

much lighter weight (5 to 6 tons) than their predecessors and of at least equal power. Such results were due to the great improvement introduced into the processes of mechanical manufacture and the use of steam at a high tension produced in new boilers with a rapid vaporization under a small bulk.

When in the train of the different races and competitions that had taken place up to 1894, the Minister of

ply ammunition for an attack that once begun could not be interrupted at any cost.

As a traction engine replaces 32 horses, it will be seen that hardly more than 200 engines would have sufficed to permit them to begin the bombardment within but a few days after the invasion: and, as the defence had not been able to make sufficient preparations, the consequences would have been still more disastrous for us.

thus far appear to be notably beneficial, especially in the case of patients in the earlier stages of the disease. The theory of the treatment is based on the experiments which show that the vapors of the essential oils used have a powerful antiseptic effect on tubercular germs. Copies of the issue of "Consular Reports" containing a full account of the treatment can be obtained by addressing the Bureau of Foreign Commerce, State Department, Washington, D. C.

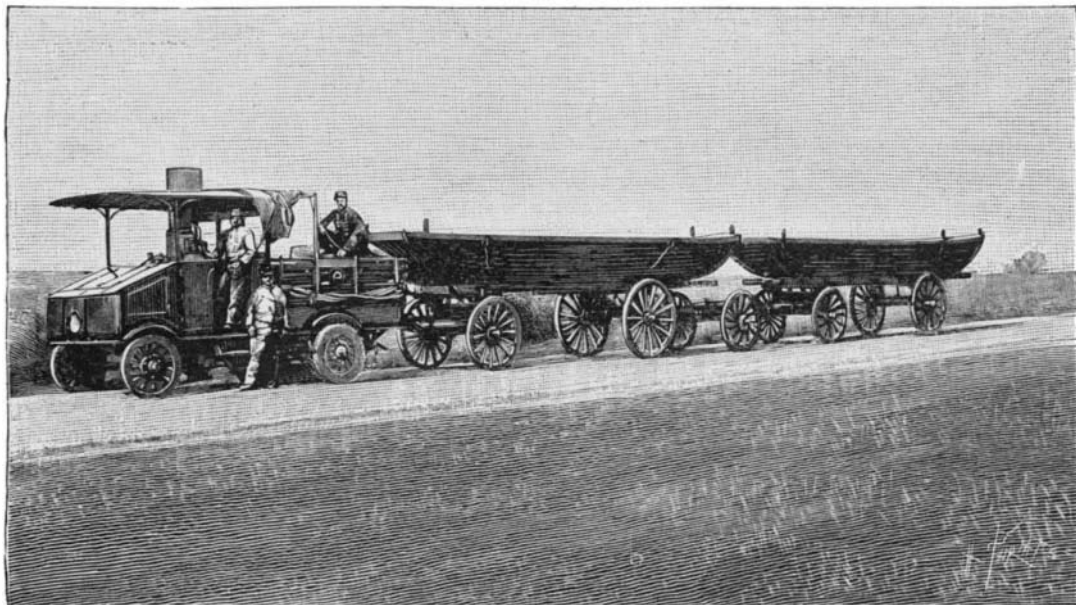


FIG. 2.—CARRIAGE OF PONTOONS FOR BRIDGES.

War consulted the military commissions that had closely followed the progress that had been made, he found that they were of the opinion that the Scotte traction engine was the type of automobile that seemed to answer the requirements of the army best. Some experiments of the most varied character, as shown by the photographs which we reproduce, were undertaken as long ago as the beginning of the winter of 1897 and were continued up to the course of the year 1899. They proved that the Scotte traction engines were capable of effecting all the conveyances required by armies in the field and the carriage of siege parks and large pieces of artillery. A Scotte train composed of six carriages of artillery or military equipments turns about and performs its revolutions within a radius of 11½ feet (Fig. 1), and is capable of passing over all the classified roads of France.

