PLAINTIFF'S
EXHIBIT
SA-400

ENGINEERING:

An Illustrated Weekly Journal.

L. CXXXIII.—FROM JANUARY TO JUNE, 1932.

London:

CES FOR ADVERTISEMENTS AND PUBLICATION—35 & 36, BEDFORD STREET, STRAND, W.C.2.

1932.

rought up to the Marble Arch, ng to taxi-cabs to complete their assengers would, however, have n those arriving at, say, Padding- Waterloo. There is no doubt atrons of the main line railways difficulties they have to contend superable.

that the Commissioner based his at least, on the fact that con- ıdded to by vehicles which are the useful load is to form a ıay be asked, should restriction r coaches. On any of the main of London, in the morning or ber of cars containing a single t one and a chauffeur, will be ingly high. Doubtless many of the central area, but it is also ny actually penetrate into it well leave their cars at some complete their journey by other one by those who will, in future, ıter regions by motor coach. shall come to regulation in this of the promising moves in this tion of railway garages at subur.

Tubes were the first to start nced that others, such as the d Scottish, are following suit.

NOTES.

NE AUXILIARIES.

marine auxiliaries since the days ating marine engines has, as in hanical engineering, been vements in efficiency, space basis. At a recent Leicester Association of East Midlands Branch of the hanical Engineers, Mr. R. W. narised the changes by a brief n at various periods of typical vices. The cases chosen were ıat, circulating pumps and air ms. Mr. Allen pointed out that ctrical plant of, say, 1885, was two-cylinder engine driving a dynamo, and using steam at whole weighing about 5½ tons pical plant was one of 80-h.p. two-cylinder open-type com th 100 lb. steam. Again, ta the totally-enclosed engine and mbination were employed. The m. and steam pressure 150 lb wo-cylinder steam sets had in o 300-h.p. and the voltage had en plants of 300-kw. at 225 volts sets operating with 250-lb eg. F. superheat. The turbine e dynamo at 1,000 r.p.m. The ıg pumps and extraction pump in the unit, which was self compact. Sets up to 900-kw. r, were now being installed in other instances supplied by enerators, six-cylinder sets ble dynamos of 450-kw. output bly free from vibration. equally notable changes ha he original reciprocating pump in engines the first change, entrifugal type driven indepen n the turbine became popula as some time before this drift rculating pumps. However, the efficiency of the pump was between 1886 and the present it. to 80 per cent. The turbine nomical in space, especially the type, while improvements

rbine placed well above the waterline. to air supply plant, designers had been ated by the closer attention now given duction of losses in intake shafts, &c. These accounted for 50 per cent. of the supplied to the fans. The reduction to a minimum was now-a-days of moment when installations on board required to supply 320,000 cub. ft. per stokehold pressures of 3½ to 4 in.

STANDARDISATION IN AUSTRALIA.

Monday, January 14, a joint meeting of the Standards Institution and the Standards ion of Australia, was held, the two parties thering being assembled at the Board of London, and at Science House, Sydney, ey. On this side, the meeting was ed by the Right Honourable Walter Runci- sident of the Board of Trade, by Mr. Maurice hairman of the British Standards Institu- by Sir William Larke, chairman of the Steel Industry Committee, while on the speakers were Sir George Julius, chair- the Standards Association of Australia, Barraclough, dean of the Faculty of ing, University of Sydney, and Mr. C. Le Director of the British Standards Institu- y is at present in Australia. Mr. Runciman out that the development of standardisation arious parts of the Empire, upon the basis operation in establishing uniform standard ions, would contribute to the growth of perial trade, while Sir George Julius ed the growing realisation of the inter- ce of the two countries, and the need that tain should further extend her Empire . Not the least of the efforts being made hat end was, he said, the work of the two Associations, which for many years had ying each other's needs with a view to a maximum efficiency and minimum cost or material, which would satisfy the ure in this direction on the part of the anufacturer had resulted in the loss of ble trade in Australia, while primary in the latter country had equally failed and the markets in the Mother Country herefore, found it difficult to meet com- om others. This position could only be a whole-hearted and co-operative survey market requirements and manufacturing so that, as far as possible, those could be met by products from Empire. It was the intention of the Government to assist in the conduct of the Standards Association of Austr- Barraclough stated that in that were 500 committees dealing with ects of standardisation. That number large, but it must be remembered were scattered over a continent the size ich was divided into six self-governing Le Maistre uttered a warning to British on the necessity of adapting their special requirements of Australia, and advice that they should visit the for themselves, if possible. We advice to our manufacturers.

IMATION WORKS IN MADRAS.

ency of Madras is essentially an agri- 71 per cent. of its population being ing the soil. The total area of the 260 sq. miles and over 42 per cent. 39,260,000 acres, is under cultiva- proportion of the remainder is forest rtility of the soil is greatly increased and this has long been recognised by ous Madrasi agriculturist. About a the sown area is systematically irrigated not, therefore, depend on the adequacy during the twelve months ending June 30, 1930. This total was greater by 118,771 acres than the previous year's figure. The total revenue derived was Rs. 3,02,53,263 and the net revenue, after deducting working expenses, was Rs. 1,36,23,889. Some idea of the scale upon which the operations were carried on will be gained when it is stated that the total length of the main and branch canals of the irrigation works was 4,447 miles, some 1,180 miles of which were utilised for navigation as well as for irrigation purposes; the length of the distributing channels reached the large total of 10,320 miles. A good deal of the report is naturally devoted to particulars regarding the now well-known Cauvery-Metur irrigation project. Work on the main dam at Metur is shown to be progressing satisfactorily; 310,000 tons of masonry had been placed in position on the dam site during the year ending June 30, 1930, and this had been increased to 429,000 tons by the end of December, representing an average of 1,050 tons per working day. The line from Salem on the South Indian Railway to Metur was opened in April, 1929, and materials are now conveyed direct to Metur Dam station. The project includes a hydro-electric power scheme, by which it is hoped to generate 30,000-h.p. continuously all the year round. The insertion into the dam of four rows of 8-ft. 6-in. diameter pipes, for the purpose, was begun in November, 1930. We hope to deal with this subject at length shortly. Another important portion of the work of the Department is in connection with the restoration of the derelict tanks distributed over a wide area within the Presidency. The total area of land coming within the scope of the tank restoration scheme is 102,500 square miles, which, as will be seen, is two-thirds of the area of the Presidency itself. Up till the end of March, 1930, restoration works had been completed over an area of 83,137 sq. miles, and, in addition, works had been put in hand, or were about to be commenced, on a further 4,493 sq. miles of land. Consequently, some 85·49 per cent. of the total area comprised in the scheme had been dealt with by March 31, 1930.

