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PATENTED JULY 9, 1907.

A. B. SHERWOOD.
SURFACE PRINTING PLATE.
APPLICATION FILED MAY 21, 1906.

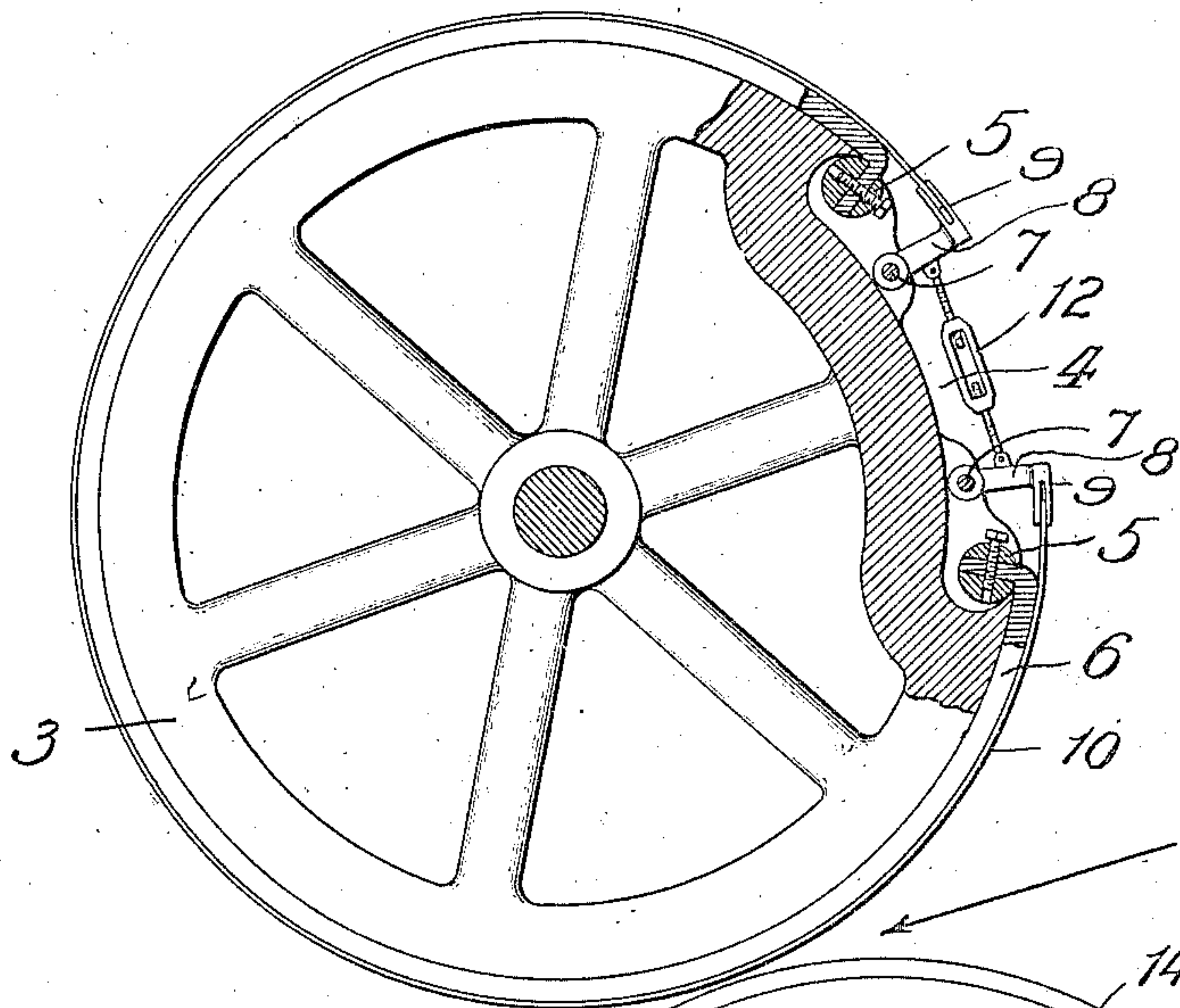


Fig. 1.