Here, then, we have a great problem solved, since we now have an engine which will advantageously replace horses, the number of which will continuously decrease, seeing the progress that automobilism is making. The advantages over animal traction are indisputable. In the first place, there is a reduction of about a half in the length of the convoys upon the road, and a reduction in the personnel necessary for the new mode of traction, which will employ but 120 men, while for the same convoy animal traction requires 180. The guarding of the sides of these automobile convoys on a campaign would require but half the number of men as a consequence of a reduction of the length upon the road. In forced marches, since the mechanical motor does not become wearied, it would permit of more extended strategic movements while ordinarily the latter have to be limited to the journey that horses can make in a given number of hours.

The following examples will make apparent the advantages of automobile traction in a still more striking manner. It has been proved that 25 Scotte traction engines are capable of supplying cartridges at 60 miles distance and in 18 hours, to an army corps of 60,000 men; and that it is possible to move in one night to a distance of 9 miles, 50 nine-inch guns of the weight of 24 tons each.

If, in 1870, the Prussians had had engines of this kind at their disposal when they began the siege of Paris, they would not have had to wait three months and a half before being able to bring their guns into position. It was necessary at that epoch to bring from Metz 960 carriages and more than 2,000 horses. The 2,000 carriages and the horses for which a requisition was made for duty around Paris, as well as the teams of the third German army, had great trouble to sup-

In future wars traction automobiles will necessarily be called upon to play a very important part in conveyances and the supply of armies in the field.

For the foregoing particulars and the engravings, we are indebted to La Nature.

A new treatment for tuberculosis has been developed by Dr. Mendel, of Roubaix, France, and is described



FIG. 3.—CONVOY OF AMMUNITION UPON THE COAST OF SATORY.

at length in the January issue of "Consular Reports." It consists in the injection of certain essential oils into the trachea. The solution used is made up of 100 cu. cm. of sterilized olive oil, to which is added 5 grammes each of the essential oils of thyme, eucalyptus and cinnamon. From 9 to 12 cu. cm. are injected daily into the tracheal duct by a curved syringe. On September 9, Dr. Mendel had treated 27 tubercular patients by this system with results which

kern, and then the inconvenience of a considerable angle of relief in the punch, will obviously become more pronounced.

To illustrate this matter I pass round the following:

Group a.—Original steel punch.

Matrix.—Letter cast in this matrix on a body exactly corresponding to the face.

Group b.—Similar set in which the character is cast on a body smaller than the face of the character; the type being, if we may use the expression, "kerned all round."

If we look at an ordinary phototyped plate we shall see that the slope from the face of any line or character to the general level of the hollows or whites is very different from that of the type-founder's punch. In the case of an etching on metal there is generally an almost vertical wall for a depth of about one two-hundredth of an inch, and then we have a buttress which is not angular but generally more or less curved in the sense of being concave toward the observer. This buttressed form of the side appears to be conducive to long-run printing, as the metal is strengthened by the buttress against crushing down or flowing; although if the stress in ordinary typographic printing were surface-wear, the case would be different. At any rate, I have satisfied myself that the buttress form of the slope is no disadvantage in printing.

Quite apart from any question whether the buttress-like slope of the typographic plate is good or bad in relation to ordinary typographic printing, it is undoubtedly a great inconvenience in relation to type casting, if electrotype matrices are made directly from the letters of a phototyped plate, as the buttress will then project as a sharp edge from the cast body, and will often necessitate so much rubbing down as to be impracticable.