REGULATIONS FOR THE ASBESTOS INDUSTRY.

The Home Secretary has issued a pamphlet of regulations relating to the Asbestos Industry, under Section 79 of the Factory and Workshop Act, 1901, three pages of which are concerned with the responsibilities of occupiers and one-half a page with the duties of persons employed, the remainder being taken up by familiar perambulatory matter. Assuming that brevity is more effective than diffuseness, there is no objection to this. Indeed, the whole pith of these regulations is comprised in the statement that the occupier is to provide mechanical means for preventing the escape of asbestos dust from the various machines into the room, and a breathing apparatus for each person employed in chambers where loose material is prevalent, while the persons employed are to wear that apparatus. If we regard the last stipulation as being the most important, it is because a long study of the reports of H.M. Inspector of Factories has convinced us that there are few, if any, of the methods proposed for increasing the safety of workmen, which these workmen will not exercise the greatest ingenuity to circumvent, when they feel so disposed. That this view is also held by the authorities is shown by the fact that another stipulation animadverts against the misuse of, or interference with, any appliance provided in pursuance of these regulations. The processes covered include the breaking, crushing, disintegrating and grinding of asbestos, the manufacture of asbestos textiles and insulating materials, and the cleaning of the equipment used for the collection of the dust. The regulations are published by H.M. Stationery Office, as *Statutory Rules and Orders*, 1931, No. 1140, at a price of 2*d.* net.

THE ENGINEERING OUTLOOK.

IV.—THE MOTOR INDUSTRY.

OFFICIAL employment statistics do not distinguish between the private car industry and commercial vehicle industry. In Table I accordingly a general summary is given covering the group of industries centred round the internal combustion engine.

TABLE I.—*Number of Workpeople Employed.*

Year.	Motors, Cycles and Aircraft.*			
	Number Insured.	Number Unemployed.	Number Employed.	Index 1923 = 100.
1923	191,830	16,108	175,722	100·0
1924	203,340	16,145	187,195	106·6
1925	214,840	14,100	200,740	114·3
1926	224,040	21,609	202,431	115·8
1927	232,860	18,339	214,521	122·5
1928	234,830	22,015	212,815	121·1
1929	245,410	17,614	227,796	129·6
1930	247,140	40,647	206,493	117·5
1931	251,320	57,462	193,858	110·3

* Figures relate only to the month of July in each year.

As explained in previous articles, the Ministry of Labour figures in respect of 1928 to 1931 are not strictly comparable with those for previous years, in that they leave out of account all workpeople 65 years of age and over, and youths under 16. Possibly, an addition of some 2,000 workpeople employed should be made on this account. The adjustment does not, however, affect materially the very decided recession shown in the above table. None of this recession is probably allocable to the aircraft industry, and a small amount only in the aggregate to the motor cycle and cycle industries. Although there was still a net influx of workpeople into the industry, it was on a smaller scale than in recent years, and it was insufficient to compensate the large increase in the number unemployed. The resulting figure of employment is lower than any year since 1924, and even allowing for the rapid technical advance in productive processes, indicates



ivate-car
f Motor
in their
ncluding
ptember.

164,553
165,352
182,256*
171,052*
158,298*

lustry is
ne neces-
with the
impetus
by the
h is held
ecessary
re, been

on the basis of the production year. Apart from the slight overlap in 1928-29, this method does not vitiate comparison, and even in the year of transition little difference would be made where the calendar year figures substituted for those of the production year. The decline in production in this section of the motor industry is in line with the decreased employment noted above, and was progressive throughout the year. Twelve monthly totals, however, show that since October, 1931, the decline has been arrested. Both as regards the magnitude of the decline and the recent improvement, these results are highly satisfactory, especially if comparison is made with the position of the motor industries of other countries. Indeed, during some weeks of

supply plant, designers had been the closer attention now given of losses in intake shafts, &c. counted for 50 per cent. of the ied to the fans. The reduction a minimum was now-a-days of it when installations on board supply 320,000 cub. ft. per d pressures of 3½ to 4 in.

ANDARDISATION IN AUSTRALIA.

nuary 14, a joint meeting of the Institution and the Standards ralia, was held, the two parties ing assembled at the Board of id at Science House, Sydney, this side, the meeting was ight Honourable Walter Runci- e Board of Trade, by Mr. Maurice f the British Standards Institu- illiam Larke, chairman of the ustry Committee, while on the were Sir George Julius, chair- ards Association of Australia, ugh, dean of the Faculty of sity of Sydney, and Mr. C. Le the British Standards Institu- nt in Australia. Mr. Runciman development of standardisation of the Empire, upon the basis in establishing uniform standard l contribute to the growth of e, while Sir George Julius owing realisation of the inter- wo countries, and the need that ld further extend her Empire least of the efforts being made is, he said, the work of the two ons, which for many years had other's needs with a view to im efficiency and minimum cost rial, which would satisfy the rection on the part of the d resulted in the loss of e in Australia, while primary ter country had equally failed markets in the Mother Country found it difficult to meet com- . This position could only be earted and co-operative survey quirements and manufacturing t, as far as possible, those be met by products from It was the intention of the rnment to assist in the conduct tandards Association of Austr- rraclough stated that in that 500 committees dealing with tandardisation. That number but it must be remembered ered over a continent the size divided into six self-governing re uttered a warning to British e necessity of adapting their l requirements of Australia, and ice that they should visit the themselves, if possible. We to our manufacturers.

