UNITED STATES PATENT OFFICE.

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PREPARED SHEET FOR STENCILS.

SPECIFICATION forming part of Letters Patent No. 545,093, dated August 27, 1895.

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To all whom it may concern:

Be it known that we, CHARLES TAYLOR POMEROY and ELTWEED POMEROY, citizens of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Prepared Sheets for Stencils; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

There are two processes known to us of making typewriter-stencils—viz: the "perforating process," by which the stencil is made by causing openings to be made in the substance of the stencil-sheet at the lines of printing, (by which is meant openings not only through the coating of the sheet, but perforations, cuts, slits, or punctures through the base as well,) through which openings the ink used in printing is passed to the receiving-sheet below. This process is described by Josiah L. Young in his patent, No. 486,059, in which a roughened platen is used which, co-operating with the cutting edges or faces of the type, makes slits or punctures in the stencil-sheet placed between the type and the roughened platen. The other process is that described in Letters Patent No. 377,706 to John Broderick, and may be called the "expressing process." In this process a sheet of material filled with closely-contiguous openings of considerable size is coated with some coating that serves to stop or plug up the openings in the sheet. This sheet is then operated upon in the typewriter and the impression of the type serves to express from the paper at the points of contact of the type the coating which has stopped up the holes, so that at the points of contact of the type the pre-existing holes in the sheet are opened and in the printing the ink is passed through these openings. While our invention has nothing to do with this class of stencils it may be remarked that the great disadvantage in the use of this process commercially is the extreme delicacy of the sheets that have to be used, rendering extraordinary care necessary in handling them lest the stencil be destroyed in making, and also rendering the stencil comparatively short-lived in use. On the other hand, the first-described or perforating process has the great advantage that a stencil made by that process can be made upon a strong durable sheet that will not be easily injured in handling and that is practically indestructible in use. The reason why the perforating process has not been more extensively used is that heretofore no material has been discovered from which a practical stencil-sheet could be successfully and economically prepared. The close contiguity of the cutting edges or points on the roughened platen serve, when struck by the type, to make an almost continuous opening in the stencil-sheet, the effect of which is that when ordinary short or delicate fibered papers are used as the base for the sheet the centers of the loop-letters are stamped or punched out and an imperfect stencil is made; while on the contrary, if the roughness of the platen is made coarse—that is, the cutting edges or points thereon are placed farther apart—the result is that the perforating is not practically continuous, and the print from the stencil formed on such a platen is dotted or spotted and is not a good reproduction or imitation of type-writing. Therefore to make the perforating process practically operative required the invention or discovery of some material for the base of the stencil-sheet on which practically continuous perforations or openings could be made and yet a sufficient amount of the substance of the sheet be left bridging the lines of the letters to in all cases hold the centers of the loop-letters in place; and it has been the object of our experiments to discover some material which could be used as a base for a stencil-sheet to be used in the perforating process.

The only materials heretofore used for making type-writer stencil-sheets, so far as we know, are the sheet patented to David Gestetner in United States Letters Patent No. 332,890, dated December 22, 1885, and the transmitting printing-sheet patented to John Broderick in United States Letters Patent No. 377,706, dated February 7, 1888. The paper patented to David Gestetner, while described by him as "bamboo-fiber paper," is what is technically known as "gampi," and is used as a writing-paper in Japan. It is composed of a very fine silky fiber of little strength. While it is a porous paper, it is by no means as porous as "yoshino," the specific paper of the Broderick patent referred to. The fibers of which gampi paper is composed are prac-

tically of uniform size and delicacy. The result is that when this paper is used as a base for stencil-sheets and is operated upon in the type-writer to make stencils in the perforating process, the blow of the type, co-operating with the roughened platen, makes a complete cut or perforation all over the face of the letter, and while it makes some letters very perfectly the centers of the loop-letters are almost always stamped out, and the resulting stencil is therefore imperfect, the cause of this stamping out apparently being that the fibers are practically all of uniform strength and the force of blow sufficient to sever one severs all. This uniformity of the fiber of the Gestetner or gampi sheet has prevented its successful use commercially as a base for type-writer stencil-sheets. On the other hand, the yoshino or dental paper of the Broderick patent aforesaid, while it has a longer fiber than the Gestetner or gampi paper, is made very weak by the absence of sizing and the extreme looseness of its structure. In fact, as can easily be seen by trial, the Broderick or yoshino paper is very much weaker and less durable than the Gestetner or gampi paper.

