W. J. PRICE.

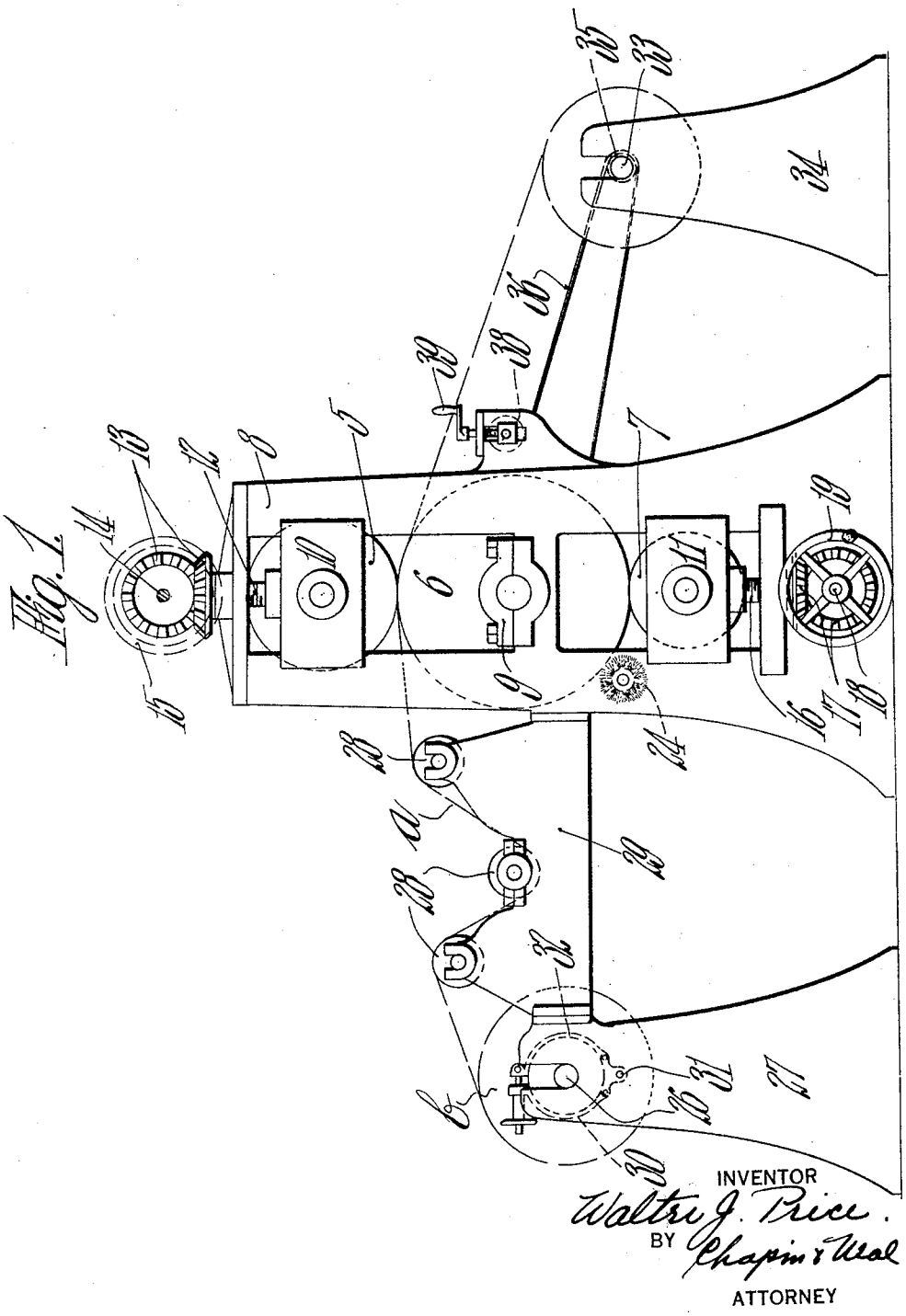
METHOD OF IMPARTING A PATTERN FINISH TO PAPER.

APPLICATION FILED AUG. 12, 1921.

1,403,628. Patented Jan. 17, 1922.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

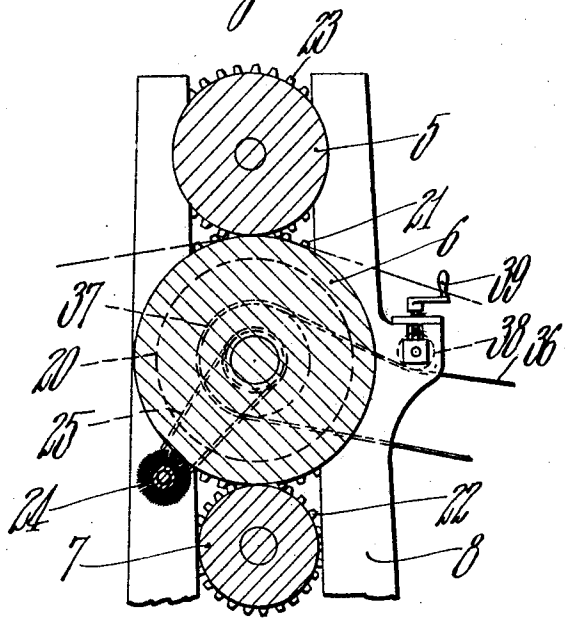
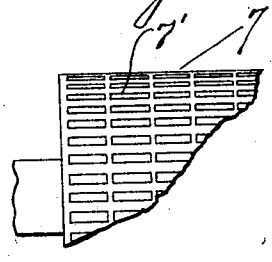


Fig. 3.



