

Jan. 29, 1935.

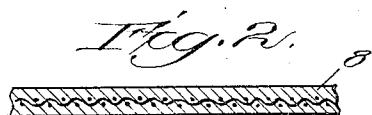
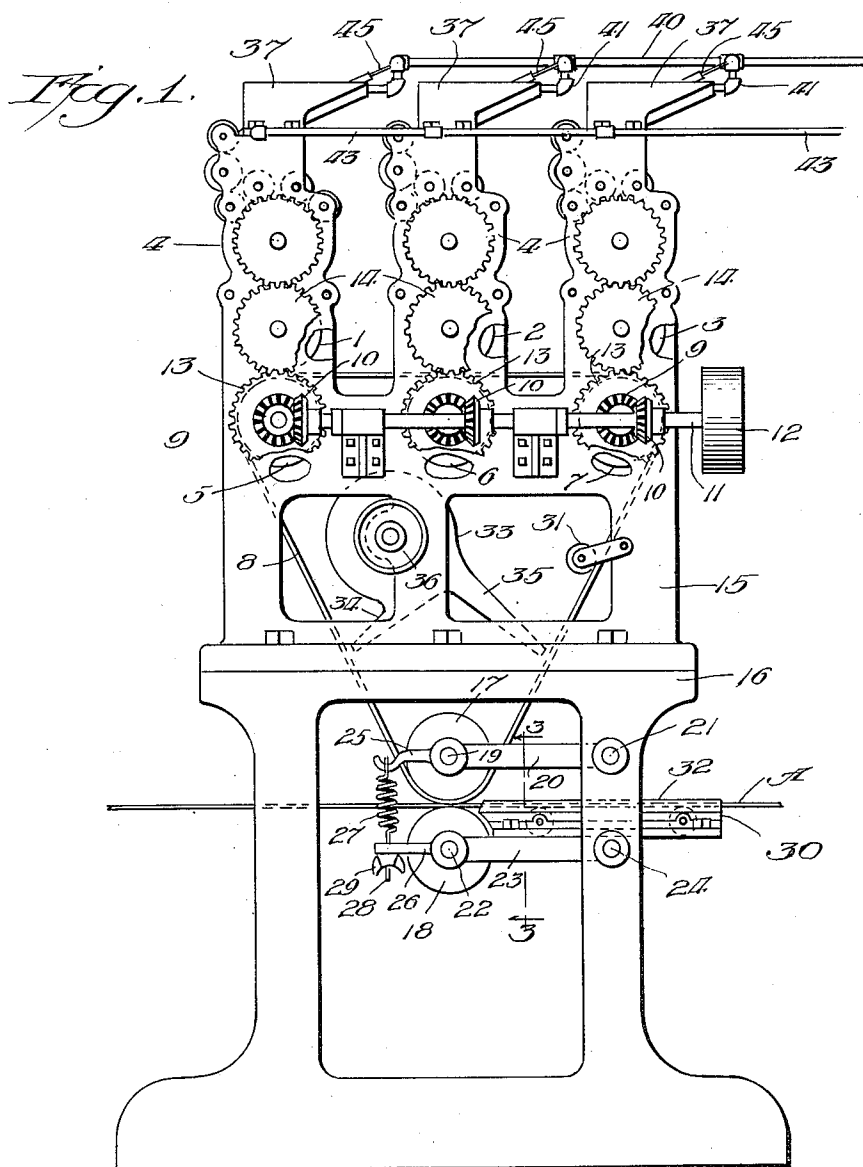
G. R. MEYERCORD

