July 4, 1933. R. W. SMITH 1,916,393

PULP SCREEN PLATE

Filed Sept. 23, 1931

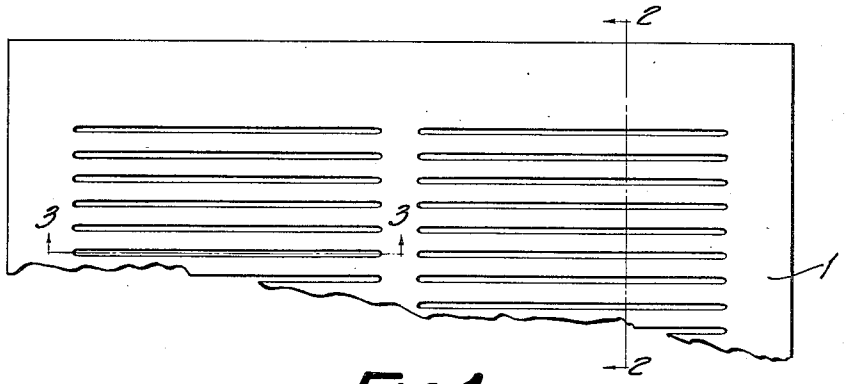

FIG. 1

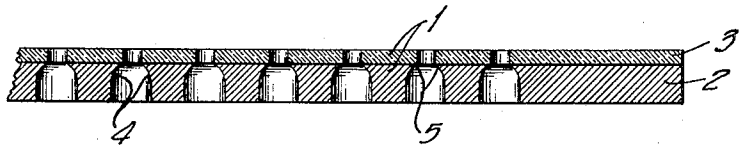

FIG. 2

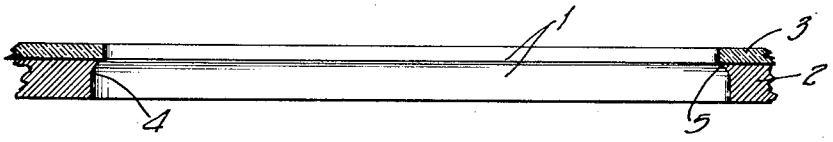

FIG. 3

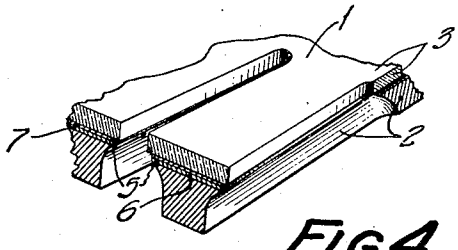

FIG. 4

INVENTOR
Richmond W. Smith
By Arthur & Ford
ATTORNEYS

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UNITED STATES PATENT OFFICE

RICHMOND W. SMITH, OF WALPOLE, MASSACHUSETTS

PULP SCREEN PLATE

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My invention relates to the paper making industry and particularly to improvements in devices for screening pulp, paper stock and the like.

Heretofore, screens of this type have been made of metal plates, generally bronze, or other non-ferrous metals, having openings of precise size cut therein by sawing or milling. It is extremely important that the screen openings be maintained within a few thousandths of an inch of the size as cut. The life of a metal screen is therefore very short due to the rapidity with which the small but maximum permissible enlargement of the openings occurs through normal wear. Moreover the openings in a metal plate present comparatively sharp edges and rough surfaces which tend to catch the passing fibers causing the formation of strings which result in slime spots in the finished paper.

It has been proposed to eliminate these difficulties by electroplating a metal base plate with rubber, thereby covering the sharp edges and rough surfaces of the openings and utilizing the low friction coefficient of the rubber, when wet, to increase the capacity of the screen. Because of the comparatively minute size of the openings required and because of the extremely small permissible variation in the size thereof such screens are difficult to make and therefore very expensive.

The principal object of my invention is to provide a pulp screen plate of rubber having openings of precise dimensions therein and which can be constructed at reasonable cost. Another object is to provide a screen plate having a greater capacity per unit of area and a very much longer life than the metal screens now in use. Another object is to provide a screen in which the possibility of clogging is reduced to a minimum.

With these objects in view, my invention includes the novel elements and the combinations and arrangements thereof described below and illustrated in the accompanying drawing in which

Fig. 1 is a fragmentary plan view of my pulp screen plate;

Fig. 2 is an enlarged fragmentary section in the plane 2—2 of Fig. 1;

Fig. 3 is an enlarged fragmentary section in the plane 3—3 of Fig. 1; and

Fig. 4 is a fragmentary perspective view of the screen on an enlarged scale.

Referring to the drawing, 1 represents the screen which comprises two elements, a backing or stiffening plate 2, and the rubber screen 3 which are secured together, preferably by cementing and vulcanizing, to form a unitary structure.

In making the screen, the metal plate is first slotted with a relief saw of thickness somewhat greater than the desired width of the finished slots. This cut does not go entirely through the plate but extends only to about the depth indicated at 4. The next operation is to cut entirely through the plate with a saw only slightly thicker than the required width of the finished slot, as shown at 5. The metal walls surrounding the openings are thus free or exposed.

