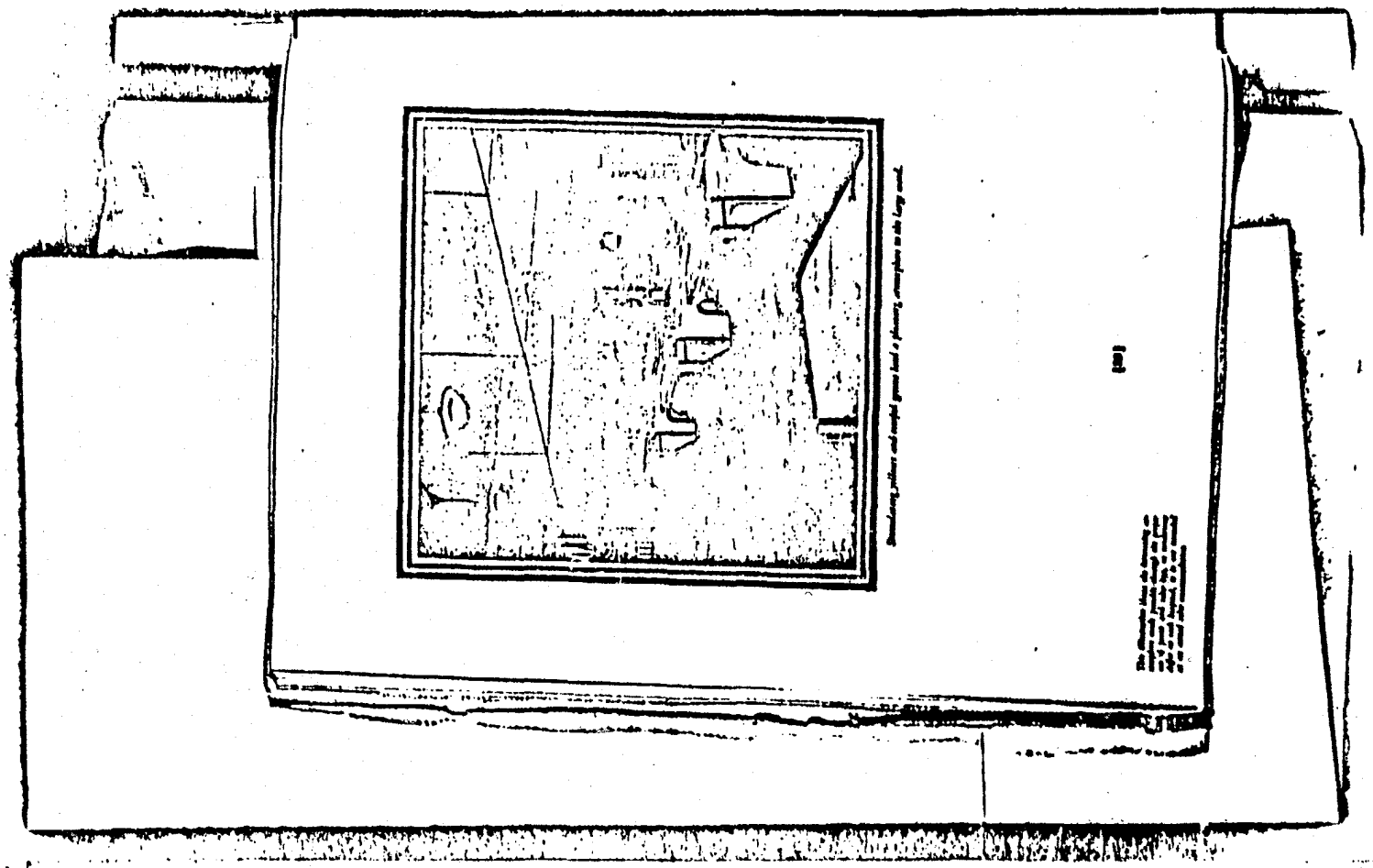
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decorated as it should be both from the standpoint of color and materials used.

As a matter of fact, standardizing on material and standardizing on color go hand in hand. The use of white-lead makes it possible to secure any of the selected colors without adding to the number of materials carried in a paint shop and the adoption of white-lead is a practical method of securing the special tints and shades of color that are needed to obtain the psychological and emotional effects desired.

Flat vs. Glass

For the hospital particularly, a glossy wall, woodwork and ceiling surface is not desirable. A surface with a high gloss acts like a mirror, though in a somewhat lesser degree. Every light from whatever source is reflected from one point to another on the surface resulting in highly concentrated areas of light and shadow. This is inefficient from a lighting standpoint, but what is worse, it is tiring to the eyes of patients, nurses and others.

With white-lead and flatting oil, it is possible to paint hospital interiors so that they have a velvety, light-diffusing surface that will retain its substance and color for a satisfactory period even under frequent scrubbings with soap and water.

White-lead and flatting oil make a paint that dries with a glossless finish of unusual richness and depth of tone. It gives to walls and ceilings that very desirable and necessary quality of uniformly distributing illumination, whether natural or artificial, eliminating all excessive high lights and shadows. Yet it has enough lustre to save it from a dead flat.

Considering Painting in the Proper Light

All that has been said before in this chapter merely goes to prove that the entire painting problem in the hospital should be considered and dealt with just as are the other problems handled daily by the superintendent in maintaining his institution as a well-oiled, smooth-running organization. Once he has standardized on materials and

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colors, dealing with painting becomes a relatively simple matter. At the same time he is assured that the painting is being handled economically and soundly both from a practical and therapeutic angle.

In addition to securing the advantages of standardization, the hospital superintendent in selecting white-lead has the satisfaction of knowing that he is using, for the paintable surfaces of his institution, a product that has generations of approval behind it. White-lead, as is well known, has been used to protect and decorate surfaces from Colonial days down to the present. It was the standard then as it is today.

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