WORKS IN MADRAS.

f Madras is essentially an agri- er cent. of its population being e soil. The total area of the q. miles and over 42 per cent. 60,000 acres, is under cultiva- ion of the remainder is forest soil is greatly increased long been recognised by Indian agriculturist. About a area is systematically irrigated fore, depend on the adequacy For many years past a large gation works have been in the Government and the annual of the Public Works Depart- This total was greater by 116,771 acres than the previous year's figure. The total revenue derived was Rs. 3,02,53,263 and the net revenue, after deducting working expenses, was Rs. 1,36,23,889. Some idea of the scale upon which the operations were carried on will be gained when it is stated that the total length of the main and branch canals of the irrigation works was 4,447 miles, some 1,180 miles of which were utilised for navigation as well as for irrigation purposes; the length of the distributing channels reached the large total of 10,320 miles. A good deal of the report is naturally devoted to particulars regarding the now well-known Cauvery-Metur irrigation project. Work on the main dam at Metur is shown to be progressing satisfactorily; 310,000 tons of masonry had been placed in position on the dam site during the year ending June 30, 1930, and this had been increased to 429,000 tons by the end of December, representing an average of 1,050 tons per working day. The line from Salem on the South Indian Railway to Metur was opened in April, 1929, and materials are now conveyed direct to Metur Dam station. The project includes a hydro-electric power scheme, by which it is hoped to generate 30,000-h.p. continuously all the year round. The insertion into the dam of four rows of 8-ft. 6-in. diameter pipes, for the purpose, was begun in November, 1930. We hope to deal with this subject at length shortly. Another important portion of the work of the Department is in connection with the restoration of the derelict tanks distributed over a wide area within the Presidency. The total area of land coming within the scope of the tank restoration scheme is 102,500 square miles, which, as will be seen, is two-thirds of the area of the Presidency itself. Up till the end of March, 1930, restoration works had been completed over an area of 83,137 sq. miles, and, in addition, works had been put in hand, or were about to be commenced, on a further 4,493 sq. miles of land. Consequently, some 85·49 per cent. of the total area comprised in the scheme had been dealt with by March 31, 1930.

REGULATIONS FOR THE ASBESTOS INDUSTRY.

The Home Secretary has issued a pamphlet of regulations relating to the Asbestos Industry, under Section 79 of the Factory and Workshop Act, 1901, three pages of which are concerned with the responsibilities of occupiers and one-half a page with the duties of persons employed, the remainder being taken up by familiar perambulatory matter. Assuming that brevity is more effective than diffuseness, there is no objection to this. Indeed, the whole pith of these regulations is comprised in the statement that the occupier is to provide mechanical means for preventing the escape of asbestos dust from the various machines into the room, and a breathing apparatus for each person employed in chambers where loose material is prevalent, while the persons employed are to wear that apparatus. If we regard the last stipulation as being the most important, it is because a long study of the reports of H.M. Inspector of Factories has convinced us that there are few, if any, of the methods proposed for increasing the safety of workmen, which these workmen will not exercise the greatest ingenuity to circumvent, when they feel so disposed. That this view is also held by the authorities is shown by the fact that another stipulation animadverts against the misuse of, or interference with, any appliance provided in pursuance of these regulations. The processes covered include the breaking, crushing, disintegrating and grinding of asbestos, the manufacture of asbestos textiles and insulating materials, and the cleaning of the equipment used for the collection of the dust. The regulations are published by H.M. Stationery Office, as *Statutory Rules and Orders*, 1931, No. 1140, at a price of 2*d.* net.

THE BROTHERS HAWORTH AND CARRON WORKS.—Messrs. Carron Company, Carron, Falkirk, have recently published the eighth of their attractive little pamphlets in the "Famous Men and Carron Works" series. This deals with the work of William and Henry Haworth,

IV.—THE MOTOR INDUSTRY.

OFFICIAL employment statistics do not distinguish between the private car industry and commercial vehicle industry. In Table I accordingly a general summary is given covering the group of industries centred round the internal combustion engine.

TABLE I.—*Number of Workpeople Employed.*

Year.	Motors, Cycles and Aircraft.*			
	Number Insured.	Number Unemployed.	Number Employed.	Index 1923 = 100.
1923	191,830	16,108	175,722	100·0
1924	203,340	16,145	187,195	106·5
1925	214,840	14,100	200,740	114·3
1926	224,040	21,609	202,431	115·6
1927	232,860	18,339	214,531	122·5
1928	234,830	22,015	212,815	121·1
1929	245,410	17,614	227,796	129·6
1930	247,140	40,647	206,493	117·5
1931	251,320	57,462	193,858	110·3

* Figures relate only to the month of July in each year.

As explained in previous articles, the Ministry of Labour figures in respect of 1928 to 1931 are not strictly comparable with those for previous years, in that they leave out of account all workpeople 65 years of age and over, and youths under 16. Possibly, an addition of some 2,000 workpeople employed should be made on this account. The adjustment does not, however, affect materially the very decided recession shown in the above table. None of this recession is probably allocable to the aircraft industry, and a small amount only in the aggregate to the motor cycle and cycle industries. Although there was still a net influx of workpeople into the industry, it was on a smaller scale than in recent years, and it was insufficient to compensate the large increase in the number unemployed. The resulting figure of employment is lower than any year since 1924, and even allowing for the rapid technical advance in productive processes, indicates a marked decline in production as compared with 1929.

Private Cars.—The revised figures of private-car production, published by the Society of Motor Manufacturers and Traders, Limited, in their annual review for the years up to and including 1928, and the figures for the years ending September, 19 in Table II.

Cars.

