(No Model.)

G. C. TOWLE.

ART OF FORMING SMOOTH SURFACES ON WOOD PULP.

No. 424,513. Patented Apr. 1, 1890.

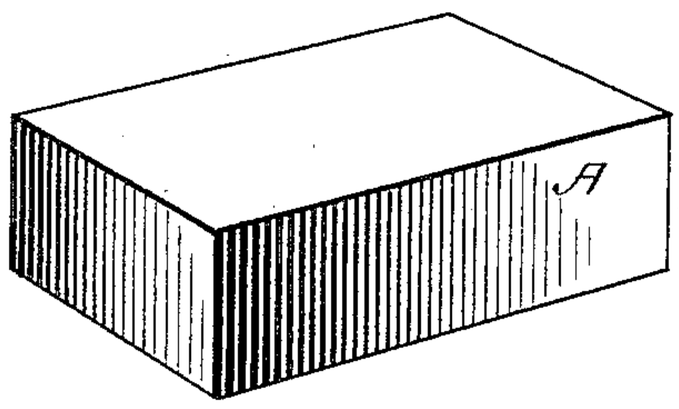

Fig. 1.

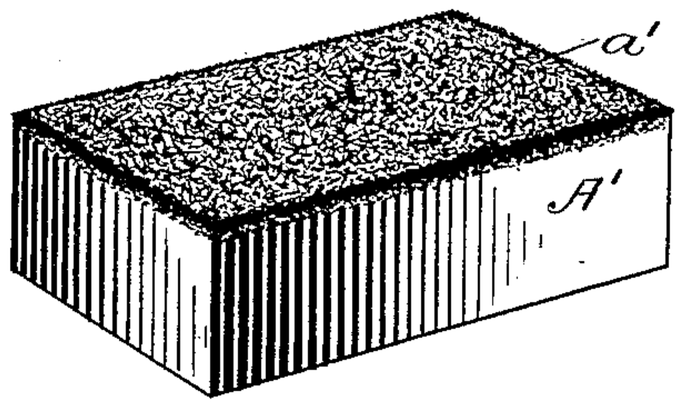

Fig. 2.

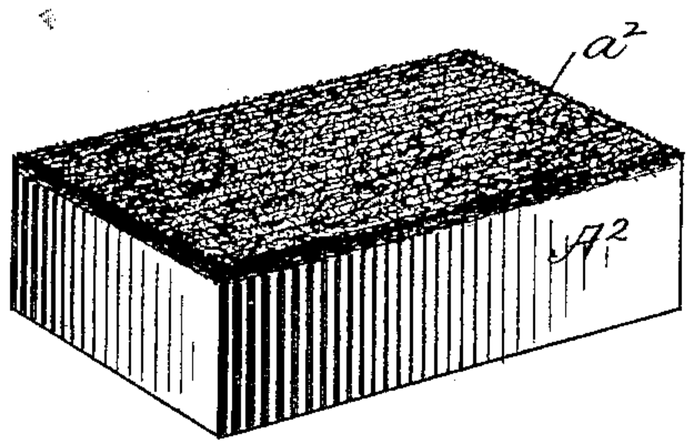

Fig. 3.

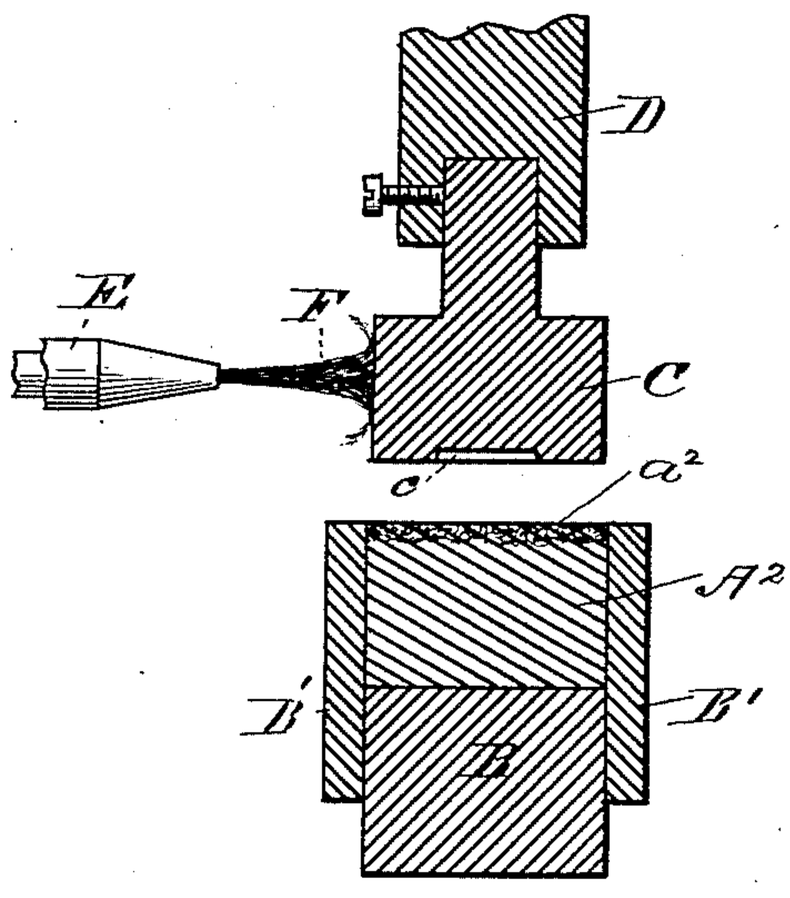

Fig. 4.