The following details of manipulation—the stages of which I show—indicate how very satisfactory matrices can be made from a phototype plate; this plate being

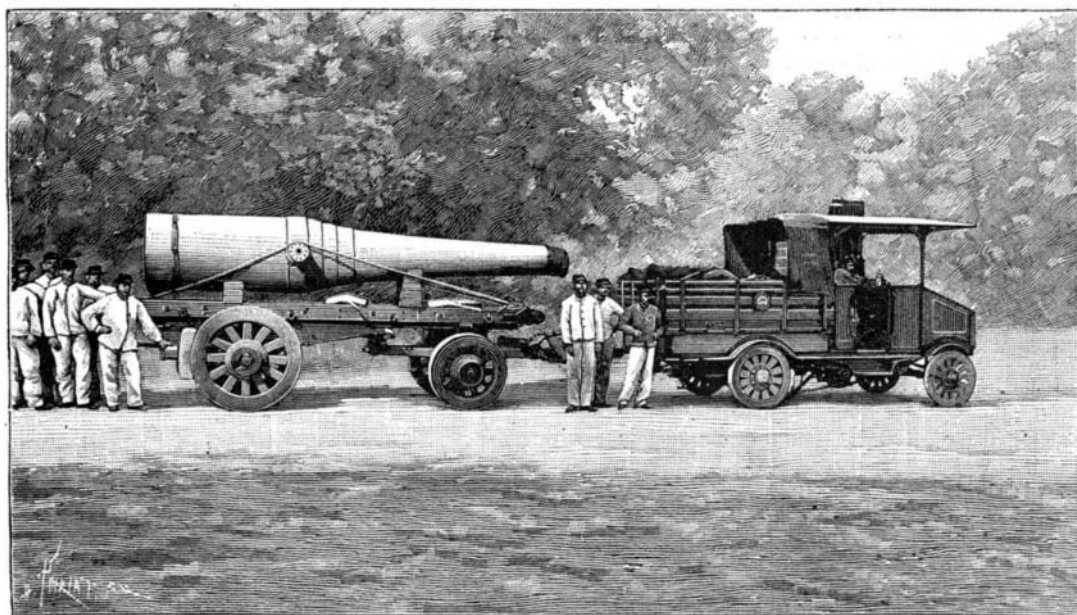


FIG. 4.—CARRIAGE OF A LARGE SIEGE GUN.

* Read at the ordinary meeting of London Royal Photographic Society held at No. 66 Russell Square, on Tuesday, December 12, 1899. Mr. Chapman Jones, F.I.C., F.C.S., Vice-President, in the chair.

itself reproduced from manuscript letter; or, may be, the page of an old book the type of which it may be desired to reproduce. In making the matrix from a character in the plate, the first thing is to saw out this character from the plate* and then to lay the cut-out piece face downward in the hollow of such a "jig" as I show you, the depth of the jig being adjusted to the height of the face above the shank or body in the case of the particular body-mold to be used. (In this particular instance the depth of the jig is 0.049 inch. †) The back of the piece bearing the character is now filed away until the thickness of the piece corresponds to the depth of the jig; and the character is now soldered to a thick strip of flat brass, a highly fusible solder being used ‡. Before electrotyping the character as it stands soldered to the flat plate it is necessary to file one side or more so as to make an even slope up from the base plate to the face of the character. For this purpose I cut a file such as I show you; a flat file, all "safe" excepting one edge which makes an angle of 96° with one of the flat faces; and consequently 84° with the other flat face; this file being used to trim up the character on four sides (if necessary) until the face is just short of being cut into. We thus get a "photographic punch" which for casting purposes is equal to the ordinary steel punch. Before electrotyping on this punch, it saves much time to rule fiducial lines having proper relation to the mold in which the type is to be cast. These can be ruled with simple bridge-like gages from the margins of the character. When the electrotype is made, and backed up in the way which is usual for electrotyped matrices, nothing remains to be done but to saw off and file to the fiducial lines and reproduced on the electrotype—the depth of the matrix having been determined by the jig already mentioned.

The "photographic punches" and matrices I show you now belong to a set which I commenced to make about fourteen years ago, and some of which I showed at a lecture delivered to the Society of Arts on March 3, 1890. In the course of this lecture I had occasion to refer to the excellent work done by Mr. Alfred Dawson in the way of producing types by the photographic method; still, as far as I know, there have been very few followers along this very easy path.