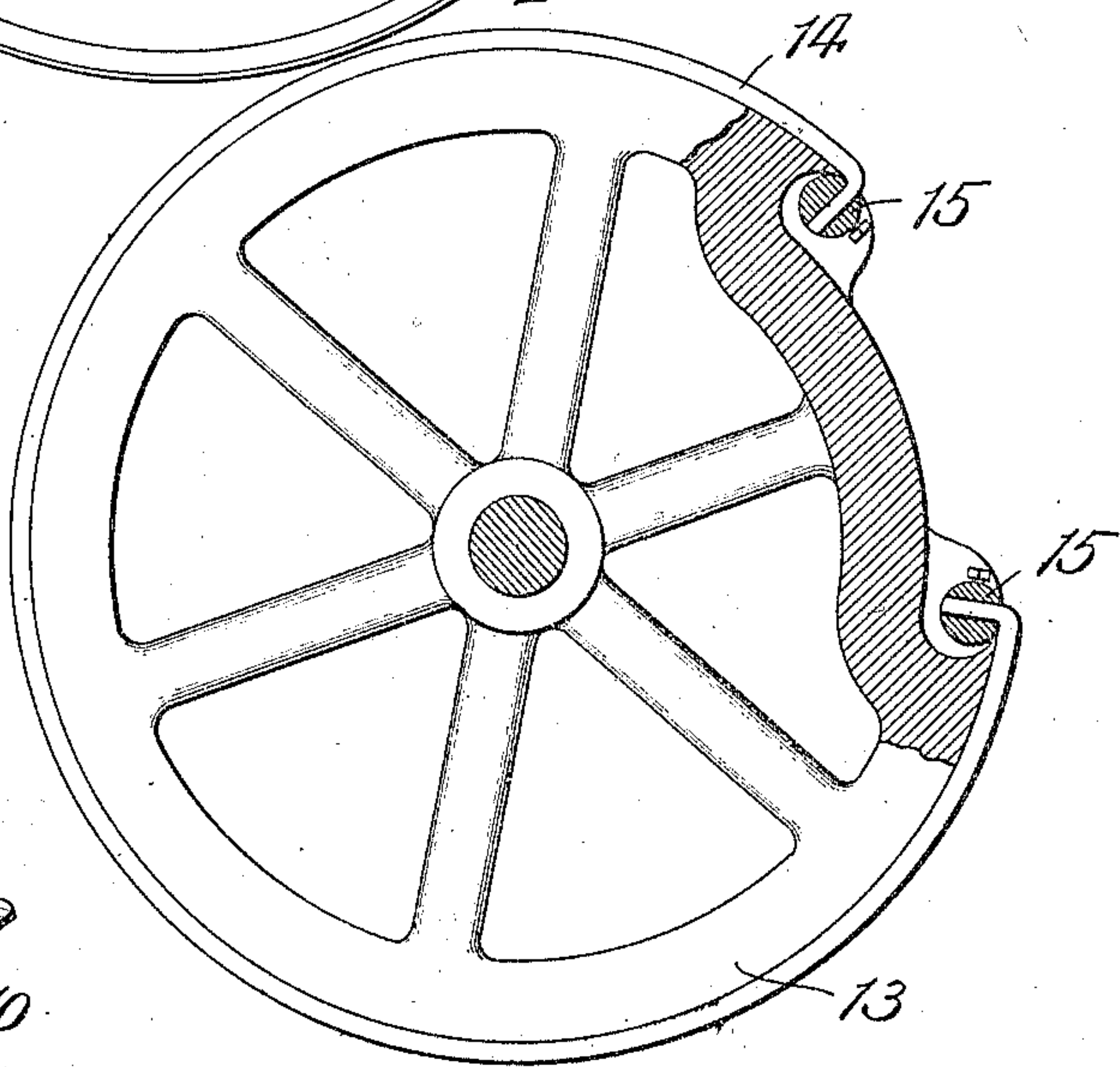
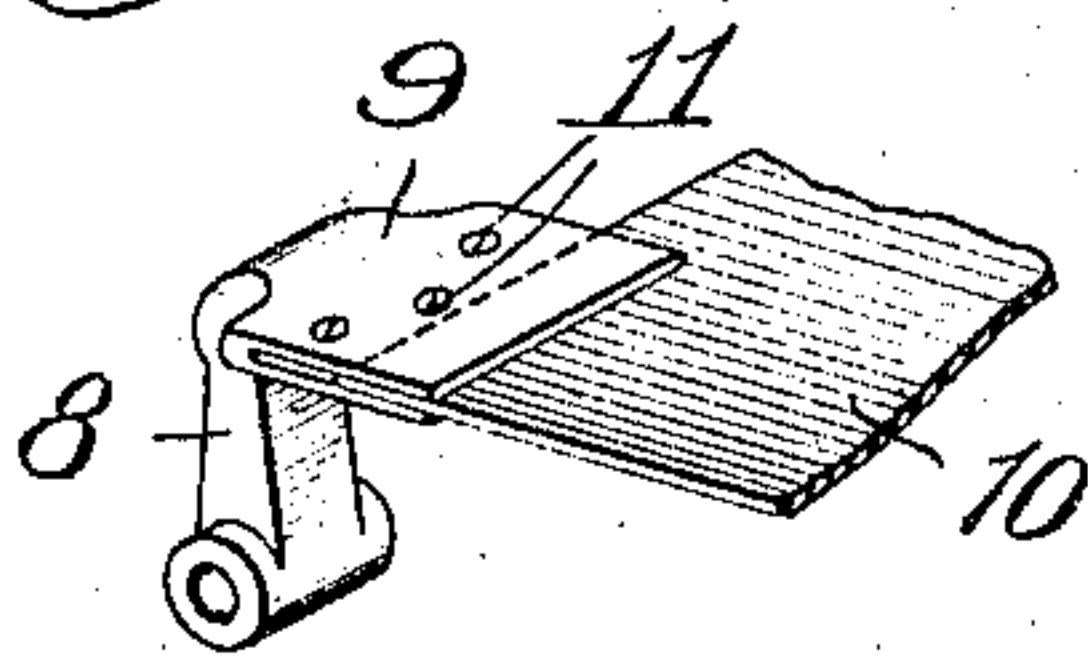


