Feb. 3, 1948. K. H. WILCOXON 2,435,376

PAPER JOINING MACHINE

Filed Sept. 18, 1944 2 Sheets-Sheet 1

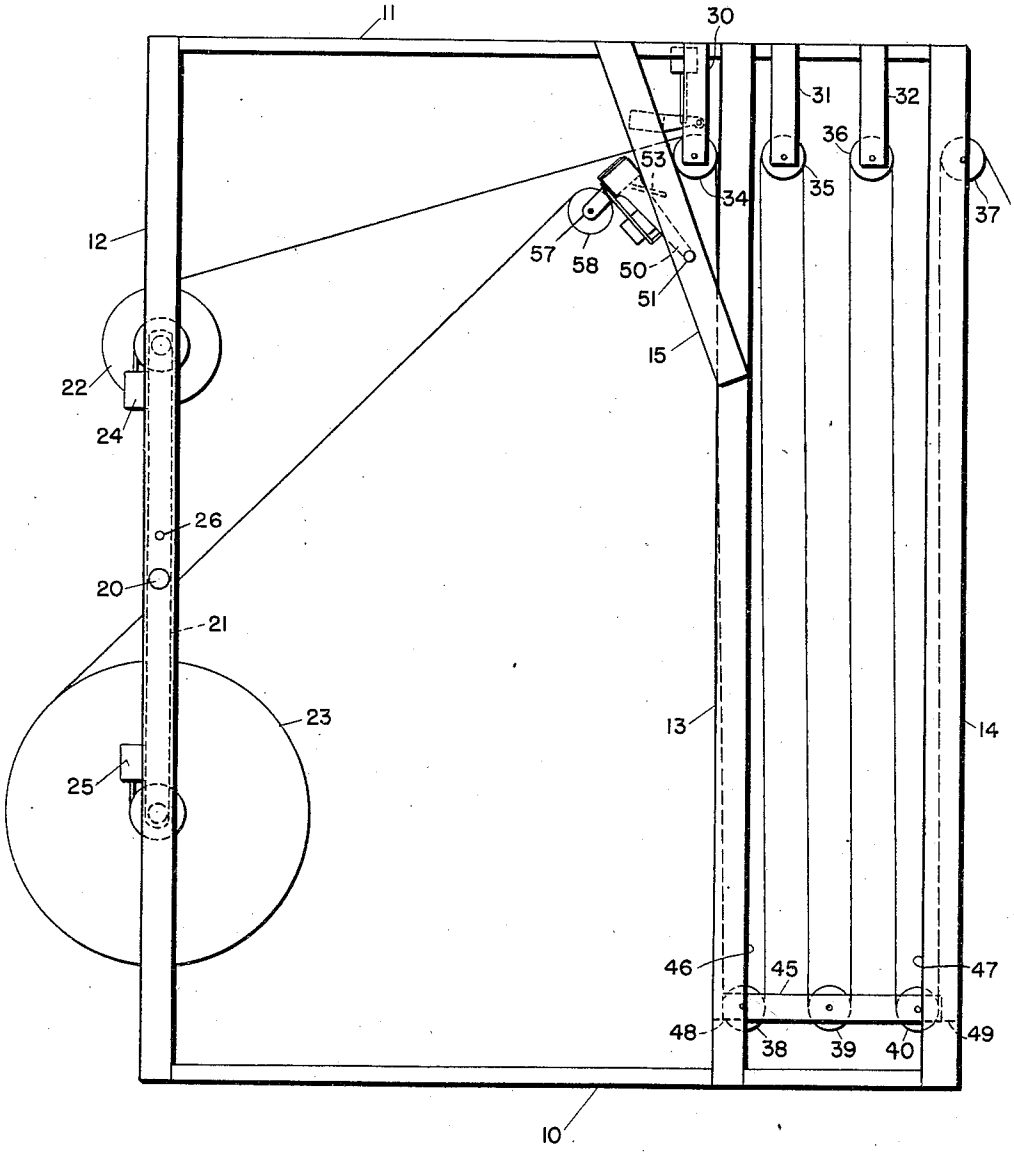


FIG.1

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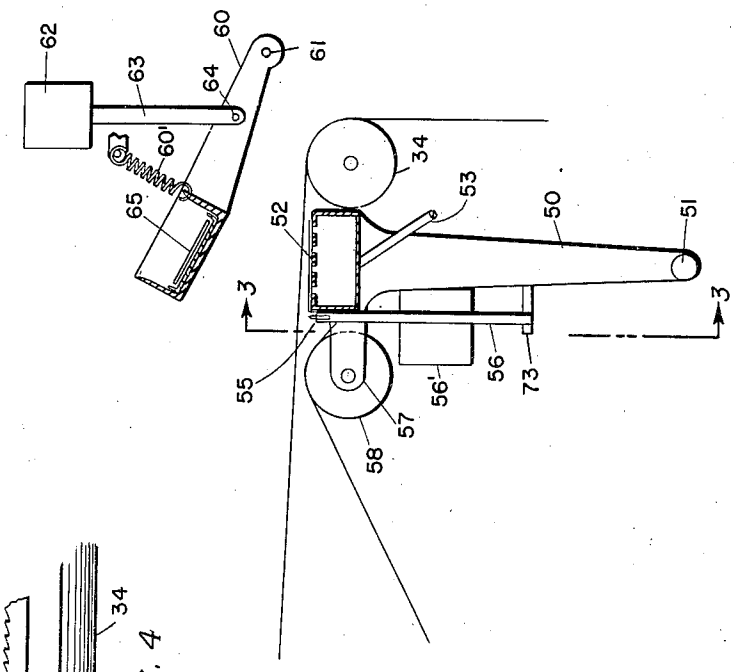


FIG. 2

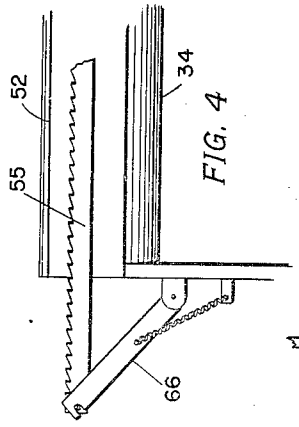


FIG. 4

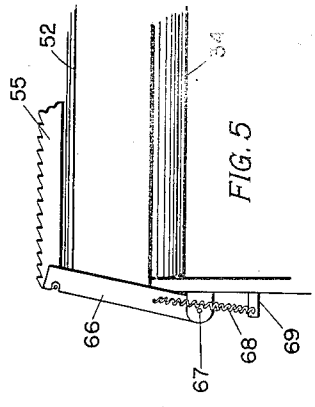


FIG. 5

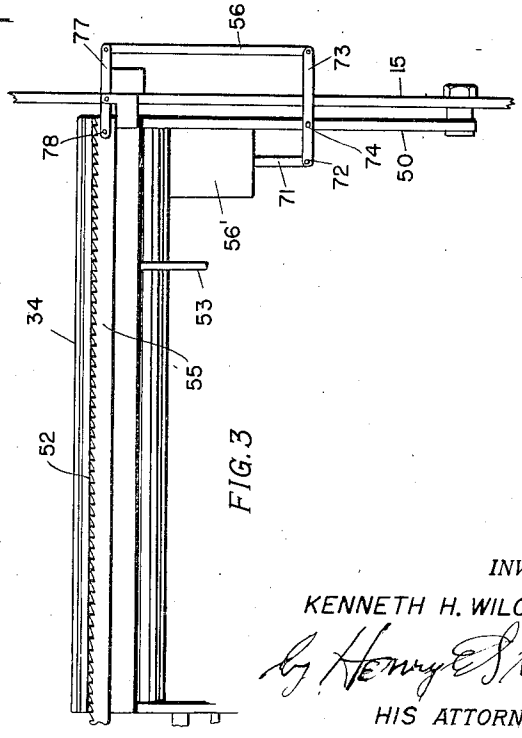


FIG. 3

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2,435,376

UNITED STATES PATENT OFFICE

2,435,376

PAPER JOINING MACHINE

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Application September 18, 1944, Serial No. 554,709

3 Claims. (Cl. 154—42)

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This invention relates to paper machines and other machines through which it may be desired to run a substantially continuous web of fabric.