In showing you the actual operation of casting types in a hand-mold I would point out that this is a method of casting standing quite by itself. In order that the pouring into the mold may be steady and in one quick run, a measured quantity of the melted metal is taken out of the pot with a small ladle or spoon, and this dose of metal is poured quickly into the mold so that the stream drives straight against the face of the matrix, while almost at the same instant, the mold is raised suddenly or "heaved" so that the metal is driven, by its inertia, well into the intricacies of the matrix. In casting by the machine, a method universal now for such type as is required in large quantities, the same principal of driving against the matrix is adopted; but the metal is projected by a small squirt or pump.

The photographic method, substantially as described above, is very convenient for making matrices which are to be set side by side for casting logotypes; only, of course in this case the matrices must be trimmed close at the sides. Matrix setting by machine (linotype) is now, it must be remembered, a commercial reality; but matrix setting by hand, as practised by Herhan a century ago, may in many cases be a useful process, especially when allied to photographic reproduction.

It seems to me that if photographers and printers realized the ease with which matrices for type-founding may be made by such a method as that described above, we should have a return to the free or writing style in printed characters. The characters in all the early books were careful copies of current styles of writing, and to give effect to the idea of writing being reproduced, it was the custom to cut many characters of the same name, and to intermix them in the boxes of the case. So far was this idea of variety carried out by Gutenberg, that his Bible (the Mazarin Bible) is often spoken of as being printed from characters, each of which was specially cut or engraved—a mistake obvious enough to anyone who looks into the matter.

By adopting some such method as is here detailed, amateurs in photography could easily originate or cast type for use by themselves, and authors of books could originate the letters used for their own works.

Considering the ease of working, I take it that the matrices for a font of ordinary book size type could be produced and justified at a cost of about 8d. each, if the work were kept going on a commercial scale. The justifying, which is ordinarily so troublesome with strikes from punches, is scarcely worth considering in the method described, as it is done almost automatically; especially as regards the depth of the matrix and the parallelism of the face of the letter to the end or shoulder of the body or shank.

As objects of interest indirectly bearing on the subject I have placed on the table several sets of original steel punches.

Cleared out of an old London type foundry, these were purchased as a sort of job lot by a dealer in miscellaneous goods, and from this gentleman (Mr. Jewell, of Sidney Grove, Sidney Street, E. C.) I purchased the greater part, as an unpromising mass of rust and packages—some of which appeared to have been unopened for half a century. About a hundred sets of punches were made up on sorting out; a few complete sets being quite undamaged by rust, owing to the faces having been dipped in melted wax. As far as I know there are no collections of historic punches in this country, as is the case at Antwerp and Haarlem. I also place on the table the specimen book showing impressions of types from the Haarlem collection of punches—these punches going back to about 1470. This valuable and now rare book was presented to me some twelve years ago by the owners of the collection, Messrs. J. Enschede & Son.—*Journal of the Royal Photographic Society*, January, 1900.

* When the original is zinc, a cast in stereotype metal is used instead of the original, and this for an obvious reason.

† The depth of the jig which was shown is capable of easy adjustment by means of packing placed under the hard steel plate.

‡ See my *Cantor Lectures on Stereotyping*, published by the Society of Arts in 1890, p. 18.

TRADE NOTES AND RECEIPTS.

Polishing Soap for Metals.—Pour water over 48 kilogrammes of pure grain soap in shreds and dissolve it therein by boiling. Mix with the solution 6 kilogrammes of the best whiting, 3 kilogrammes of white-lead, 3 kilogrammes of tartar, and 3 kilogrammes of burnt magnesite.—*Farben Zeitung*.

Hair Dye.—As a harmless and simple hair dye, M. Joseph recommends argentum-vaseline (1 to 20 per cent., according to the desired shade), i. e., a salve consisting of yellow vaseline with admixture of 1 to 20 per cent. of silver nitrate, previously dissolved in as little water as possible. The comb is coated with this salve every week to every fortnight and the hair carefully combed through.—*Deutsche Medicinische Wochenschrift*.