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UNITED STATES PATENT OFFICE.

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METHOD OF IMPARTING A PATTERN FINISH TO PAPER.

1,403,628. Specification of Letters Patent. Patented Jan. 17, 1922.

Application filed August 12, 1921. Serial No. 491,773.

To all whom it may concern:

Be it known that I, WALTER J. PRICE, a citizen of the United States, residing at Holyoke, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Methods of Imparting a Pattern Finish to Paper, of which the following is a specification.

This invention relates to an improved method of imparting a pattern finish,—such as a linen, fabric, or similar finish,—to paper and the like preferably in a continuous manner.

Various methods have been proposed heretofore for accomplishing this result, such as endless belts made up of linen or other fabric, between which belts, the paper to be finished is passed. The difficulty in this scheme of finishing paper is in joining the ends of the belt together so as to get a joint of necessary mechanical strength without getting one which will periodically leave its mark on the paper. Another method of finishing paper is performed in the so-called embossing machine, wherein the paper is passed between an engraved steel roll and a second roll of paper, cotton or the like. A further method is to pass the paper between mating rolls, similar to calendar rolls, both of which rolls have patterns formed therein, as for example, by cutting or engraving rolls which cut the calendar rolls and form the desired patterns therein.

The latter method has not, so far as I can ascertain, proved commercially successful and has not gone into practical use to any appreciable extent due to certain disadvantages, which I seek to overcome by this invention. With the use of two mating calendar rolls, both having patterns, it is exceedingly difficult to get the patterns on the two rolls to exactly register and, if originally exactly in register, it is exceedingly difficult to keep them so. If the two patterns do not register, the condition existing is that of a projection in one roll engaging in a recess of the mating roll and, with this condition, paper passed between the rolls will be crimped instead of remaining flat and having the impress of the patterns therein. In either event, one of the two patterns tends to grind off the other, and, the rolls have a short useful life, it being usually necessary to employ an engraving roll in constant cooperation with each calendar roll to insure a proper pattern in them at all times. If, however, the patterns on the two rolls are kept in exact register, which, as has been stated, is exceedingly difficult, the two rolls, if relatively hard, will cut into the paper, crush and injure its fiber, making it limp as well as rough and unsuitable for writing purposes. This same objection also applies to the second method above outlined. The paper will tear readily along the lines where the fibers are cut or crushed and by the crushing of the fibers the finished paper rapidly absorbs the ink when written upon and causes it to spread much in the same manner as with blotting paper. If the rolls are made of softer material, such as paper, so as not to crush and cut the fibers, then the condition is that of two somewhat resilient patterns pressing one upon the other and there is too much resiliency to allow of a satisfactory impress of the pattern in the paper.

My invention has for its general object to overcome these adverse conditions and render commercially satisfactory that method of finishing paper which consists essentially in passing it continuously between pressure rolls and impressing in the paper a pattern corresponding to a pattern formed on one only of said rolls.

According to a preferred form of my invention, I provide a pattern in one only of the mating rolls between which the paper is passed and the other roll has a smooth, relatively hard and substantially non-yielding surface, while the pattern carrying roll has a surface which is somewhat softer and possesses some resiliency.

This method overcomes the disadvantages of the prior methods heretofore set forth and,—as against cutting the paper and leaving obvious traces of the cutting and a rough, limp sheet,—yieldingly compresses the paper, and thereby does not crush or cut the fiber, and since the compression is against a smooth, hard, non-yielding surface, there is no crimping of the paper, and the pattern is clearly reproduced therein without an undesirable rough appearance. The finished paper has a desirable transparency in the compressed portions not obtainable by the former methods outlined and presents a satisfactory writing surface.

In conjunction with the pattern carrying rolls, I may provide a cutting roll for the purpose of forming the pattern therein, or the pattern may be otherwise formed if desired. The cutting roll does not neces-

sarily require to be in continual engagement with the pattern-carrying roll, as has been heretofore proposed, but may be used intermittently, as and when desired.

Other objects and advantages will appear in the following description and in the illustrative embodiment of the invention in the accompanying drawings, in which:

Fig. 1 is an exterior elevational view of an apparatus for practising my method of finishing paper and the like.

Fig. 2 is a fragmentary sectional elevational view of the principal parts thereof; and

Fig. 3 is an enlarged fragmentary view of the cutting or engraving roller.