In printing operations on a large scale, and continuous in nature, as in newspapers and magazines, paper for the presses is supplied ordinarily in large rolls; but with the use of modern, high-speed presses, even these large rolls last only a short time, and it is necessary, therefore, to change rolls frequently.

It is desirable, of course, not to have to stop the printing presses each time the paper rolls are changed; and many attempts have been made to provide continuous press operation by joining together the expiring paper web and a web from a new roll. The most common procedure is to smear the end of the new web with adhesive, start the new roll rotating in the proper direction, and bring it into contact with the expiring web. While two webs can usually be joined sufficiently in this manner, commonly a large amount of paper is spoiled, since a good connection is seldom made immediately, and that part of the expiring web which has contacted the new roll and has picked up some of the adhesive must be discarded. When good paper is being used, this wastage is an item of considerable expense.

Printing presses, moreover, that print on high-gloss paper are finely adjusted, and are unable to take three thicknesses of paper without damage to the type. The joining operation just described ordinarily leaves long, loose, trailing ends of paper which are apt to be twisted and folded, and thus require that the presses be halted until such ends can be removed. Should such presses be halted for this or any other reason, the type will become over-inked, and several hundred feet of expensive paper will be spoiled before the type again reaches its proper condition.

It is, therefore, an object of this invention to provide means for joining together a new web of paper and an expiring web without waste, and without the necessity of stopping the presses.

It is a further object of the invention to provide means as indicated whereby the movement of the webs of paper can nevertheless be halted momentarily while connection is made between them.

It is also an object of the invention to provide means for producing a strong lap-joint between two webs of paper, and to leave, in connection therewith, no loose, trailing ends.

Additional objects are: to provide means for

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holding positively in proper position for a joining operation the end of a new web of paper, means for bringing the said end into proper contacting relation with the expiring web, means for making positive contact between the new and the old web, and means for severing the old web after a proper connection has been made between the two webs.

Further objects will be apparent from a reading of the following specification and claims:

Figure 1 is a side view, somewhat schematic in nature, of a paper machine embodying the present invention.

Figure 2 is a view, also taken from the side of the machine, illustrating the paper joining means of the invention.

Figure 3 shows the paper cutting knife and associated parts.

Figure 4 is a detail of a part of the knife-mounting means, showing the knife in inoperative position.

Figure 5 is a view similar to Figure 4, but with the knife in raised position after a cutting operation.

Referring in detail to the drawings, and particularly to Figure 1, a framework is provided for the various elements of the mechanism, and this framework may be seen to include a base member 10, a top member 11, and vertical supports 12, 13 and 14. An angularly arranged bar 15, secured to the two members 11 and 13, serves as a brace, and also supports certain other equipment, as will be hereinafter more fully explained.

Mounted in the framework, for rotational movement therein, as on pivot 20 in member 12, is a carrier 21 for the paper rolls 22 and 23. The normal position of this carrier is vertical, as shown in Figure 1. Braking means, as 24 and 25, permit the stopping of the rolls 22 and 23, respectively, when desired. Some means, as indicated by the simple bar or spike 26 passing through member 12 and carrier 21, should be provided for locking the carrier in the vertical position shown. It will be understood, of course, that a carrier with more than two rolls of paper may be used in the machine.

On the opposite side of the machine (to the right in Figure 1), there are supported from member 11, by means of arms 30, 31 and 32 and vertical member 14, respectively, rollers 34, 35, 36 and 37, and below these may be seen further rollers 38, 39 and 40, mounted for rotation in a bar 45 which in turn is adapted to slide vertically in suitable guides 46 and 47, on the members 13 and 14. Similar supporting means for

the opposite ends of the several rollers should be assumed.