... ...	164,553
... ...	165,352
... ...	182,256*
... ...	171,052*
... ...	158,298*

ber 30.



motor industry is owing to the neces- ccordance with the nd to the impetus w models by the npia, which is held nce the necessary s, therefore, been

fro
sit
sea
giv
an
at
dat

more useful to collate production figures on the basis of the production year. Apart from the slight overlap in 1928-29, this method does not vitiate comparison, and even in the year of transition little difference would be made where the calendar year figures substituted for those of the production year. The decline in production in this section of the motor industry is in line with the decreased employment noted above, and was progressive throughout the year. Twelve monthly totals, however, show that since October, 1931, the decline has been arrested. Both as regards the magnitude of the decline and the recent improvement, these results are highly satisfactory, especially if comparison is made with the position of the motor industries of other countries. Indeed, during some weeks of November, 1931, it was not impossible that British production exceeded the production of the U.S.A., which was then, owing to shut-downs, running at some 7,000 units per week. Such a position is certainly unprecedented, and perhaps unlikely to

he Marble Arch
to complete their
l, however, have
at, say, Padding-
ere is no doubt
ain line railways
have to contend

issioner based his
e fact that con-
hicles which are
ad is to form a
should restriction
any of the main
the morning or
taining a single
hauffeur, will be
oubtless many of
ea, but it is also
enetrate into it
eir cars at some
journey by other
bo will, in future,
by motor coach
regulation in this
ng moves in this
garages at subur-
the first to start
hers, such as the
following suit.

nce the days
ngines has, as in
ngineering, been
s in efficiency,
asis. At a recent
Association of
s Branch of the
eers, Mr. R. W.
anges by a brief
eriods of typical
ases chosen were
pumps and air
pointed out that
f, say, 1885, was
engine driving a
using steam at
g about 5½ tons
as one of 80-h.p.
open-type com-
am. Again, ten
losed engine and
e employed. The
pressure 150 lb.
eam sets had in-
the voltage had
0-kw. at 225 volts
ing with 250-lb
at. The turbine
1,000 r.p.m. The
extraction pump
which was self
ts up to 900-kw.
being installed
nces supplied by
-cylinder sets o
f 450-kw. output
n vibration. In
ble changes had
ciprocating pump
e first change, in
e driven indepen-
became popular
before this drive
However, it
pump sets

turbine placed well above the waterline. With regard to air supply plant, designers had been assisted by the closer attention now given to the reduction of losses in intake shafts, &c. Formerly, these accounted for 50 per cent. of the energy supplied to the fans. The reduction of losses to a minimum was now-a-days of great moment when installations on board ship be required to supply 320,000 cub. ft. per minute against stokehold pressures of 3½ to 4 in.

Engineering Standardisation in Australia.

On Thursday, January 14, a joint meeting of the British Standards Institution and the Standards Association of Australia, was held, the two parties to the gathering being assembled at the Board of Trade, London, and at Science House, Sydney, respectively. On this side, the meeting was presided by the Right Honourable Walter Runciman, President of the Board of Trade, by Mr. Maurice Peto, chairman of the British Standards Institution, and by Sir William Larke, chairman of the Iron and Steel Industry Committee, while on the other side the speakers were Sir George Julius, chairman of the Standards Association of Australia, Mr. Henry Barraclough, dean of the Faculty of Engineering, University of Sydney, and Mr. C. Le Maistre, Director of the British Standards Institution, who is at present in Australia. Mr. Runciman pointed out that the development of standardisation in the various parts of the Empire, upon the basis of co-operation in establishing uniform standard specifications, would contribute to the growth of Imperial trade, while Sir George Julius outlined the growing realisation of the interdependence of the two countries, and the need that Great Britain should further extend her Empire trade. Not the least of the efforts being made to that end was, he said, the work of the two Standards Associations, which for many years had been studying each other's needs with a view to arriving at a maximum efficiency and minimum cost in article or material, which would satisfy the user. Failure in this direction on the part of the British manufacturer had resulted in the loss of considerable trade in Australia, while primary producers in the latter country had equally failed to understand the markets in the Mother Country and, therefore, found it difficult to meet competition from others. This position could only be met by a whole-hearted and co-operative survey of local market requirements and manufacturing processes, so that, as far as possible, those requirements could be met by products from within the Empire. It was the intention of the Australian Government to assist in the conduct of the work of the Standards Association of Australia. Henry Barraclough stated that in that country there were 500 committees dealing with various aspects of standardisation. That number was very large, but it must be remembered that they were scattered over a continent the size of Europe, which was divided into six self-governing States. Mr. Le Maistre uttered a warning to British manufacturers on the necessity of adapting their goods to the special requirements of Australia, and gave the good advice that they should visit the country to see for themselves, if possible. We commend this advice to our manufacturers.

Irrigation Works in Madras.

The Presidency of Madras is essentially an agricultural region, 71 per cent. of its population being engaged in tilling the soil. The total area of the Presidency is 142,260 sq. miles and over 42 per cent. of it, namely, 39,260,000 acres, is under cultivation. A further proportion of the remainder is forest land. The fertility of the soil is greatly increased during the twelve months ending June 30, 1930. This total was greater by 118,771 acres than the previous year's figure. The total revenue derived was Rs. 3,02,53,263 and the net revenue, after deducting working expenses, was Rs. 1,36,23,889. Some idea of the scale upon which the operations were carried on will be gained when it is stated that the total length of the main and branch canals of the irrigation works was 4,447 miles, some 1,180 miles of which were utilised for navigation as well as for irrigation purposes; the length of the distributing channels reached the large total of 10,320 miles. A good deal of the report is naturally devoted to particulars regarding the now well-known Cauvery-Metur irrigation project. Work on the main dam at Metur is shown to be progressing satisfactorily; 310,000 tons of masonry had been placed in position on the dam site during the year ending June 30, 1930, and this had been increased to 429,000 tons by the end of December, representing an average of 1,050 tons per working day. The line from Salem on the South Indian Railway to Metur was opened in April, 1929, and materials are now conveyed direct to Metur Dam station. The project includes a hydro-electric power scheme, by which it is hoped to generate 30,000-h.p. continuously all the year round. The insertion into the dam of four rows of 8-ft. 6-in. diameter pipes, for the purpose, was begun in November, 1930. We hope to deal with this subject at length shortly. Another important portion of the work of the Department is in connection with the restoration of the derelict tanks distributed over a wide area within the Presidency. The total area of land coming within the scope of the tank restoration scheme is 102,500 square miles, which, as will be seen, is two-thirds of the area of the Presidency itself. Up till the end of March, 1930, restoration works had been completed over an area of 83,137 sq. miles, and, in addition, works had been put in hand, or were about to be commenced, on a further 4,493 sq. miles of land. Consequently, some 85·49 per cent. of the total area comprised in the scheme had been dealt with by March 31, 1930.