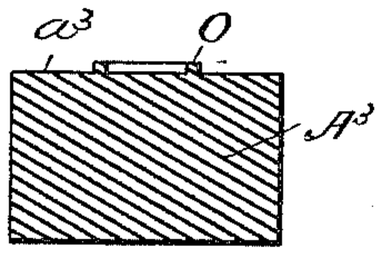

Fig. 7.

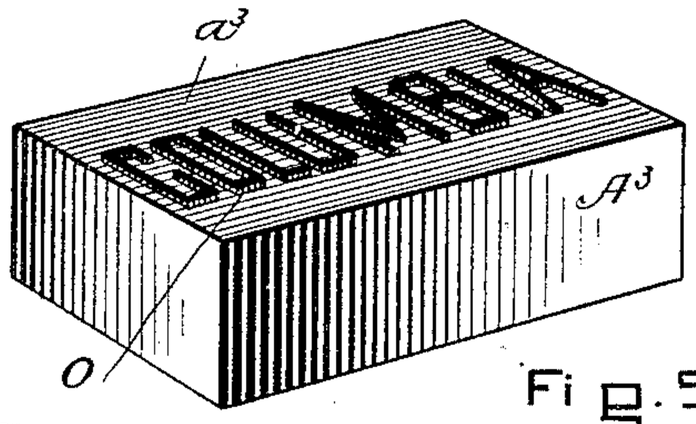

Fig. 5.

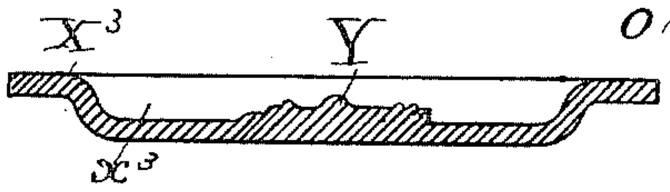

Fig. 8.

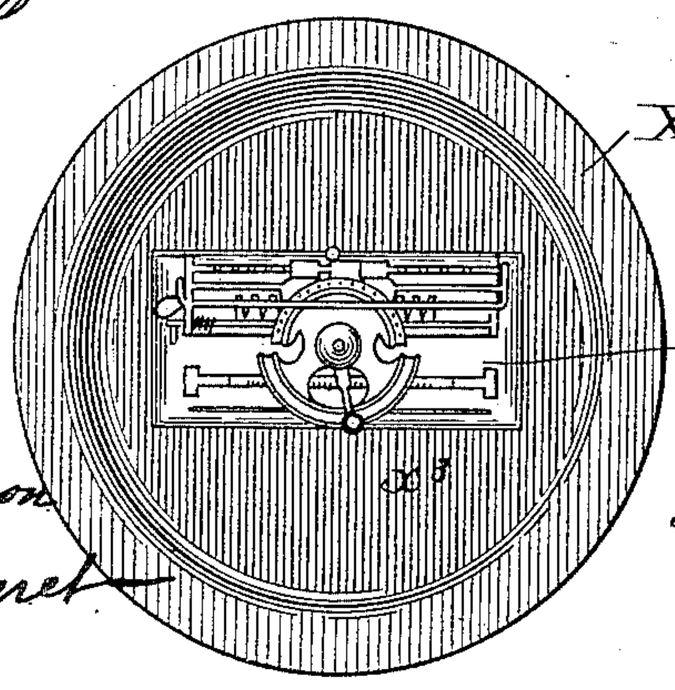

Fig. 6.

WITNESSES.

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UNITED STATES PATENT OFFICE.

GEORGE C. TOWLE, OF HYDE PARK, MASSACHUSETTS.

ART OF FORMING SMOOTH SURFACES ON WOOD PULP.

SPECIFICATION forming part of Letters Patent No. 424,513, dated April 1, 1890.

Application filed January 9, 1889. Serial No. 295,860. (No model.)

To all whom it may concern:

Be it known that I, GEORGE C. TOWLE, of Hyde Park, in the county of Norfolk and Commonwealth of Massachusetts, have invented certain new and useful Improvements in the Art of Forming Smooth Surfaces on Wood Pulp, of which the following is a specification.

Heretofore it has been customary to fashion articles of wood pulp by molding them or by sawing and cutting them into required shapes and finishing the surfaces either by cutting or by sandpapering them, and sometimes by pressing them simply. It has been attempted to press such surfaces into figured shapes or letters; but such experiments, so far as I am aware, have been unsuccessful, because the letters or shapes were not enduring, and especially would not continue through any process of gilding or other liquid finishing. It is desirable to use wood pulp for the construction of calendar-stands or other articles for the desk, and for plaques and other ornamental use, and to prepare the surfaces of these with a permanent smoothness of finish, and to make the surfaces with raised or impressed letters and figures, bas-reliefs, and the like, and also to gild such surfaces, whether plain or ornamental, so as to preserve such surfaces when gilded or sized or painted.