Fig. 2.



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SURFACE-PRINTING PLATE.

No. 859,587.

Specification of Letters Patent.

Patented July 9, 1907.

Application filed Mar 21, 1906. Serial No. 317,949.

To all whom it may concern:

Be it known that I, ALEXANDER B. SHERWOOD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Surface-Printing Plates, of which the following is a specification.

My invention relates to improvement in the construction of surface-printing plates for rotary or reciprocating printing presses and also in an improved method of printing thereby rendered possible.

Surface-printing is usually performed in a rotary press and it has been most common hitherto to provide a press having two cylinders, one, the printing-cylinder, carrying the surface-printing plate and the other, or impression-cylinder, carrying a rubber blanket. The plate employed in such presses, as hitherto provided, is usually zinc or aluminium of a thickness, as a rule not less than .026 of an inch mounted upon the printing-cylinder to rest firmly against the metal face thereof. The sheet to be printed is fed between the printing-cylinder and the impression-cylinder, the necessary close contact being effected in a measure by the resilient quality of the rubber blanket. Much difficulty has been experienced in operating presses of this type, provided with surface-printing plates, such as described, to obtain the density and sharpness of outline of impressions so desirable in high class work and especially so when the paper to be printed was of a hard quality, such as bond or ledger paper. All paper has a more or less uneven surface and in the case, more especially, of the hard papers described, it is difficult to produce impressions with desired uniform density of color and sharpness of outline.