Mixing Plaster of Paris.—For stirring plaster of paris, filtered rainwater or sour milk is best employed. Within twenty-four hours the gypsum has become exceedingly hard. Fine marble dust increases the degree of hardness. An addition of 33½ grammes of sal-ammonia to ½ kilo of plaster is commendable.

One may also proceed as follows:

Shape the gypsum into a cone in a dish, and slowly pour in water or sour milk till the cone has absorbed it up to the point. Now only commence stirring, avoiding all premature mixing.—*Neueste Erfindungen und Erfahrungen*.

Production of Soap Powder.—I. Oleic soap 24 kilos, water 30 kilos, ammonia soda (98-100 per cent.) 36 kilos. II. Oleic soap 20 kilos, Glauber's salt 16 kilos, water 31 kilos, ammonia soda (98-100 per cent.) 23 kilos.

III. Oleic soap 20 kilos, water 32 kilos, ammonia soda (98-100 per cent.) 35 kilos, soda-crystals-lye 50 kilos.

Oleic and water are entered in the kettle, heated over the fire and the ammonia soda, etc., stirred in by small portions. The thick paste is then taken out and placed on sheet zinc to dry. When perfectly dry, the soap powder is ground into a fine dust in a mill and filled in packages.—*Seifensieder Zeitung*.

Black Ink for Rubber Stamps.—Intimately mix black printer's varnish with the color in a suitable tin dish and grind it very finely on a paint mill. If the latter is not at hand, the grinding may be done on a stone or glass plate by means of a muller.

Following are some receipts for black stamping ink:

1. Black varnish, 10 parts; finest lampblack, 3 parts.

2. Black varnish, 10 parts; lampblack, of inferior quality, 4 parts.

3. Black varnish, 10 parts; ordinary lamp black, 6 parts.

An excellent black stamping color, which does not run, and yield handsome impressions, is produced from finest lampblack 10 parts, mucilage 4 parts, glycerine 1 part, water 3 parts.—*Papier Zeitung*.

Luminous Glass Letters.—According to the *Sprechsaal*, luminous glass letters are now manufactured in Germany.

The letters are made, in all colors, from pressed glass and are hollow, being open in the back. Before being attached to the tin letter backs fastened to the walls, etc., they are filled with luminous substances.

The operation for applying a firm name or inscription of any kind, such as street name, house number, etc., to the wall in luminous letters is as follows:

The flat tin letters, which form the backing of the hollow ones of glass, are secured to the masonry, etc., by a few nails. Upon these letter backs, whose edges are bent forward, the hollow glass letter is securely fastened by a pin with screws.

The inside of the glass letters is previously filled up with luminous mass, which can now be had from chemical factories. It is obvious that owing to the filling being completely protected from air and moisture by the tight-fitting closure, it will remain intact for a long time, and surpasses luminous paint coatings in every respect. If the luminosity of the mass should cease after a long time, the letters can be taken off without much trouble and filled anew.

Blue, Brown and Green Coloring of Prints on Gelatin Argentic Bromide Paper.—This process is based upon the action of solutions of iron and uranium salts on metallic silver. This toning causes a strengthening of the picture, which should be taken into account in making the prints.

The directions are as follows:—

BLUE COLORING:—

(a.) Ammonia—ferric citrate..... 1 gramme.

Distilled water..... 100 c.c.m.

(b.) Red prussiate of potash..... 1 gramme.

Distilled water..... 100 c.c.m.

For use mix:—

Solution (a)..... 50 c.c.m.

Glacial acetic acid..... 10 "

Solution (b)..... 50 "

The mixture is clear and green in color. The fixed silver bromide pictures must be well soaked previously. The coloring appears already after 1 or 2 seconds and consists in a bluish-black, which promptly changes into an intense blue. When the desired shade has been attained, wash until the water runs off clear.

BROWN COLORING:—

(a.) Uranium nitrate..... 10 grammes.