Since rubber does not vulcanize well to the bronze of which the plates are generally made, before applying the rubber 3 to the plate, the plate is sand blasted and then coated with brass 6 by spraying it thereon in a molten condition as is well understood in the art. This step is preferably but not necessarily carried out prior to the cutting through of the plate. After sand blasting and spraying, the rubber is cemented to the plate, as shown at 7, and vulcanized thereon. A slotting saw of the proper size operating through the slots already made in the metal plate is then used to cut to exact size the screen openings proper in the rubber. These openings, depending upon requirements, generally vary in width between the approximate limits of 0.006 inch and 0.090 inch depending upon conditions such, for example as the nature of the pulp and the character of the sheet required. It is understood of course that all the openings in any one screen should be the same size and it is extremely important that the slots in the rubber be cut squarely and very accurately.

By reference to Fig. 4 which is an enlarged fragmentary perspective view of the screen,

it will be noted that the portion of the device which functions as a screen is entirely of rubber. That is the edges and walls which limit and define the openings or passages in the screen are rubber throughout. This is an important feature of the screen and is attained of course by cutting the openings in the metal backing to a somewhat greater width than the openings in the rubber. This differential in size should not be so excessive as to permit the rubber around the openings to flex or move under fluid pressure and thus decrease the size of the openings, but the rubber should project slightly beyond the edges of the openings in the metal plate as shown in Fig. 4.

The metal backing for the screen should be of sufficient thickness to provide the requisite stability and, as a material therefor, bronze is preferred. The rubber screen itself may be about $\frac{1}{16}$ inch thick and of a density around twenty plastometer although it is to be understood that the invention is in no sense limited in these respects.

Screens made according to my invention are not only substantially more efficient than all metal screens but are extremely resistant to wear. The life of such a screen is indefinitely long and cannot be accurately estimated at this time. One specimen which has been in operation over a year indicates no enlargement of the openings. On the other hand a comparative test of a rubber and bronze screen, respectively, extending over a period of two months showed no enlargement whatever in the openings in the rubber screen whereas the openings in a bronze screen showed an average enlargement of 0.004 inch.

While I have described my invention in its preferred embodiment it is to be understood that the words which I have used are words of description and not of limitation and that changes within the scope of the appended claims may be made without departing from the true scope and spirit of my invention in its broader aspects.

What I claim is—

1. A pulp screen plate comprising a layer of rubber having openings therein, and a stiffening plate substantially coextensive with the perforate portion of said rubber and having openings therein communicating with the openings in said rubber but slightly larger in size.

2. A pulp screen plate comprising a rigid metal plate having a layer of rubber secured to one side thereof to form a unitary structure and provided with a multiplicity of passages extending therethrough.

3. A pulp screen plate comprising a rigid metal plate having a layer of rubber secured to one side thereof to form a unitary structure and provided with a multiplicity of passages extending therethrough; said passages being of larger cross sectional area in the metal than in the rubber.

4. In a pulp screen plate, the combination with a rubber plate having slotted openings therein forming the screen proper, of means on one side thereof for stiffening said plate around the edges of said openings to prevent deformation under liquid pressure.

5. A pulp screen plate comprising a metal base plate having slotted openings therein of substantially greater cross sectional area at one side of said plate than at the other, and a rubber plate vulcanized thereon and having slotted openings therein communicating with but of smaller cross sectional area than the minimum area of the openings in said plate.

6. A pulp screen plate comprising a rigid plate of corrosion resistant metal having a layer of brass thereon and provided with slotted passages therethrough, and a rubber plate vulcanized on said brass and provided with slotted passages communicating with the passages in said metal plate.

7. A pulp screen plate comprising a metal plate having slotted openings therein provided with free edges, and a rubber facing connected to said plate; said facing having slotted openings therein the walls surrounding which overlie and project slightly beyond the walls surrounding the openings in the plate.

8. A pulp screen plate comprising a metal plate and a rubber plate secured together to form a unitary structure, and provided with a multiplicity of slotted passages therethrough; the side walls of said passages through the metal being exposed and splayed outwardly.

9. A pulp screen plate comprising a metal plate and a rubber plate vulcanized together to form a unitary structure, and provided with a multiplicity of slotted passages therethrough; the side walls of said passages through the rubber portion of the structure being parallel and in precise spaced relation and the side walls of said passages through the metal portion of the structure being exposed and splayed outwardly.

10. A pulp screen plate comprising a metal plate having a layer of rubber on one side thereof and provided with a mutiplicity of slotted passages therethrough, the walls surrounding the openings in the metal being exposed, the edges of the openings to said passages on the rubber side of said screen being square and sharp whereby openings of a precise width are defined.

11. The method of making a pulp screen plate which comprises cutting slotted openings in a metal plate, cementing a sheet of rubber to said plate, and thereafter cutting slotted openings in said sheet communicating with the openings in said plate.

12. The method of making a pulp screen

plate which comprises slotting a metal plate, vulcanizing a layer of rubber over one side of said plate, and thereafter cutting slots in said rubber through the slots in said plate but of smaller size than the plate slots.

13. The method of making a pulp screen plate which comprises cutting, in a metal plate, slotted passages having openings of a substantially greater width at one side surface of the plate than the other, vulcanizing a layer of rubber over the surface of said plate having the openings of lesser width therein, and thereafter forming in said rubber, slots of precise, predetermined but smaller size than the plate slots by cutting the rubber through the passages in said plate.

RICHMOND W. SMITH.