Regulations for the Asbestos Industry.

The Home Secretary has issued a pamphlet of regulations relating to the Asbestos Industry, under Section 79 of the Factory and Workshop Act, 1901, three pages of which are concerned with the responsibilities of occupiers and one-half a page with the duties of persons employed, the remainder being taken up by familiar perambulatory matter. Assuming that brevity is more effective than diffuseness, there is no objection to this. Indeed, the whole pith of these regulations is comprised in the statement that the occupier is to provide mechanical means for preventing the escape of asbestos dust from the various machines into the room, and a breathing apparatus for each person employed in chambers where loose material is prevalent, while the persons employed are to wear that apparatus. If we regard the last stipulation as being the most important, it is because a long study of the reports of H.M. Inspector of Factories has convinced us that there are few, if any, of the methods proposed for increasing the safety of workmen, which these workmen will not exercise the greatest ingenuity to circumvent, when they feel so disposed. That this view is also held by the authorities is shown by the fact that another stipulation animadverts against the misuse of, or interference with, any appliance provided in pursuance of these regulations. The processes covered include the breaking, crushing, disintegrating and grinding of asbestos, the manufacture of asbestos textiles and insulating materials, and the cleaning of the equipment used for the collection of the dust. The regulations are published by H.M. Stationery

THE ENGINEERING OUTLOOK.

IV.—The Motor Industry.

Official employment statistics do not distinguish between the private car industry and commercial vehicle industry. In Table I accordingly a general summary is given covering the group of industries centred round the internal combustion engine.

Table I.—*Number of Workpeople Employed.*

Year.	Motors, Cycles and Aircraft.*			
	Number Insured.	Number Unemployed.	Number Employed.	Index 1923 = 100.
1923	191,830	16,108	175,722	100·0
1924	203,340	16,145	187,195	106·5
1925	214,340	14,100	200,740	114·3
1926	224,040	21,609	202,431	115·6
1927	232,860	18,339	214,531	122·5
1928	234,830	22,015	212,815	121·1
1929	245,410	17,614	227,796	129·6
1930	247,140	40,647	206,493	117·5
1931	251,320	57,462	193,858	110·3

* Figures relate only to the month of July in each year.

As explained in previous articles, the Ministry of Labour figures in respect of 1928 to 1931 are not strictly comparable with those for previous years, in that they leave out of account all workpeople 65 years of age and over, and youths under 16. Possibly, an addition of some 2,000 workpeople employed should be made on this account. The adjustment does not, however, affect materially the very decided recession shown in the above table. None of this recession is probably allocable to the aircraft industry, and a small amount only in the aggregate to the motor cycle and cycle industries. Although there was still a net influx of workpeople into the industry, it was on a smaller scale than in recent years, and it was insufficient to compensate the large increase in the number unemployed. The resulting figure of employment is lower than any year since 1924, and even allowing for the rapid technical advance in productive processes, indicates a marked decline in production as compared with 1929.

Private Cars.—The revised figures of private-car production, published by the Society of Motor Manufacturers and Traders, Limited, in their annual review for the years up to and including 1928, and the figures for the years ending September, 1929, 1930 and 1931, are given in Table II.

Table II.—*Output of Cars.*

1923	... 71,396	1927	...	...	164,553
1924...	... 116,000	1928	...	...	165,362
1925...	... 132,000	1929	...	...	182,256*
1926...	... 153,500	1930	...	...	171,052*
		1931	...	...	158,298*

* Year ending September 30.

The production year of the motor industry is from October 1 to September 30, owing to the necessity of regulating production in accordance with the seasonal movement of demand and to the impetus given to the production of new models by the annual Motor Exhibition at Olympia, which is held at the beginning of October. Since the necessary data have been available, it has, therefore, been more useful to collate production figures on the basis of the production year. Apart from the slight overlap in 1928-29, this method does not vitiate comparison, and even in the year of transition little difference would be made where the calendar year figures substituted for those of the production year. The decline in production in this section of the motor industry is in line with the decreased employment noted above, and was progressive throughout the year. Twelve monthly totals, however, show that since October, 1931, the decline has been arrested. Both as regards the magnitude of the decline and the recent improvement, these results

aced well above the waterline. r supply plant, designers had been y the closer attention now given of losses in intake shafts, &c. ccounted for 50 per cent. of the lied to the fans. The reduction a minimum was now-a-days of nt when installations on board l to supply 320,000 cub. ft. per okehold pressures of 3½ to 4 in.