1,989,375

PRINTING PRESS

Filed Nov. 12, 1932

2 Sheets-Sheet 1



Inventor:
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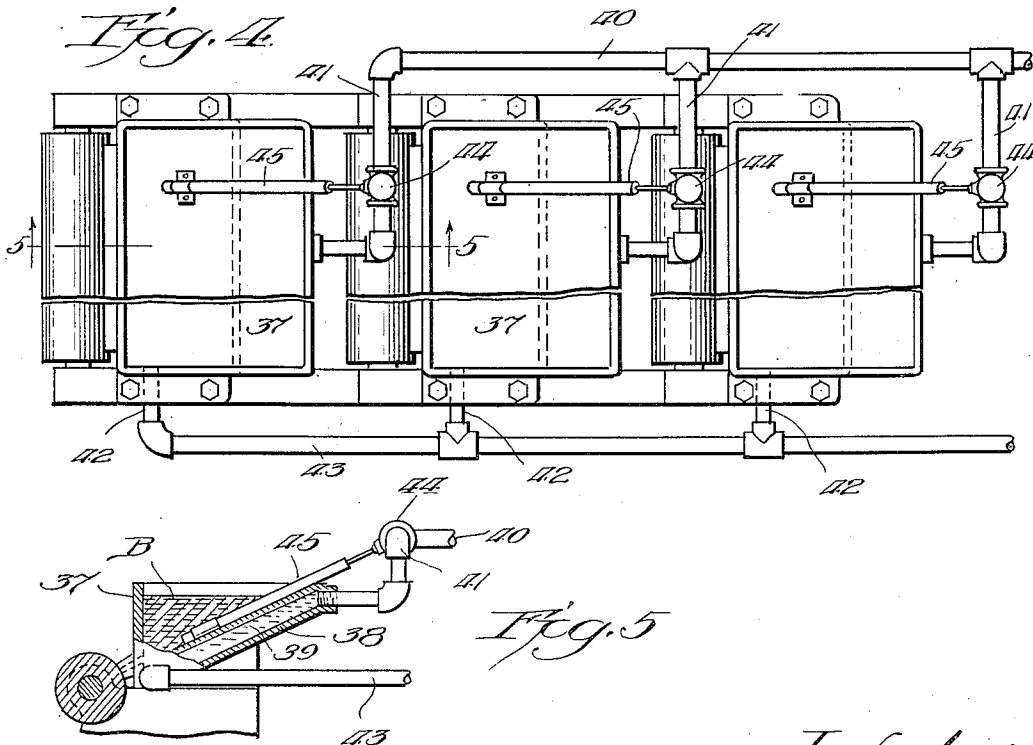
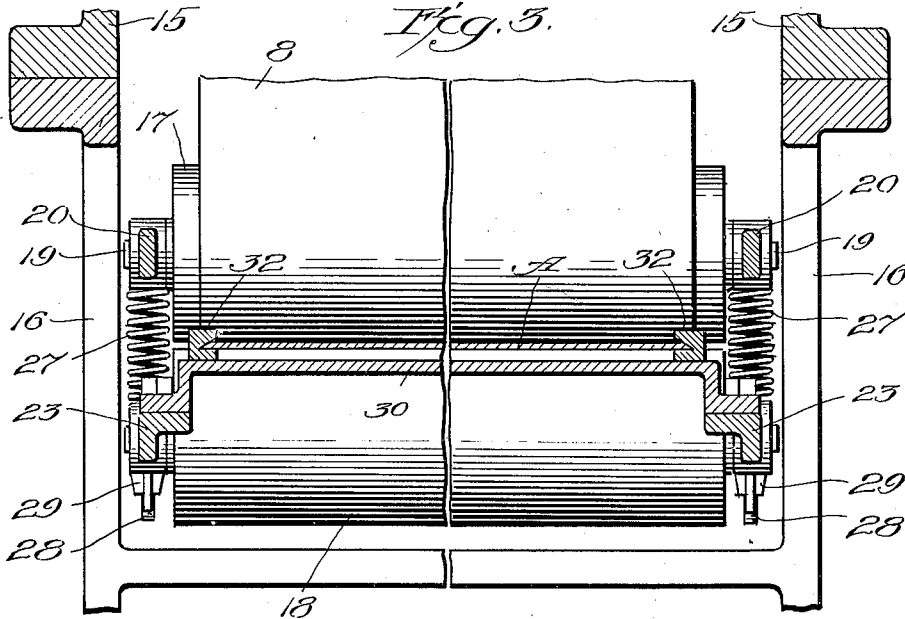
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UNITED STATES PATENT OFFICE

1,989,375

PRINTING PRESS

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Application November 12, 1932, Serial No. 642,404

6 Claims. (Cl. 101—177)

The primary object of the present invention is to produce improved and more efficient mechanism for transferring impressions from plate rollers to sheet metal, paper or other material, or to other objects.

One of the objects of the present invention is to produce a simple and novel printing press of the rotary type in which comparatively great variations in thickness at different points in a sheet passing through the same will not prevent the making of perfect impressions upon the sheet.

When a printing press runs at high speed the parts coming in contact with the work rise in temperature, as they also do when the work is in the form of metal sheets that are more or less heated. When this occurs, the ink may be rendered too fluid and, in the case of color printing, the effect may be more pronounced on some inks than on others, so that a poor job of printing results. Further objects of the present invention are to control the temperature of the mechanism or of the inks, or of both, so that sharp, clean and distinct impressions may be made, even on a warm sheet or object or on work of any other kind, regardless of the susceptibility of printing ink to temperature changes or to the varying degrees of susceptibility of the different inks that may be used in multi-color printing.