An improvement over the well-known printing press described has been produced by constructing a press with three cylinders, namely a plate-cylinder on which the metal surface-printing plate, carrying the inked design, is mounted, a printing-cylinder carrying a rubber transferring sheet, and an impression-cylinder with a hard unyielding metal surface. The inked design carried by the surface-printing plate is transferred to the rubber blanket, or sheet, on the printing-cylinder, and the printing performed thereby against the sheet of paper, or the like, passing between it and the impression-cylinder. In thus printing from rubber a better contact than formerly is had, with the sheet of paper or the like to be printed, and a sharper outline of the printed design thus obtained, as a rule; but this is effected at a sacrifice in density of color. Furthermore in the use of the three cylinder press some difficulty has been experienced in maintaining the proper register, owing to the tendency of the gears to wear, however slightly, and the necessary lost motion between rotating parts which could not be avoided. A further disadvantage attending the use of the rubber printing sheet is its tendency to wear and the effect

thereon of oils, turpentine and the ink itself as well as atmospheric influences, all of which tend to unfit the rubber for more than limited use.

My object is to provide a construction of surface-printing plate by the use of which the objections to the other printing means hereinbefore mentioned are overcome; whereby the printing may be as dense as desired, and subject to regulation, and sharpness of outline may be maintained throughout the run.

It is also my object to provide a construction of surface-printing means which will be more economical in the matter of cost and maintenance than those hitherto employed.

In carrying out my invention I employ as the surface-printing means a sheet of very thin and highly flexible metal (say .004 of an inch in thickness) which will undulate freely under uneven pressure against its surface, the said sheet being imposed upon a backing of relatively soft, cushioning, resilient material, such as rubber, canvas and rubber fabric, or the like. The thin metal sheet with its backing described is mounted upon a plate-cylinder, which may be and preferably is the printing-cylinder, and the impression-cylinder is also by preference provided with a cushioning surface, preferably of rubber or the like.

In the operation of the press a new and improved method of printing is produced consisting in the impressing of a thin, hard, highly flexible and resilient sheet-metal surface-printing plate yieldingly and undulatorily against the yieldingly supported surface to be printed, thereby effecting a sharpness of outline and quality, or density, of color which so far as I am aware can be obtained in no other way.

Referring to the drawings—Figure 1 shows a surface-printing, plate-carrying, printing-cylinder and an impression-cylinder, as I prefer to construct them in carrying out my invention, the cylinders being broken away in places to expose details of construction which would otherwise be hidden; and Fig. 2, a broken perspective view of the preferred form of clamping means for the thin metal sheet.

The printing-cylinder 3 has the usual metal face and is recessed as shown at 4. Near the sides of the recess 4 are tightening rollers 5 slitted longitudinally to receive opposite ends of a cushion, preferably a rubber blanket 6, which is caught at its edges and fastened, as by the screws shown, in the slits of the rollers, and tightened or stretched over the surface of the cylinder by the turning of the rollers, in the common manner. Extending parallel with the rollers 5, and also mounted in suitable bearings in the recess 4, are rock-shafts 7, carrying arms 8 having bifurcated heads 9.

10 is a sheet of very thin metal of uniform thickness throughout and of flexible, resilient quality. It may be zinc or aluminium, for example, or, and preferably, copper. Any suitable metal having the desired quali-

ties may be employed. The heads 9, disposed as shown in the figure, form clamps to receive the opposite ends of the sheet 10, the clamping being performed by tightening the screws 11 shown in Fig. 2. The arms 5 8 with their heads 9 are in pairs along the respective shafts 7, the pairs being connected by means of turnbuckle devices 12. When the sheet is gripped by the heads 9, turning of the turnbuckles 12 draws the respective clamping heads toward each other thereby drawing and tightening or stretching the sheet 10 smoothly over the backing 6. On the impression-cylinder 13 I show a cushioning sheet 14, preferably of rubber, or the like, to present a yielding and resilient surface. The sheet 14 is mounted at its end in 15 tightening rollers 15 constructed like the rollers 5.

