May 2, 1933. F. T. POWERS 1,906,809

POWDERING BRUSH

Filed May 1, 1931

Fig. 1.

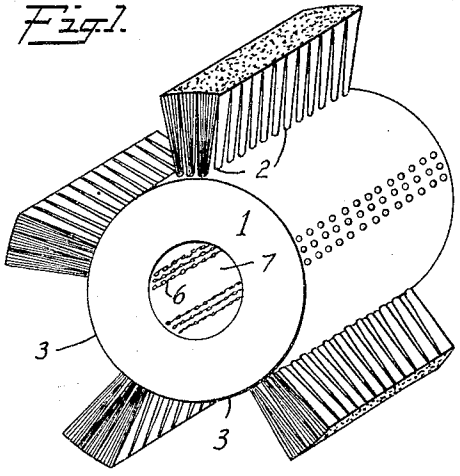


Fig. 2.

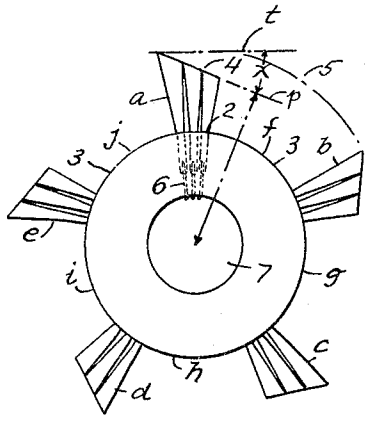


Fig. 3.

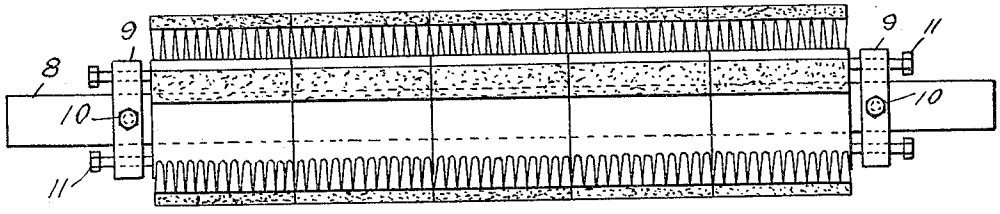
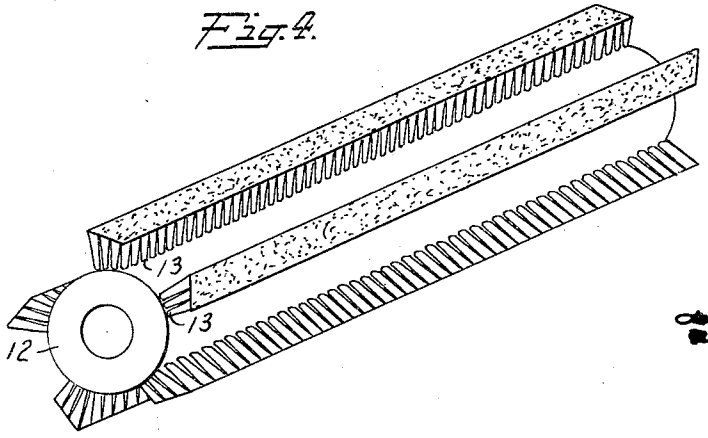


Fig. 4.



Frank T. Powers

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UNITED STATES PATENT OFFICE

FRANK T. POWERS, OF DOUGLASTON, NEW YORK

POWDERING BRUSH

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My invention relates to the art of making printing plates by photo-mechanical processes, and more particularly to that step in the art in which the metal plate is prepared by the application of resist to be acted upon by an etchant.

The object of my invention is to provide a powdering brush for use in a mechanical powdering machine whereby resist in a powdered form may be applied to the partially etched printing plate and a result attained which is superior to results usually attained by expert hand operation.

In carrying out the process of making printing plates by what is commonly called photo-engraving, it is now customary to perform each of the many steps involved by hand processes. The process as a whole is so well understood and so generally practiced that a detailed description is omitted herein and only that step described to which my present invention particularly relates, namely, the application of a resist in the form of a powder to the surface of the partially etched plate. This step is commonly called "powdering" and a plate is "powdered four ways" between each "bite".

This application of resist is commonly accomplished by applying a quantity of powdered dragon's blood to the surface of the plate and then brushing off the surplus with a broad flat brush usually made of so-called camel's hair. In brushing off the surplus powder, it is customary to brush the plate in but one direction during each of the four powdering operations.

After each application and brushing of the powder, the plate is heated to a temperature which melts or softens the powdered resist and causes it to adhere to and coat over those portions of the plate which it is desired to protect against further etching. These portions which are normally protected by the resist are the sides of the dots or lines which make up the design being etched, and it is the presence of this protection afforded by the resist that permits carrying the etching process to sufficient depth to give satisfactory printing quality. The manner in which the powder is laid up against the sides of the dots and lines by the brushing process has a controlling influence on the quality of the finished plate. Therein lies much of the skill of the etcher. Unless the powder is brushed against the lines and dots exactly and uniformly the shoulders will be ragged or undercutting will result. Either of these defects, i. e., ragged shoulders or undercutting, render the plate unsuitable for the production of mats for cylinder press printing for the reason that the mats are caught in the ragged serrations of the shoulder or in the undercutting, and can not be removed from the plate without serious injury. It is, therefore, particularly important that plates which are intended for newspaper and similar printing, where mats are used for preparing cast printing plates for rotatory or cylinder presses, shall have smooth shoulders and be free from undercutting.