In carrying out my invention in its most highly developed form, whereby all of the aforesaid objects of the invention are attained, I cause the impressions from the plate roller or rollers to be delivered to a soft endless belt or apron, which in turn transfers them to a sheet, panel or strip passing through the press. The sheet, panel or strip is yieldingly pressed against the belt or apron, preferably by means of two rollers, one of which engages the back of the belt or apron, while the other is in contact with the under side of the work. Both of these pressure rollers are formed of rubber, rubber composition, or other comparatively soft, resilient material, or they are faced to a considerable depth with such material. Consequently, the pressure that holds the belt or apron and the work together is produced by instrumentalities which are quite flexible and yieldable, so that the lines of contact between one pressure roller and the belt or apron and between the other pressure roller and the under side of the work need never be straight lines, and neither need the line of contact between the work and the belt ever be a straight line. In other words, the pressure rollers and the belt will adapt themselves to any surface irregulari-

ties in the thickness of the sheet, panel or strip that is going through the press. The belt or apron may be cooled by blowing air or other cooling fluid against the same, and the inking means for the several plate rollers, in the case of multi-color printing, for example, may have their temperatures controlled, independently of each other, to insure that the inks will be of the proper consistencies to obtain the best results.

The various features of novelty whereby my invention is characterized will hereinafter be pointed out with particularity in the claims; but, for a full understanding of my invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawings, wherein:

Figure 1 is a side view of a printing press embodying the present invention; Fig. 2 is a section through the ink-transferring belt or apron, on a larger scale than Fig. 1; Fig. 3 is a section on line 3—3 of Fig. 1, on a larger scale; Fig. 4 is a top plan view of the press, only the ink-supplying means being shown; and Fig. 5 is a section on line 5—5 of Fig. 4.

Referring to the drawings, 1, 2 and 3 represent three plate rollers each having associated therewith suitable inking apparatus indicated as a whole at 4. These rollers are, of course, parallel with each other. Underlying the plate rollers are pressure rollers 5, 6 and 7, respectively. Extending between the plate rollers and the pressure rollers is the upper run of an endless belt or apron 8 which is faced with rubber or any suitable ink-carrying material. The belt or apron may conveniently be formed of rubber reenforced with fabric embedded within the same in the manner of a tire casing or a rubber hose, thereby causing the belt or apron to be non-stretchable while remaining soft enough so that the plate rollers will not be worn through contact with the belt or apron.

The plate rollers and the pressure rollers are all geared together so as to rotate at the same peripheral speed. In the arrangement shown, the several pressure rollers are provided on corresponding ends with bevel gears 9, 9 meshing with complementary gears 10, 10 on a shaft 11 driven in any suitable manner as, for example, through a wheel or pulley 12. Each of the aforesaid pressure rollers has thereon a gear 13 meshing with a like gear 14 on the corresponding plate roller.

The plate rollers, inking apparatus, and the aforesaid pressure rollers are all mounted between the side walls of the frame 15 resting upon a

suitable base having side walls 16, 16 below and parallel with the side walls of the frame 15. The endless belt or apron 8 hangs down in the form of a loop the lower end of which is within the 5 base of the machine. Resting in and supported by the loop in the belt is a roller 17 whose axis is, of course, parallel with the axes of the pressure rollers 5, 6 and 7. Just below the loop in the belt is another roller 18, parallel with the roller 17. Means are provided for drawing the rollers 17 and 18 together with the belt lying between them. In the arrangement shown, the roller 17 is provided at its ends with trunnions 19 rotatably mounted in the free ends of a pair of arms 20, 15 20 that extend in an approximately horizontal direction to the front of the machine where they are connected to the side walls of the base by hinge pins 21 whose axes are parallel with the axis of the roller 17. The roller 18 is likewise 20 provided with trunnions 22 journaled in the inner ends of arms 23 parallel to the arms 20 and connected to the side walls of the base at the front of the machine by hinge pins 24. The distance between the centers of the trunnions 19 and 25 the centers of the hinge pins 21 is equal to the corresponding distance with respect to the trunnions 22 and the hinge pins 24 so that, when the arms 20 and 23 are swung up or down, through corresponding angles, the rollers 17 and 18 will 30 remain in the same positions relatively to each other. The arms 20 and 23 are provided at their inner ends with extensions 25 and 26, respectively. Between each extension 25 and the corresponding extension 26 is a tension spring 27. Each of the 35 springs may be anchored at one end to one of the extensions between which it lies and have a straight screw-threaded portion 28 extending loosely through an opening in the other extension; there being on the screw-threaded part or stem a nut 29. By adjusting the nuts, the tension of the springs may be varied.