In operation the sheets of paper, or the like, to be printed are fed in the direction of the arrow, and to facilitate the feeding I prefer to mount the cylinders at an angle to the vertical plane, with reference to each other, as indicated. The sheet 10 carries upon its surface any suitable, applied ink-design, which is imposed thereon in the usual way to print in the manner well understood. It has not been thought necessary to illustrate the inking rollers, which may be of any 25 usual or suitable construction. In printing, the sheet of paper, or the like, is squeezed with desired pressure between the cylinders and as both the printing and impression surfaces are of a yielding, resilient, undulatory character the very closest contact is brought 30 about between the printing surface and the surface to be printed. Slight variations in the thickness of the paper, or the like, will be compensated for by the undulating action of the two resilient surfaces between which it is compressed. Of course the cylinders in practice would be adjusted with reference to each other in the usual way to conform properly to the thickness of material being printed.

As the design is printed directly from a metal surface its sharpness of outline and proper uniformity 40 may be maintained without difficulty, and by rendering this metallic surface yielding and undulatory as described, all the advantages of perfect surface contact in printing is obtained; and the use of a resilient surface, or surface-covering, 14 on the impression-cylinder enhances this effect with the result that more perfect and uniform surface-printed impressions are produced 45 than by any other means of which I am aware.

Owing to the resilient character of the printing surface; and the readiness with which it undulates under 50 uneven pressure, the inking rollers will contact therewith, even under comparatively slight pressure, with greater uniformity throughout than is the case where a stiff or unyielding surface-printing plate is employed. The result is that more perfect and uniform application 55 of ink to the design is effected. Another advantage of my improvement lies in the fact that it reduces friction between parts and consequently the power necessary to operate the press. The reason for this is that but slight pressure is necessary between the moving parts, 60 as the yielding faces of the cylinders readily conform

to each other. The fact that less pressure between the cylinders is necessary is a great advantage, particularly in color work, where undue pressure tends to spread the ink and stretch the sheet being printed, thus interfering with exact register. It will be understood, of course, that the press provided with my improvements may be employed for printing upon sheets of metal or other material besides paper.

My improvements tend not only to enhance the results in surface-printing, but also to cheapen the cost materially. The sheet 10 being very thin is naturally 70 less expensive than the heavier sheets, or surface-printing plates, hitherto employed. There is practically no wear upon the backing, which will therefore last indefinitely. As there is little friction between 75 the cylinders, the wear upon the surfaces of the printing-plate and impression-cylinder is reduced to a minimum. The sheet 10, forming the surface portion of the printing-plate, may be an integral part of the backing 6. For example a sheet 6, of rubber or the like, 80 may be plated with metal which plating would be the equivalent of the sheet 10 as it is illustrated.

What I claim as new, and desire to secure by Letters Patent, is:

1. The combination in a printing press of a surface-printing sheet of highly flexible and resilient hard, thin, sheet-material, a backing therefor of relatively soft cushioning material, and means engaging the edges of the printing sheet and its backing for operatively mounting them in the press, and an impression surface co-operating 90 with the surface-printing sheet having a relatively soft and resilient cushioning surface, for the purpose set forth.

2. The combination in a printing press of a printing-cylinder, a surface-printing sheet of highly flexible and resilient thin sheet metal, and a backing therefor of relatively soft cushioning material and means engaging the edges of the printing sheet and its backing to secure them upon the printing cylinder; and an impression surface having a relatively soft and resilient surface portion, for the purpose set forth. 100

3. The combination in a printing press of a printing cylinder, a surface-printing sheet of highly flexible and resilient thin sheet metal, and a backing therefor of sheet rubber, and means engaging the edges of said metal sheet and backing to secure them upon the printing cylinder and an impression cylinder co-operating with the printing cylinder and having a rubber circumferential surface portion, for the purpose set forth. 105

4. The combination in a printing press, of a printing cylinder, a surface-printing sheet of highly flexible and resilient thin sheet metal, a backing therefor of relatively soft cushioning material, means for securing said printing sheet and backing at their edges to the surface of the printing cylinder and an impression surface having a relatively soft and resilient surface adapted to co-operate 115 with said printing surface.

5. The combination in a printing press, of a printing cylinder, a surface-printing sheet of highly flexible and resilient thin sheet metal and backing therefor of relatively soft cushioning material, means for securing said printing sheet and backing at their edges to the surface of the printing cylinder and an impression surface having its surface portion formed of a sheet of rubber adapted to co-operate with said printing surface. 120

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