The operation of these parts (in which no novelty is claimed) will be briefly described before explaining the present invention proper. From roll 22, at the top of member 21, paper is threaded over roll 34, downward and around roller 38, upward and over 35, and in like manner around rollers 39, 36, 40 and 37, whence it is fed into the press. Under normal operating conditions the lower rollers ride high in the machine but, upon a slowing of the press or an acceleration of roll 22, the parts will assume the relations shown in Figure 1, and thus provide considerable excess paper between the supply roll and the press. If the press is momentarily speeded up, or if the roll 22 is slowed or halted, tension on the paper web is increased, and the bar 45, with its rollers 38, 39 and 40, rises in the guides 46 and 47, thereby permitting the press to utilize the paper in the system of rollers. Stops, as 48 and 49, limit the downward movement of bar 45. In addition, there will commonly be a mechanical or electrical linkage between bar 45 and the paper rollers, whereby the speed of rotation of the paper rolls will be governed to some extent by the position of the bar and its rollers. There is otherwise danger that, with bar 45 in its lowermost position, too much paper will accumulate, and the web will become loose, and, with bar 45 in its upper position, tension on the web will become too great, both of which conditions are apt to result in a rupture of the web.

As has been mentioned, the machine is intended to carry two rolls of paper, 22 and 23. While one is being used, the other is prepared for use, that is, it is made ready for joining with the web moving through the rollers and into the press.

The means for holding the new web in its proper relation to the old one, and for actually carrying out the joining operation, may be seen in Figure 1, but are best illustrated in Figures 2 and 3. With reference especially to Figure 1, 50 is an arm, with a pivot 51. This arm is adapted for mounting on brace member 15 of the framework of the machine. The upper end of arm 50 is somewhat enlarged, is flat, and is provided with perforations 52, which communicate through the flexible tube 53 with an air pump (not shown). This arm is adapted to swing to the left and downwardly on its pivot, so as to leave sufficient room for easy insertion of the end of the new paper web, as will be further described.

Associated with the arm 50, and just to the left of it in Figure 2, is a knife member comprising a knife proper 55 (preferably provided with a serrated edge, as may be seen in Figure 3) an actuating arm 56, and a solenoid 56' for driving the arm. Also adjacent arm 50, and supported therefrom by lugs, as 57, for rotation therein, is a roller 58. It is desirable that the periphery of this roller extend somewhat above the perforated plate 52, as shown.

Above the elements just described, and mounted independently thereof, on support 30 (Figure 1), is an arm 60. This arm is arranged to move downwardly on a pivot 61—being driven by solenoid 62, acting through the bar 63 and pivot 64—until it rests on the flat face of perforated plate 52. The free end of arm 60 is, in the preferred embodiment of the invention, supplied with a heating element, not shown in detail, but indicated at 65.

As will be seen in Figures 4 and 5, the edge of knife 55, while the blade is at rest (Figure 4), is

substantially level and on a plane with the perforated plate 52. The left end of the knife is hooked within the arm 66, so as to be removable therefrom, and this arm is pivoted to the member which supports roller 58, at 67. A spring 68, secured elsewhere on the same supporting member, as on the lug 69, and to the arm 66, holds the knife normally in the retracted position shown in Figures 3 and 4.

The knife-actuating mechanism comprises a motor, the solenoid 56', which acts on an arm 71, and thence, through pivot 72, on lever 73, pivoted at 74 to member 15, arm 56, and pivoted lever 77, whereby, as will be seen, an upward movement of arm 71 results in movement of the right end of the knife upwardly and to the right, it being pivoted to arm 77 at 78. At the same time, arm 66 carries the left end of the knife upwardly. The parts are so calculated that, on completion of the upward movement, the bottom edge of the knife is above roller 34.

The lower edge of knife 55 is rounded and smooth, to avoid the possibility of scratching or tearing the new web prior to the cutting operation.

The machine operates in the following manner (it being assumed at the outset that the parts are all in the conditions shown in Figure 1):

Knife 55 is swung upwardly on pivot 78, or removed therefrom, and bar 50 is moved downwardly. The outer end of the new roll of paper 23 is freed, and brake 25 is released. The end then is carried upwardly, over roller 58, which rotates freely, and positioned on plate 52. The air pump (not shown) maintains a low pressure in conduit 53 and in the communicating perforations in plate 52; and the paper thus is held firmly on the plate. A suitable adhesive, preferably of a type that is set quickly by heat and pressure, is applied to the upper side of the paper on the plate. Ordinary "make-ready" paste has been found quite satisfactory. Knife 55 is replaced, its left end being secured in arm 66. Arm 50, with its associated parts, is next moved upwardly to a positon such that the face of plate 52 is parallel and very close to the expiring web of paper from roll 22 (see Figure 2).