In carrying out my improvements in the art or process of preparing, finishing, figuring, and ornamenting surfaces of wood pulp I take the article as prepared by cutting, sawing, or molding in the ordinary way, preferring for the surface which I am about to treat either a sawed or sandpapered surface to begin with, and first dip that surface in a liquid bath, which is by preference water moderately acidulated with nitric acid and used hot. Some other acids, as acetic acid, will produce similar but not as good results, as will also some alkaline solutions, but with not so good results. The effect of this dipping of the surface in a solution either acid or alkaline of the character herein described is to raise or improve the slightly furred or napped character of the surface. My next step is to dip this prepared surface in oil or otherwise cover it with a slight film of oil, using by preference either mineral oil or linseed-oil. For plain or coarse work I mix paraffine or resin with the oil, this oiling of the surface serving to partially fill the pores and combine with the next step in the process to cement the nap and close the pores and form a base of resistance to any other liquid finish that may be used, such as gilding or sizing or coloring. Third, I then press the surface so prepared by the other two steps in the process with a heated die. This as to plain surfaces compresses the nap and the pores to a smooth or laid exterior, and by means of the heat and pressure sets or fixes the oil and the fiber together, so as to insure a permanent smoothness of surface; and for forming raised letters or other ornamental figuring I use a die with such letters or figuring cut in its surface, using it under pressure in the same manner, but with the effect to raise the letters or other ornamental figures or leave them in relief on the pulp-surface by a process of partial compression of the surrounding surface and partial raising of the relief-surfaces, (the operation being substantially the same when cameo-dies are used to form intaglio or indented letters or figures in the surface of the wood-pulp article,) and the same method results not only in a smooth and permanent finish of the plain surfaces in this case but also in a complete and fixed relation of the raised or depressed figures. After the article has been prepared and fixed by this method, the surface or surfaces so prepared may be further finished by sizing, gilding, or coloring without detriment, without the disappearance of the figures or ornaments, and with the appearance of a fine, smooth-finished, gilded, or other surface, all its lines of ornament being preserved.

In the drawings accompanying this specification, Figure 1 shows in perspective a molded or sawed block of wood pulp. Fig. 2 shows the same with its upper surface a' dipped in the acidulated bath. Fig. 3 shows in perspective the same with the upper surface a^2 covered with a film of oil. Fig. 4 shows in vertical transverse section the same prepared block in a press with a die ready to be impressed upon the prepared surface. Fig. 5 shows in perspective the block after it has been pressed with the letters raised thereon, and Fig. 7 shows the same in vertical transverse section. Figs. 6 and 8 show in top plan

and in vertical section, respectively, a plaque with a raised figure of a type-writer in the middle pressed out of a sheet of pulp according to my method.

A is a block of wood pulp. A′ is the same after the dipping in acid solution, with the furred surface a'. A^2 is the same with the furred surface coated with a film of oil at a^2. A^3 is the same after pressure with the heated die, having the plain finished surface a^3 and the raised lettered surfaces also finished, as at O.

B is the bottom, and B′ B′ are the sides, of the table or platen holder for the block A^2 which I use in my press, and C is a die held in a plunger D and having the intaglio figure *c* cut in its operative side.

As the construction of press is immaterial to this invention, I do not show its construction further than the die and holder. I also use a blow-pipe E, arranged with the press so as to throw a flame F upon the die C to keep it sufficiently heated.

X^3 is a plaque with a finished upper surface x^3 and a raised figured surface W, produced in the same method.

In the course of my experiments in making this invention and of practically using the invention since, I have found that water moderately acidulated with nitric acid and used hot, as above described, gives the best results for the preliminary bath—that is to say, it loosens the surface fibers and, as it were, raises a fur or nap on the surface and prepares the surface for the subsequent steps of the process; but I have found, also, that this bath may be used tepid or even cold and produce similar results, but not so satisfactorily. I have also tried as a preparatory bath water acidulated with sulphuric acid instead of nitric acid, and it did not produce the required result. I have tried water acidulated with hydrochloric acid, and also a mixture of water with a solution of potash, and also a mixture of water with common soap, and also a mixture of water with a solution of ammonia, and in each of these cases I found that the same result was produced, but not in so satisfactory a degree as with the use of nitric acid. I consider, therefore, a bath of water moderately acidulated with either hydrochloric acid or water rendered moderately alkaline by the use of potash, ammonia, or common soap an equivalent for the bath acidulated with nitric acid, hereinbefore referred to; but I do not consider a bath acidulated with sulphuric acid as an equivalent.

I claim as new and of my invention—

The art or process of fixing a permanent, plain, or embossed smooth surface on articles of wood pulp, consisting in treating the surface of the plain stock first with a bath of water acidulated with nitric acid or its described equivalent, then with a film of oil, and then subjecting it to pressure with a heated die, essentially as set forth.

GEORGE C. TOWLE.

Witnesses:

HERBERT MANSFIELD,

GEORGE V. WHITE.