It will be seen that in the particular arrangement illustrated the belt serves to hold up the rollers 17 and 18 so that the weight of the latter, 45 together with a portion of the weight of the arms 20 and 23, serves to maintain the belt taut. The desired degree of tautness of the belt may, however, be brought about in any suitable way.

The work is fed between the rollers 17 and 18, 50 underneath the belt, so as to be held against the belt by a pressure depending upon the tension of the springs 27. In the drawings the work on which the printing is to be done is shown as taking the form of a metal strip A. This strip 55 is conveniently fed into the machine across the top of a table 30 resting on top of and secured to the arms 23; the table preferably extending a short distance outwardly in front of the machine. With this arrangement, the table moves 60 up and down with the roller 18, at all times having its upper face or surface tangent to the roller 18, regardless of where the roller happens to be. The spring connections between the supporting arms for the rollers 17 and 18 not only 65 determine the pressure with which the belt and the work are held in contact with each other, but they permit the rollers to be adjusted relatively to each other in order that thin or thick strips may pass between them. It will be noted that 70 variations in thickness in a strip passing through the machine, which may cause an increase or decrease in the tension of the springs 27, do not affect the tension of the ink-carrying belt.

It may be possible, by employing a belt of the 75 proper degree of softness and of the proper thick-

ness, to take care of variations in thickness throughout any given strip or sheet through the "give" in the belt. However, if either or both of the rollers 17 and 18 be made of or be faced with 5 yieldable material, the matter of maintaining effective contact between the belt and the surface of the strip is simplified. For example, if the roller 18 be soft, it may yield in the downward direction while the belt is yielding in an upward 10 direction at the time a thick spot in the strip is passing; the amount of deformation in the belt therefore being only one-half as great as it would be if the roller 18 were of hard material. I therefore prefer that the roller 18 shall be of 15 soft rubber, a soft rubber compound, or other resilient yieldable material, or that it at least be faced to a considerable depth with such material. Also, although the roller 17 may ordinarily be made of hard material, for some purposes, at 20 least, I prefer that this roller shall be similar to the roller 18, so that what may be termed the gripping means for the strip or sheet passing through the machine shall be soft and very flexible and thereby be extremely sensitive to every 25 slight variation in thickness in the work and, as before stated, insure the maintenance of perfect contact between the belt and the work.

The belt may be held against shifting sidewise in any suitable manner. In the arrangement shown, there is engaged with the inner face of 30 one of the legs of the loop in the belt a centering roller 31 of the type having right and left-hand screw threads meeting midway between the ends of the roller. Also, the work may be properly centered or aligned on the supporting table, 35 In the arrangement illustrated, the table has thereon guides 32 for engagement with the long edges of the strip and preventing the strip from shifting laterally.

The belt or apron may be cooled in any suitable 40 way should the temperature thereof be raised because printing is being done on metal that is in a more or less heated condition, or for any other reason as, for example, because of high speed operation. In the arrangement shown, 45 there is a blower 33 having discharge nozzles 34 and 35 to blow air against the inner face of both legs of the loop in the belt. The blower may be driven in any suitable way as, for example, by a belt pulley 36. 50

It may not always suffice simply to cool the ink-carrying belt or apron, but it may at times be desirable to control the temperature of the inks in order to secure the most satisfactory results; this being also true in situations that apparently 55 do not require or make desirable the cooling of the belt itself. The need of controlling the temperature of the ink is greatest in multi-color printing where inks are employed of such different characteristics that a rise in temperature does 60 not affect them all in the same way; some of them being perhaps not affected at all while others, at the same time, become more fluid than they should be. Even in cases where only one kind of ink is employed, it is at times desirable to 65 control the temperature of the ink and therefore its consistency.