The actual joining operation is begun by applying brake 24 to roll 22 to stop the same. As has been explained, the press or other processing apparatus may continue to function for a limited time, notwithstanding such stoppage, because of the excess paper in the roller system 34, 38, 35, 39, 36, 40 and 37. When the expiring web has ceased to move, solenoid 62 is activated, and forces downward arm 60 and its heating element 65. The heat and pressure combine to perfect a union between the old and the new web in a matter of one or two seconds, the time depending upon several factors, as the type of paper and adhesive, and the degrees of heat and pressure.

As soon as the union is completed, or, if desired, even as it is begun, solenoid 56' is energized, and, acting through the linkage 71, 73, 56, 77, forces knife 55 upwardly and rightwardly (Figure 3), thus severing the old web. Immediately, solenoid 62 is de-energized, retracting spring 60' lifts arm 60 away from the paper and plate 52, and air is admitted to line 53, freeing the paper from plate 52. By way of speeding up the operation, the air may be admitted as soon as member 60 is firmly seated on plate 52.

The new web then starts through the machine. If desired, since the inertia of a full roll of paper is substantial, roll 23 may be rotated somewhat,

by hand or otherwise, to ease the strain on the web. The size of rollers **58** and **34** is such that the web will clear the perforated plate.

Next, carrier **21**, which supports the two paper rolls, is turned counterclockwise on pivot **20** until roll **23** is at the top and **22** is at the bottom, the used roll is removed, and a full roll substituted. Knife **55** is unhooked from arm **66**, which arm is retracted by spring **68**, and solenoid **56'** is de-energized, whereupon arm **71** and its associated elements can be returned to their normal positions (as in Figure 3).

The machine is then ready for another operation.

One specific embodiment of my invention has been described and illustrated. It will be understood, however, that many changes are possible within the spirit and intent of the invention, for the true scope of which, therefore, reference should be had to the appended claims.

I claim:

1. In a machine adapted normally to have a web of fabric moving therethrough, means for joining to such a web another web, said means comprising a member adapted to lie adjacent one side of the said first web when in one position and having means for releasably holding one end of said other web, means for stopping said first mentioned web, means for applying pressure to one of said webs thereby to force the same against the other web, means for cutting said first mentioned web behind the joint thus formed and for releasing said second mentioned web, and a roller or the like adapted to receive said other web ahead of said member, a roller behind said member, said cutting means being located between said member and the first mentioned roller and having a cutting stroke ending beyond the periphery of said roller.

2. In a machine adapted normally to have a web of fabric moving therethrough, means for joining to such web another web, said means comprising a member having a substantially flat face approximately coextensive with the joint to be made with means for releasably holding thereon a portion of said other web, said face being substantially spaced from said first mentioned web when said member is in one position and substantially parallel to and adjacent said first mentioned web when said member is in another position, a second member having a surface approximately coextensive with the joint to be made, means for stopping said first mentioned web, means for moving one of said members toward the other when said first mentioned member is in its said other position thereby to press the two webs together between said members, means for cutting the first mentioned web behind the joint thus formed, means for releasing the second mentioned web from said face, and means for supporting said other web ahead of said face, said last mentioned means extending effectively above said face.

3. In a machine adapted normally to have a web of fabric moving therethrough, means for joining to such web another web, said means comprising a member having a substantially flat face approximately coextensive with the joint to be made with means for releasably holding thereon a portion of said other web, said face being substantially spaced from said first mentioned web when said member is in one position and substantially parallel to and adjacent said first mentioned web when said member is in another position, a second member having a surface approximately coextensive with the joint to be made, means for stopping said first mentioned web, means for moving one of said members toward the other when said first mentioned member is in its said other position thereby to press the two webs together between said members, means for cutting the first mentioned web behind the joint thus formed, means for releasing the second mentioned web from said face, means for supporting said other web ahead of said face, and supporting means on the opposite side of said face, said two last mentioned means extending effectively above said face.

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