STANDARDISATION IN AUSTRALIA.

anuary 14, a joint meeting of the Institution and the Standards stralia, was held, the two parties being assembled at the Board of and at Science House, Sydney, this side, the meeting was Right Honourable Walter Runci- he Board of Trade, by Mr. Maurice of the British Standards Institu- William Larke, chairman of the dustry Committee, while on the s were Sir George Julius, chair- dards Association of Australia, lough, dean of the Faculty of ersity of Sydney, and Mr. C. Le of the British Standards Institu- sent in Australia. Mr. Runciman e development of standardisation ts of the Empire, upon the basis n in establishing uniform standard ontribute to the growth of while Sir George Julius ing realisation of the inter- two countries, and the need that uld further extend her Empire least of the efforts being made was, he said, the work of the two tions, which for many years had h other's needs with a view to num efficiency and minimum cost terial, which would satisfy the his direction on the part of the rer had resulted in the loss of de in Australia, while primary atter country had equally failed markets in the Mother Country found it difficult to meet com- rs. This position could only be -hearted and co-operative survey requirements and manufacturing hat, as far as possible, those d be met by products from e. It was the intention of the vernment to assist in the conduct Standards Association of Austr- Barraclough stated that in that e 500 committees dealing with standardisation. That number e, but it must be remembered ttered over a continent the size as divided into six self-governing istre uttered a warning to British the necessity of adapting their ial requirements of Australia, and that they should visit the mselves, if possible. We o our manufacturers.

ON WORKS IN MADRAS.

of Madras is essentially an agri- per cent. of its population being the soil. The total area of the) sq. miles and over 42 per cent. 260,000 acres, is under cultiva- during the twelve months ending June 30, 1930. This total was greater by 118,771 acres than the previous year's figure. The total revenue derived was Rs. 3,02,53,263 and the net revenue, after deducting working expenses, was Rs. 1,36,23,889. Some idea of the scale upon which the operations were carried on will be gained when it is stated that the total length of the main and branch canals of the irrigation works was 4,447 miles, some 1,180 miles of which were utilised for navigation as well as for irrigation purposes; the length of the distributing channels reached the large total of 10,320 miles. A good deal of the report is naturally devoted to particulars regarding the now well-known Cauvery-Metur irrigation project. Work on the main dam at Metur is shown to be progressing satisfactorily; 310,000 tons of masonry had been placed in position on the dam site during the year ending June 30, 1930, and this had been increased to 429,000 tons by the end of December, representing an average of 1,050 tons per working day. The line from Salem on the South Indian Railway to Metur was opened in April, 1929, and materials are now conveyed direct to Metur Dam station. The project includes a hydro-electric power scheme, by which it is hoped to generate 30,000-h.p. continuously all the year round. The insertion into the dam of four rows of 8-ft. 6-in. diameter pipes, for the purpose, was begun in November, 1930. We hope to deal with this subject at length shortly. Another important portion of the work of the Department is in connection with the restoration of the derelict tanks distributed over a wide area within the Presidency. The total area of land coming within the scope of the tank restoration scheme is 102,500 square miles, which, as will be seen, is two-thirds of the area of the Presidency itself. Up till the end of March, 1930, restoration works had been completed over an area of 83,137 sq. miles, and, in addition, works had been put in hand, or were about to be commenced, on a further 4,493 sq. miles of land. Consequently, some 85·49 per cent. of the total area comprised in the scheme had been dealt with by March 31, 1930.

REGULATIONS FOR THE ASBESTOS INDUSTRY.

The Home Secretary has issued a pamphlet of regulations relating to the Asbestos Industry, under Section 79 of the Factory and Workshop Act, 1901, three pages of which are concerned with the responsibilities of occupiers and one-half a page with the duties of persons employed, the remainder being taken up by familiar perambulatory matter. Assuming that brevity is more effective than diffuseness, there is no objection to this. Indeed, the whole pith of these regulations is comprised in the statement that the occupier is to provide mechanical means for preventing the escape of asbestos dust from the various machines into the room, and a breathing apparatus for each person employed in chambers where loose material is prevalent, while the persons employed are to wear that apparatus. If we regard the last stipulation as being the most important, it is because a long study of the reports of H.M. Inspector of Factories has convinced us that there are few, if any, of the methods proposed for increasing the safety of workmen, which these workmen will not exercise the greatest ingenuity to circumvent, when they feel so disposed. That this view is also held by the authorities is shown by the fact that another stipulation animadverts against the misuse of, or interference with, any appliance provided in pursuance of these regulations. The processes covered include the breaking, crushing, disintegrating and grinding of asbestos, the manufacture of asbestos textiles and insulating materials, and the cleaning

THE ENGINEERING OUTLOOK.

IV.—THE MOTOR INDUSTRY.

OFFICIAL employment statistics do not distinguish between the private car industry and commercial vehicle industry. In Table I accordingly a general summary is given covering the group of industries centred round the internal combustion engine.

TABLE I.—*Number of Workpeople Employed.*

Year.	Motors, Cycles and Aircraft.*			
	Number Insured.	Number Unemployed.	Number Employed.	Index 1923 = 100.
1923	191,830	16,108	175,722	100·0
1924	203,340	16,145	187,195	106·5
1925	214,340	14,100	200,740	114·3
1926	224,040	21,609	202,431	115·6
1927	232,860	18,339	214,531	122·5
1028	234,830	22,015	212,815	121·1
1929	245,410	17,614	227,796	129·6
1930	247,140	40,647	206,493	117·5
1931	251,320	57,462	193,858	110·3

* Figures relate only to the month of July in each year.

As explained in previous articles, the Ministry of Labour figures in respect of 1928 to 1931 are not strictly comparable with those for previous years, in that they leave out of account all workpeople 65 years of age and over, and youths under 16. Possibly, an addition of some 2,000 workpeople employed should be made on this account. The adjustment does not, however, affect materially the very decided recession shown in the above table. None of this recession is probably allocable to the aircraft industry, and a small amount only in the aggregate to the motor cycle and cycle industries. Although there was still a net influx of workpeople into the industry, it was on a smaller scale than in recent years, and it was insufficient to compensate the large increase in the number unemployed. The resulting figure of employment is lower than any year since 1924, and even allowing for the rapid technical advance in productive processes, indicates a marked decline in production as compared with 1929.

Private Cars.—The revised figures of private-car production, published by the Society of Motor Manufacturers and Traders, Limited, in their annual review for the years up to and including 1928, and the figures for the years ending September, 1929, 1930 and 1931, are given in Table II.