We have after many experiments discovered that the base of the stencil-sheet, to be successfully used in the perforating process, should be a sheet of paper or other material composed of fibers or threads of greatly unequal strength, and should be of a felted rather than a woven structure and composed of a large percentage of weak easily-broken or ruptured fibers evenly mixed with a small percentage of large, long, and tough fibers. This material may be, if paper, unsized, but a small amount of sizing, sufficient to practically fill the openings between the fibers, is not only no detriment in use, but adds to the strength of the stencil-sheet, and we prefer it. This sheet should also be sufficiently heavy and close to give strength and durability, but of course should not be so thick as to prevent the type of a type-writing machine from cutting wholly through the substance of the stencil-sheet nor so close as to prevent thorough impregnation of the sheet by the coating.

A simple test which will enable any one to pick out a sheet of the preferred density is to take an ordinary steel pen and ordinary writing-fluid and write upon the surface of the uncoated sheet placed over a sheet of white paper. If the writing is easily done and the ink does not come through the paper onto the white sheet beneath in the act of writing, but can be forced through by pressure applied after writing if considerable ink be used, the sheet is of about the proper density. This sheet should be composed in the greater part of fibers so weak that when the sheet is coated and used in making a type-writer stencil these weak fibers will be destroyed, cut or broken by the blow, and evenly mixed with these weak fibers should be a small percentage of long, tough, and strong fibers of such strength and toughness that even an extra hard blow of the type will not break them, but will rather stretch or bend them down. When this sheet has been obtained it is preferably coated with a coating of a friable character, which under the blow of the type will be fractured, powdered, or crumbled, and will in such condition be either removed from the stencil-sheet, or, if any of it remains, it will exist in such a finely-comminuted condition as to permit the ink used in printing to pass readily through it.

We have discovered that a fibrous Japanese writing-paper, composed of a comparatively small number of large, long fibers and a great number of small, weak fibers, (which composition is readily discovered by the aid of a magnifying-glass or microscope of low power,) is especially well adapted for use as a base in our stencil-sheet. This basic-sheet of ours may very properly be described as a "non-perforate" sheet, meaning by the words "non-perforate" not a sheet devoid of openings or pores, for no sheet of material having a felted structure is devoid of such pores or openings, but a sheet having such small or crooked openings or pores that they do not readily transmit ink, such as is used in stencil-making, and in which the pores or openings are not used or intended to be used to transmit the ink in the operation of printing from the stencil-sheet. This sheet may then be coated with a coating consisting of one of the hard paraffine waxes, (melting at from 130° Fahrenheit upward,) mixed with beef-tallow and a little lard to render it friable, which coating we prefer to use, or it may be coated with a coating of varnish, which makes a very good stencil-sheet, the only object of the coating being to render those parts of the sheet not cut by the type impervious to ink in printing.

We claim—

1. A prepared sheet for use as a stencil sheet consisting of a base of a felted structure composed of a comparatively small number of long and strong fibers and a comparatively large number of short and weak fibers massed together into a homogeneous non-perforate sheet, coated with a substance impervious to ink, substantially as described.

2. A prepared sheet for use as a stencil sheet consisting of a sheet of paper composed of a comparatively small number of long and strong fibers and a comparatively large number of short and weak fibers, massed together into a homogeneous non-perforate sheet, said sheet being coated with wax substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

CHARLES TAYLOR POMEROY.
ELTWEED POMEROY.

Witnesses:
JOS. D. GALLAGHER,
CHARLES W. BROWER.