In the arrangement illustrated, each inking apparatus includes a suitable ink reservoir 37. As 70 best shown in Fig. 5, each ink reservoir has a hollow wall 38 through which a cooling fluid 39 flows. This cooling fluid may be supplied by a pipe 40 from which branch pipes 41 lead to the several reservoirs. These branch pipes are connected to the reservoirs so as to communicate 75

with the interior of their hollow walls toward one end whereas branch pipes 42 on a return pipe 43 communicate with the other ends of the chambers within the hollow walls. Each branch pipe 41 is provided with a thermostatic valve 44 whose thermal element 45 extends down to the ink B in the corresponding reservoir. By properly adjusting the thermostats and providing a cooling fluid of low temperature, it is possible to cool the ink in each reservoir to such a point that it will not become too fluid before reaching the strip or sheet that is being printed, but will be of the proper consistency at the time it is being transferred from the belt to the work. Since the temperature regulation in each ink reservoir is independent of that in the others, the temperatures of the inks as they leave the reservoirs may all be different from each other, depending upon the natures of the inks and their need or lack of need of great, little or no cooling.

The operation of the machine having been explained in connection with the description of the features of construction only a brief summary need now be made with respect thereto. The plate rollers and the belt being driven at any suitable speed, the belt receives ink impressions from the plate rollers; and the work is fed through the machine in contact with the belt and receives the ink impressions therefrom. The yieldability of the belt and of one or both of the lower pressure rollers provides automatic compensation for any variations in thickness throughout a piece of work, even though such variations be considerable; making it possible to secure clean, sharp printing on strips, sheets or panels, or even boards, that could not be successfully printed in machines of the types heretofore in use. Also, my improved cooling system makes it possible successfully to print on heated metal or other sheets and does away with the difficulties that might otherwise be encountered in printing at high speeds in a plurality of colors, first on the belt and then on the piece of work, by reason of the fact that under the heat generated in the machine some inks, at least, might become too fluid.

While I have illustrated and described with particularity only a single preferred form of my invention, I do not desire to be limited to the exact structural details thus illustrated and described; but intend to cover all forms and arrangements which come within the definitions of my invention constituting the appended claims. In the claims by "strip" or "sheet" I mean not only a strip or a sheet but a panel or board. Also, when I say that the peripheral portion of a roller is soft and resilient I do not mean that the remainder of the roller is necessarily hard, for it may be either hard or soft or possess any desired degree of hardness or softness.

I claim:

1. In a printing press, a plate roller, an endless belt having an outer soft ink-receiving surface, means to hold the plate roller in rolling contact with said surface of the belt, two parallel pressure rollers lying on opposite sides of the belt and adapted to press said surface of the belt against a strip passing between the belt and the

outer pressure roller, and means yieldingly urging said pressure rollers toward each other, at least one of said pressure rollers having the peripheral portion thereof composed of soft resilient material.

2. In a printing press, a plate roller, an endless belt having an outer soft ink-receiving surface, means to hold the plate roller in rolling contact with said surface of the belt, two parallel pressure rollers lying on opposite sides of the belt and adapted to press said surface of the belt against a strip passing between the belt and the outer pressure roller, and means yieldingly urging said pressure rollers toward each other, the pressure roller on the outer side of the belt having the peripheral portion thereof composed of soft resilient material.

3. In a printing press, a plate roller, an endless belt having an outer soft ink-receiving surface, means to hold the plate roller in rolling contact with said surface of the belt, two parallel pressure rollers lying on opposite sides of the belt and adapted to press said surface of the belt against a strip passing between the belt and the outer pressure roller, and means yieldingly urging said pressure rollers toward each other, both pressure rollers having their peripheral portions composed of soft resilient material.

4. In a printing press, a frame, horizontal roller means mounted in said frame, an endless belt having an outer soft ink-receiving surface extending over said roller means and depending therefrom, two parallel pressure rollers lying on opposite sides of the lowermost portion of the belt, means yieldingly pressing said pressure rollers toward each other and into contact with the belt, means yieldingly supporting said pressure rollers from the frame, and a work-supporting table mounted on the last mentioned means to support a sheet in position to be fed between the lower pressure roller and the belt.

5. In a printing press, a frame, horizontal roller means mounted in said frame, an endless belt having an outer soft ink-receiving surface extending over said roller means and depending therefrom, two parallel pressure rollers lying on opposite sides of the lowermost portion of the belt, means yieldingly pressing said pressure rollers toward each other and into contact with the belt, means yieldingly supporting said pressure rollers from the frame, and a work-supporting table mounted on the last mentioned means to support a sheet in position to be fed between the lower pressure roller and the belt, at least one of the pressure rollers having the peripheral portion thereof composed of soft resilient material.

6. In a printing machine, a plate roller, means to ink the same, a support for the work, an endless blanket to receive ink from the plate roller and transfer it to the work, means to press the blanket against the plate roller and against the work, means to drive the plate roller and the blanket, and means to blow air against the back of the blanket to cool the blanket.

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