TABLE II.—*Output of Cars.*

1923 ...	71,396	1927	164,553
1924... ...	116,600	1928	165,352
1925... ...	132,000	1929	182,256*
1926... ...	153,500	1930	171,052*
		1931	158,298*

* Year ending September 30.

The production year of the motor industry is from October 1 to September 30, owing to the necessity of regulating production in accordance with the seasonal movement of demand and to the impetus given to the production of new models by the annual Motor Exhibition at Olympia, which is held at the beginning of October. Since the necessary data have been available, it has, therefore, been more useful to collate production figures on the basis of the production year. Apart from the slight overlap in 1928-29, this method does not vitiate comparison, and even in the year of transition little difference would be made where the calendar year figures substituted for those of the production year. The decline in production in this section of the motor industry is in line with the decreased employment noted above, and was progressive throughout the year. Twelve monthly totals, however, show that since October 1931 the decline has been

ought up to the Marble Arch,
ig to taxi-cabs to complete their
ssengers would, however, have
n those arriving at, say, Padding-
Waterloo. There is no doubt
atrons of the main line railways
difficulties they have to contend
superable.

that the Commissioner based his
it least, on the fact that con-
dded to by vehicles which are
the useful load is to form a
ay be asked, should restriction
r coaches. On any of the main
of London, in the morning or
ber of cars containing a single
t one and a chauffeur, will be
ingly high. Doubtless many of
the central area, but it is also
ny actually penetrate into it
s well leave their cars at some
complete their journey by other
one by those who will, in future,
nter regions by motor coach.
shall come to regulation in this
of the promising moves in this
ption of railway garages at subur-
Tubes were the first to start
ounced that others, such as the
nd Scottish, are following suit.

NOTES.

AUXILIARIES.

The auxiliaries since the days
ating marine engines has, as in
mechanical engineering, been
improvements in efficiency,
right or space basis. At a recent
the Leicester Association of
East Midlands Branch of the
hanical Engineers, Mr. R. W.
marised the changes by a brief
in at various periods of typical
rvices. The cases chosen were
ant, circulating pumps and air
ms. Mr. Allen pointed out that
lectrical plant of, say, 1885, was
, two-cylinder engine driving a
dynamo, and using steam at
whole weighing about 5½ tons.
ypical plant was one of 80-h.p.,
a two-cylinder open-type com-
ith 100 lb. steam. Again, ten
the totally-enclosed engine and
ombination were employed. The
m. and steam pressure 150 lb.
two-cylinder steam sets had in-
to 300-h.p. and the voltage had
ern plants of 300-kw. at 225 volts
ne sets operating with 250-lb
deg. F. superheat. The turbine
he dynamo at 1,000 r.p.m. The
ing pumps and extraction pump
t in the unit, which was self
y compact. Sets up to 900-kw.
er, were now being installed
e in other instances supplied by
generators, six-cylinder sets of
pole dynamos of 450-kw. output
ably free from vibration. In
equally notable changes had
the original reciprocating pumps
ain engines the first change, in
centrifugal type driven indepen-
en the turbine became popular
was some time before this drive
circulating pumps. However, it

turbine placed well above the waterline.
gard to air supply plant, designers had been
sisted by the closer attention now given
reduction of losses in intake shafts, &c.
these accounted for 50 per cent. of the
ergy supplied to the fans. The reduction
osses to a minimum was now-a-days of
moment when installations on board
required to supply 320,000 cub. ft. per
gainst stokehold pressures of 3½ to 4 in.

ENGINEERING STANDARDISATION IN AUSTRALIA.

Thursday, January 14, a joint meeting of the
Standards Institution and the Standards
ion of Australia, was held, the two parties
gathering being assembled at the Board of
London, and at Science House, Sydney,
ively. On this side, the meeting was
ed by the Right Honourable Walter Runci-
President of the Board of Trade, by Mr. Maurice
hairman of the British Standards Institu-
and by Sir William Larke, chairman of the
Steel Industry Committee, while on the
the speakers were Sir George Julius, chair-
of the Standards Association of Australia,
ry Barraclough, dean of the Faculty of
ring, University of Sydney, and Mr. C. Le
, Director of the British Standards Institu-
ho is at present in Australia. Mr. Runciman
d out that the development of standardisation
various parts of the Empire, upon the basis
co-operation in establishing uniform standard
ions, would contribute to the growth of
perial trade, while Sir George Julius
ed the growing realisation of the inter-
ance of the two countries, and the need that
Britain should further extend her Empire
. Not the least of the efforts being made
that end was, he said, the work of the two
Associations, which for many years had
dying each other's needs with a view to
at a maximum efficiency and minimum cost
ple or material, which would satisfy the
ailure in this direction on the part of the
manufacturer had resulted in the loss of
sible trade in Australia, while primary
in the latter country had equally failed
stand the markets in the Mother Country
Therefore, found it difficult to meet com-
from others. This position could only be
by a whole-hearted and co-operative survey
al market requirements and manufacturing
es, so that, as far as possible, those
nts could be met by products from
Empire. It was the intention of the
ealth Government to assist in the conduct
k of the Standards Association of Austr-
Henry Barraclough stated that in that
re were 500 committees dealing with
pects of standardisation. That number
ear large, but it must be remembered
were scattered over a continent the size
which was divided into six self-governing
. Le Maistre uttered a warning to British
ers on the necessity of adapting their
o the special requirements of Australia, and
good advice that they should visit the
see for themselves, if possible. We
his advice to our manufacturers.

IRRIGATION WORKS IN MADRAS.