Distilled water..... 1000 c.c.m.

(b.) Red prussiate of potash..... 10 grammes.

Distilled water..... 1000 c.c.m.

Of this mix:—

Solution (a)..... 50 c.c.m.

Glacial acetic acid..... 10 "

Solution (b)..... 50 "

Maintain the rotation. The fixed and washed silver prints are dipped in the bath and treated same as for the blue toning.

MALACHITE-GREEN COLORING:—

Same is obtained by use of both solutions:—

Uranic nitrate solution, 1:100..... 25 c.c.m.

Solution of ammonia-ferric citrate..... 25 "

Glacial acetic acid..... 10 "

Solution of red prussiate of potash, 1:100..... 50 "

—*Photographische Correspondenz*.

SELECTED FORMULÆ.

To Remove Anilin Stains from the Hands.—Ammonia water will remove many of the stains. The use first of a little bleaching powder and subsequently of strong alcohol will remove pretty much all. The same agents will probably remove other stains mentioned. Where the hands have become begrimed or the dirt and stains have become "grinded in," to use a common phrase, the best plan is to apply liquor potassæ for a moment, then plunge the hands in soft warm water, and use a stiff brush. This must be done with due foresight and care, however, to avoid making painful sores. The best plan is to apply it several times, very much diluted to the backs of the fingers and around the nails. The palm surface will stand much stronger applications.—*National Druggist*.

Violet Water.—

1. Spirit ionone, 10 per cent..... ½ dram.
Distilled water..... 5 fl. ounces.
Orange flower water..... 1 " "
Rose water..... 1 " "
Cologne spirit..... 8 " "

Add the spirit of ionone to the alcohol and then add the waters. Let stand and filter.

2. Violet extract..... 2 ounces.

Cassie extract..... 1 "

Spirit of rose..... ½ "

Tincture of orris..... ½ "

Green coloring, a sufficiency

Alcohol, to..... 20 "

3. Tincture of orris..... 64 ounces.

Tincture of vanillin..... 16 "

Oil sandalwood..... ½ "

Oil bergamot..... 1 "

Oil rose geranium..... ½ "

Cologne spirit..... 80 "

Rose water..... 96 "

Dissolve the oils in the spirit; add the tinctures, and set aside for 3 days; then add the water slowly, stirring well, and let stand for 2 weeks before filtering. Color with chlorophyll or aniline green to the tint required.—*Pharmaceutical Era*.

Library Paste.—1. Dissolve 2 drams of alum in a quart of water and add flour sufficient to make a thick cream. Powder together 10 cloves and 1 dram of rosin and stir the powder into the cream. Put on the fire in a vessel of sufficient size 4 ounces of water and bring to a boil. When in active ebullition pour into the vessel the mixture of flour, etc., in a thin stream, stirring all the time to prevent burning. Pour into an earthenware vessel, cover tightly and keep in a cool place. This paste keeps well. When needed for use take out a portion and replace cover on container. If needed, thin down with boiling water.

2. Rice starch..... 2 ounces.

Gelatin..... 6 drams.

Water..... 16 fl. ounces.

Oil of cloves..... 15 minims.

Incorporate the starch powder with the water, add the gelatin and heat gently over a water bath until a jelly-like compound results.

3. Best Bermuda arrowroot..... 1¾ ounces.

Sheet gelatin or best Russian glue..... 80 grains.

Water..... 15 ounces.

Methylated spirit..... 1 "

Put the arrowroot into a small pan, add 1 ounce water and mix it thoroughly up with a spoon, or the ordinary mounting brush, until it is like thick cream; then add 14 ounces water and the gelatin broken into fragments. Boil for four or five minutes, set it aside until partially cold, then add the methylated spirit and six drops of carbolic acid. Be very particular to add the spirit in a gentle stream, stirring rapidly all the time. Keep the paste in a corked stock bottle and take out as much as may be required for the time, and work it up nicely with the brush.—*Pharm. Era*.

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