Referring to these drawings; a web *a* of paper, previously dried as distinguished from paper in the process of formation, is led from a suitable supply, such as a roll *b*, between two mating rolls 5 and 6. One of these rolls, as 5, has a smooth surface, and one which is relatively hard and unyielding. This surface may, for example, be made of steel or any other suitable material. The roll 6 has a surface of somewhat softer material and preferably one of some resiliency and may, for example, be constructed of compressed paper (like an ordinary calendar roll), cotton, papier mâché, or any other suitable material. It is even possible that a soft metal such as zinc or the like will suffice. The roll 6 is the pattern-carrying roll and has a pattern of any desired design formed therein in any suitable manner, either in relief or intaglio. The pattern may be made to simulate linen or any other fabric or may have various other designs thereon, such for example, as the more or less conventional design shown at 8 in Fig. 3.

Preferably, I provide a cutting or engraving roll 7 of relatively hard material, such as steel, or the like, upon the surface of which is formed the desired pattern, such for example, as that just referred to and indicated at 7′ in Fig. 3. The diameter of this roll should be a sub multiple or multiple of the diameter of roll 6. The roll 7, as shown, is in engagement with roll 6 for the purpose of cutting a pattern therein but it is not necessarily essential that the rolls 6 and 7 remain in engagement and means, later to be described, are provided for separating them whenever cutting is unnecessary. Furthermore, it is not necessarily essential that the pattern be cut during the process of finishing the paper, although usually it is desired to do so for the purpose of saving time.

The rolls 5 and 7 are mounted for adjustment relatively to roll 6 and means are provided for applying pressure upon each of the former to force it against roll 6. As shown, the rolls 5, 6 and 7 are mounted one above the other and supported at their ends in spaced side frames 8. The bearings 9 for rotatably supporting roll 6 may be fixed on the frame, as illustrated, while the bearings 10 and 11 for rolls 5 and 7 respectively, are mounted to slide in frame 8 toward or away from roll 6. This mounting is similar to that employed in ordinary calendars and is well understood in the art. Rotatably mounted in each frame 8 is a vertically disposed screw 12 which is suitably engaged with the adjacent bearing 10 so as to move the latter up or down on rotation of the screw. The two screws 12 are connected by bevel gears 13 and a cross-shaft 14, so that a rotation of one will simultaneously and equally move the other and a hand wheel 15 is provided on shaft 14 for convenience in turning the screws. Similar screws 16 are provided for bearings 11 which screws are connected by bevel gears 17 and a cross-shaft 18, rotatable by a hand wheel 19. By turning the latter in the appropriate direction, the roll 7 may be moved out of engagement with roll 6 whenever desired.

The roll 6 may be driven from any suitable source of power by a pulley 20 (Fig. 2) fixed on the shaft thereof. The latter also carries a gear 21 with which a gear 22 on the shaft or roll 7 may be enmeshed, when desired, the ratio of these gears being such as to drive the rolls 6 and 7 at equal surface speed. While it is not essential for all purposes to drive roll 5, I prefer to do so and provide on its shaft a gear 23 to mesh with gear 21, these two gears being likewise proportioned to drive their rolls at equal surface speed.

It may be sometimes desirable to clean the pattern-carrying roll 6 and in such cases, I provide suitable means, such as a brush 24, driven by a belt 25 and suitable pulley, from roll 6, for this purpose.

Any suitable means may be provided for receiving the supply roll *b* and guiding the web *a* into the bight of rolls 5 and 6, as also for winding up the web after it has been finished. As shown, the roll *b* is mounted on an arbor 26, removably supported at its ends in spaced standards 27. From this roll the web *a* is led to and between rolls 5 and 6, being suitably guided, as by idler rolls 28 mounted in and extending between side frames 29, each of which is supported by and between a side frame 8 and a standard 27. For the purpose of tensioning the paper, an adjustable braking device 30, of common form, is pivoted to one standard 27 at 31 and cooperates with a drum 32 on arbor 26. The finished paper is wound up on an arbor 33, mounted similarly to arbor 26 in standards 34. This arbor 33 carries a pulley 35 which is driven by a belt 36 from a pulley 37 on roll 6. An idler 38, mounted in the rear frame 8 for adjustment in an obvious manner by the handle 39, engages belt 36.

The driving connection for arbor 33 is such as to be capable of turning it with sufficient rapidity at the start of the winding operation and as the paper builds up on the arbor, the idler 38 is adjusted to slacken belt 36 and allow it to slip.

The details of the exemplary apparatus heretofore described are not particularly important and may be varied in many ways and still embody my invention, which is concerned essentially with the passage of a strip between two rolls, perferably although not necessarily continuous, one of which carries a pattern and has a resilient surface capable of compressing the paper in conformity to the pattern without cutting it or crushing the fibers and the other of which presents a smooth and relatively harder and unyielding surface.

I believe I am the first to finish paper in the manner just set forth and I desire to claim my invention in the broadest possible legal manner.

What I claim is:

1. The method of imparting a pattern finish to paper and the like, which consists in forcing the paper against a hard non-yielding surface during continuous travel of the paper by a member carrying a pattern made of softer material.

2. The method of imparting a pattern finish to paper and the like, which consists in forcing the paper yieldingly against a smooth and relatively non-yielding surface during continuous travel of the paper by a member carrying a pattern and made of somewhat resilient material.

In testimony whereof I have affixed my signature.

WALTER J. PRICE.