Presidency of Madras is essentially an agri-
ion, 71 per cent. of its population being
by tilling the soil. The total area of the
is 142,260 sq. miles and over 42 per cent.
namely, 39,260,000 acres, is under cultiva-
fair proportion of the remainder is forest.
The fertility of the soil is greatly increased
during the twelve months ending June 30, 1930. This total was greater by 118,771 acres than the previous year's figure. The total revenue derived was Rs. 3,02,53,263 and the net revenue, after deducting working expenses, was Rs. 1,36,23,889. Some idea of the scale upon which the operations were carried on will be gained when it is stated that the total length of the main and branch canals of the irrigation works was 4,447 miles, some 1,180 miles of which were utilised for navigation as well as for irrigation purposes; the length of the distributing channels reached the large total of 10,320 miles. A good deal of the report is naturally devoted to particulars regarding the now well-known Cauvery-Metur irrigation project. Work on the main dam at Metur is shown to be progressing satisfactorily; 310,000 tons of masonry had been placed in position on the dam site during the year ending June 30, 1930, and this had been increased to 429,000 tons by the end of December, representing an average of 1,050 tons per working day. The line from Salem on the South Indian Railway to Metur was opened in April, 1929, and materials are now conveyed direct to Metur Dam station. The project includes a hydro-electric power scheme, by which it is hoped to generate 30,000-h.p. continuously all the year round. The insertion into the dam of four rows of 8-ft. 6-in. diameter pipes, for the purpose, was begun in November, 1930. We hope to deal with this subject at length shortly. Another important portion of the work of the Department is in connection with the restoration of the derelict tanks distributed over a wide area within the Presidency. The total area of land coming within the scope of the tank restoration scheme is 102,500 square miles, which, as will be seen, is two-thirds of the area of the Presidency itself. Up till the end of March, 1930, restoration works had been completed over an area of 83,137 sq. miles, and, in addition, works had been put in hand, or were about to be commenced, on a further 4,493 sq. miles of land. Consequently, some 85·49 per cent. of the total area comprised in the scheme had been dealt with by March 31, 1930.

REGULATIONS FOR THE ASBESTOS INDUSTRY.

The Home Secretary has issued a pamphlet of regulations relating to the Asbestos Industry, under Section 79 of the Factory and Workshop Act, 1901, three pages of which are concerned with the responsibilities of occupiers and one-half a page with the duties of persons employed, the remainder being taken up by familiar perambulatory matter. Assuming that brevity is more effective than diffuseness, there is no objection to this. Indeed, the whole pith of these regulations is comprised in the statement that the occupier is to provide mechanical means for preventing the escape of asbestos dust from the various machines into the room, and a breathing apparatus for each person employed in chambers where loose material is prevalent, while the persons employed are to wear that apparatus. If we regard the last stipulation as being the most important, it is because a long study of the reports of H.M. Inspector of Factories has convinced us that there are few, if any, of the methods proposed for increasing the safety of workmen, which these workmen will not exercise the greatest ingenuity to circumvent, when they feel so disposed. That this view is also held by the authorities is shown by the fact that another stipulation animadverts against the misuse of, or interference with, any appliance provided in pursuance of these regulations. The processes covered include the breaking, crushing, disintegrating and grinding of asbestos, the manufacture of asbestos textiles and insulating materials, and the cleaning of the equipment used for the collection of the dust. The regulations are published by H.M. Stationery

THE ENGINEERING OUTLOOK.

IV.—THE MOTOR INDUSTRY.

OFFICIAL employment statistics do not distinguish between the private car industry and commercial vehicle industry. In Table I accordingly a general summary is given covering the group of industries centred round the internal combustion engine.

TABLE I.—*Number of Workpeople Employed.*

Year.	Motors, Cycles and Aircraft.*			
	Number Insured.	Number Unemployed.	Number Employed.	Index 1923 = 100.
1923	191,830	16,108	175,722	100·0
1924	203,340	16,145	187,195	106·5
1925	214,340	14,100	200,740	114·3
1926	224,040	21,609	202,431	115·6
1927	232,860	18,329	214,531	122·5
1928	234,830	22,015	212,815	121·1
1929	245,410	17,614	227,796	129·6
1930	247,140	40,647	206,493	117·5
1931	251,320	57,462	193,858	110·3

* Figures relate only to the month of July in each year.

As explained in previous articles, the Ministry of Labour figures in respect of 1928 to 1931 are not strictly comparable with those for previous years, in that they leave out of account all workpeople 65 years of age and over, and youths under 16. Possibly, an addition of some 2,000 workpeople employed should be made on this account. The adjustment does not, however, affect materially the very decided recession shown in the above table. None of this recession is probably allocable to the aircraft industry, and a small amount only in the aggregate to the motor cycle and cycle industries. Although there was still a net influx of workpeople into the industry, it was on a smaller scale than in recent years, and it was insufficient to compensate the large increase in the number unemployed. The resulting figure of employment is lower than any year since 1924, and even allowing for the rapid technical advance in productive processes, indicates a marked decline in production as compared with 1929.

Private Cars.—The revised figures of private-car production, published by the Society of Motor Manufacturers and Traders, Limited, in their annual review for the years up to and including 1928, and the figures for the years ending September, 1929, 1930 and 1931, are given in Table II.

TABLE II.—*Output of Cars.*

1923	...	71,396	1927	...	154,553
1924...	...	116,800	1928	...	165,352
1925...	...	132,000	1929	...	182,256*
1926...	...	153,500	1930	...	171,052*
			1931	...	158,298*

* Year ending September 30.

The production year of the motor industry is from October 1 to September 30, owing to the necessity of regulating production in accordance with the seasonal movement of demand and to the impetus given to the production of new models by the annual Motor Exhibition at Olympia, which is held at the beginning of October. Since the necessary data have been available, it has, therefore, been more useful to collate production figures on the basis of the production year. Apart from the slight overlap in 1928-29, this method does not vitiate comparison, and even in the year of transition little difference would be made where the calendar year figures substituted for those of the production year. The decline in production in this section of the motor industry is in line with the decreased employment noted above, and was progressive throughout the year. Twelve monthly totals, however, show that since October, 1931, the decline has been arrested. Both as regards the magnitude of the decline and the recent improvement, these results