I find it possible to attain this desirable result universally and uniformly by substituting for the present common method of hand brushing a mechanical brushing device with a particular type of rotating brush. I am aware that previous efforts have been made to apply powder to plates with revolving mechanical brushes, but such efforts have not been successful to such a degree as to displace hand brushing, largely because of the type of brush used. It requires a skilled etcher to perfectly powder a plate and the brushes which have been used heretofore in attempts to substitute revolving, power driven or manually operated brushes for the common hand brush, have not produced results comparable with good, skilled, hand powdering.

I find that with my new type of brush in a powdering machine operated either by hand or from any suitable source of power, I can powder plates with a degree of uniformity and perfection not attainable by even an experienced etcher using a hand brush. And even the most inexperienced operator can produce perfect results with my brush.

In the accompanying drawing the essential features of my invention are shown. Figure 1 is an isometric perspective view of one section of one form of my new brush, of which Fig. 2 is an end view.

Figure 3 is a view of an assembled brush. Fig. 4 is an isometric perspective view of an alternate form. In Fig. 1 a cylindrical hub 1, of suitable material such as wood, sectors of which are studded with tufts of fibrous material such as hair, 2, set in rows extending longitudinally along the outer surface of the cylinder leaving spaces or sectors, 3, on the surface of the cylinder, in which no tufts of fibrous material are set.

In Fig. 2 I have shown more in detail the characteristics of my new brush. A plurality of segments of the core are studded with tufts of fibrous material. In Fig. 2 five such segments are shown marked *a*, *b*, *c*, *d* and *e*. Between these studded segments are an equal number of segments of the core in which no tufts of fibrous material are set. These segments are marked *f*, *g*, *h*, *i* and *j*. Each segment of fibrous material is trimmed off at its outer end at a bevel or taper such that the plane *p* in which the outer ends of the fibrous material lies is at an angle X of some 10 to 45 degrees with a plane tangent *t* to a circle 5 drawn about the centre of the hub to circumscribe the outer tip ends of the segments of fibrous material.

There are several methods used by brush makers in the manufacture of cylindrical brushes. In Figs. 1 and 2, the method indicated is to anchor by means of wire 6 the tufts of fibrous material 2 into holes drilled in the core. When this method of manufacture is employed the length of the cylinder 1 is limited to the length which can be conveniently studded with tufts of fibrous material through the central opening in the core cylinder. I find this limit to be about four inches when the internal diameter of the cylinder is about 1¾ inches. I, therefore, make up my brushes of this type in sections about four inches long, and I use a sufficient number of these sections placed end to end to make up a brush of any desired length.

In Fig. 3 a mandrel or shaft 8 of a diameter less than the internal diameter of the cylinder shown in Fig. 1 has suitably mounted upon it a plurality of sections of brushes of the form showed in Fig. 1. These sections are held firmly in position upon the shaft by collars 9 which are provided with set screws 10 by means of which they are held in place on the shaft. Screws 11 are provided in these collars by means of which the sections of brushes are clamped firmly in place and prevented from movement relative to the shaft.

An alternate and also suitable method of construction of my new brush is shown in Fig. 4, which illustrates a hollow cylindrical core equal to the full length of the brush desired and set with tufts of fibrous material 13 cemented instead of wired into a multiplicity of holes in the surface of the core without the use of wire and without drilling the holes completely through the shell of the core.

The characteristics of my new brush, which I find essential to its successful operation and to the perfection of the results obtained are first the intermittent arrangement of the fibrous material around the core of the brush; and second the trim or sectional contour of the outer end of each brush sector. The number of sectors of bristles and intervening blank spaces also has an influence upon the result, as does also the speed of rotation of the brush. As to the number of sectors, I find that there should be not less than three nor more than six, and I find that four or five sectors of bristles with, of course, an equal number of blank sectors intervening between the sectors of bristles, to be the most satisfactory. As to the speed of rotation of the brush, I find that the optimum speed in revolutions per minute is such that the velocity of travel of the periphery of the brush is between three hundred and six hundred feet per minute. As to the contours of the outer end of the brush sectors, I find that the beveled or chiseled form illustrated in Figs. 1 and 2 produces results having a degree of perfection not attainable by other forms or contours.

Having described my invention so that one skilled in the art may make and use it, I now state what I believe to be new and novel, and for which I pray that Letters Patent be granted.

I claim:

1. A brush for the purpose set forth, having a plurality of sectors of a cylindrical core set with tufts of fibrous material the fibres of which are substantially radial to the center of the core, said sectors alternating with sectors in which no tufts of fibrous material are set, and having the outer ends of said fibrous material substantially in imaginary planes forming acute angles with tangents to a circle circumscribing the brush at the points of intersection of said imaginary planes and said circle, substantially as described.

2. A brush for the purpose set forth, having a plurality of sectors of a cylindrical core set with tufts of fibrous material the fibres of which are substantially radial to the center of the core, said sectors alternating with sectors in which no tufts of fibrous material are set, and having the outer ends of said fibrous material substantially in imaginary planes forming angles of ten to forty-five degrees with tangents to a circle circumscribing the brush at the points of intersection of said imaginary planes and said circle, substantially as described.

3. A brush for the purpose set forth, comprising a cylindrical core on alternate sectors of the periphery of which are mounted tufts of fibrous material, the fibres of which are substantially radial to the center of the core, to form a plurality of longitudinal strips of brush material, each strip having the

outer ends of said fibrous material substantially in an imaginary plane, forming an acute angle with the tangent of a circle circumscribing the brush at the point of contact of the outermost tips of the fibres and a circumscribing circle, substantially as described.

Signed at Douglaston, in the county of Queens, and State of New York, this 25th day of April, A. D. 1931.

FRANK T. POWERS.