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FEEDING MECHANISM.

1,321,573.


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To all whom it may concern:

Be it known that I, HERBERT O. TIBBITTS, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Feeding Mechanism, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The present invention relates to mechanism for carrying printed sheets from one press to another and for feeding them automatically, one at a time, to the second press. Provision is also made for timing the movement of the sheets along the conveying mechanism, in order to prevent two or more sheets from bunching and being fed into the press at once. This also prevents the sticky sheets from coming into contact with each other until they come out of the second press or bronzing machine in their finished form. To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:—

Figure 1 is a top plan view showing my improved feeding mechanism; Fig. 2 is a side elevation taken from the right of Fig. 1; Fig. 3 is a side elevation taken from the left of Fig. 1; and Figs. 4, 5, 6 and 7 are diagrammatic views showing different operative positions of the gripping and timing mechanism.

The automatic feeding mechanism is here shown as connecting the delivery mechanism of a press 1 with the feeding mechanism of a second press or printing machine 2, only such parts of the two presses being shown as are necessary to an adequate description of the invention.

The second press 2 which is shown in the drawings, is a bronzing machine and illustrates one of the different types with which the present invention may be connected.

This bronzer has a main frame in which is mounted a bronzing roll 3 which is adapted to carry the sheets into the machine. The driving mechanism for this roll is not essential for the present invention but the roll is shown as being mounted on a shaft 5 carried in bearings 6 in the frame 7. One end 8 of this shaft extends beyond the bearing and carries two cams 9 and 10 which revolve with the shaft. From these cams are operated the means for positioning and correctly feeding the sheets to the bronzing roll.

In a longitudinal slot 11 in the roll are mounted the gripping means for fastening the sheets in position on the roll during the bronzing operation. These gripping means consists of members 12 carrying flat springs 13 which are adapted to grip and hold a sheet of paper, as will be clearly understood from Figs. 4 and 5. These gripping fingers close on the sheet of paper just as the bronzing roll passes the edge of the table 22. At the two sides of the machine, brackets 16 are mounted in which is carried a shaft 17 operated by an arm 18 to which is pivotally connected a link 19 carrying a roller 20 adapted to bear on the inner cam member 9 carried on the extended shaft of the bronzing roll. On the shaft 17 are mounted gage fingers 21 which are adapted to be moved by the action of the cam to come down in front of the feed table 22, over which the sheets 25 are fed, and to allow the sheet to extend over this table so that it may be gripped by the grippers 13 carried in the bronzing roll. In these same brackets a second shaft 23 is mounted which is rocked by means of an arm 26 and link 27, the link having a roller 28 at its lower end adapted to contact with the outer cam member 10. On this second rock shaft are mounted a series of tension fingers 14 having upwardly curved ends, and these fingers will hold the sheets on the feed table when the gage fingers 21 begin to open, so that the sheet will be held in the correct position when the gripping fingers 13 of the bronzing roll act. The cam 10 which operates these tension fingers is adapted to lift them just as the gripping mechanism takes hold, so that the sheet can pass freely onto the bronzing roll. It is of course understood that this mechanism is the usual feeding mechanism employed on bronzing machines and other roll presses of that type.

Only the extending end 30 of the frame of the press 1 which delivers the printed sheets, is shown. In this frame a roll 31 is mounted, which is employed in the present connection to carry a series of endless belts 32
which are used as the conveying mechanism. This roll is adapted to run free in the press, and the belts will be driven from the other press 2 in a manner to be described in detail later. On this extending frame 30, brackets will be mounted which carry a cross rod 33 carrying a shoe 34 over which the belts will pass.

The automatic feeding mechanism proper consists of an extensible frame which is attached to the bronzing machine and takes the place of the usual feeding table. This frame consists of two side members 35 adapted to be held in place on the bronzer or press frame by bolts 36, and a pan 37 connects these two members to cover the opening over the press.

This pan 37 has a depressed portion 38 close to the feeding mechanism on the bronzing machine, and in this depression will be mounted the two rolls for driving the series of endless belts. The pan will preferably be provided with a series of apertures 39 near the other end to allow the necessary current of air to pass into the bronzing machine.

Of the two driving rolls 40 and 41 which are mounted in the depressed portion of the pan the roll 40 is provided with a knurled surface so that the belts will grip the roll and be driven thereby. The roll 41 is smaller and is set to the rear of the roll 40 in order to carry the belts up out of the depressed portion of the pan, so that they do not strike the same as they move by.

On the two side members of the frame for the feeding mechanism are mounted small brackets 42 which have elongated slots 43 in them. One of these brackets on each side is provided with a short pin 44 extending upwardly from the bottom of the aperture. Carried in these brackets is a rack 45 having two arms 46 which are adapted to pass through the brackets, and these arms have a series of small apertures 47 along their lower surfaces which engage with the pins mounted in the brackets to secure the arms in the desired position. These arms curve upwardly at their outer ends, in which a rock shaft 48 is mounted. In front of this rock shaft two brace rods 49 are attached to the arms. One of these rods a shoe 50 is mounted over which the belts will pass. Upon the rock shaft are mounted timing fingers 51 which will hereafter be termed the rear set of timing fingers to distinguish them from the forward set which are placed just in the rear of the tension fingers. This rear set of timing fingers is adapted to act in unison with the gage fingers of the bronzing machine, and are operated from the rock shaft on which these fingers are carried.

This operating mechanism consists of a short arm 52 attached to the shaft 17 which is pivotally connected to a long link 58 which extends along the frame member. This link 58 has a series of notches 64 at its rear end which are spaced equally with the apertures 47 in the arms. To the shaft 48 a second short arm 55 is connected, to which is pivotally mounted a link 56 having a hook-shaped end 57 which is adapted to engage in one of the notches in the rear end of the link 53 connected to the shaft 17. This hook-shaped end will engage in one of the notches so that the rock shaft 48 carrying the rear timing fingers 51 will be operated in any of its adjusted positions. The notched link 53 is carried in the brackets through which the adjustable arms 46 are mounted, and the link carried by the rock shaft for the rear timing fingers is mounted in a small bracket 58 carried by one of the adjustable arms. This small operating link 56 is provided with a coil spring 59 which bears at its inner end against the small bracket 58 and at its outer end against a collar 60 which is fastened to the link, so that the spring operates the timing fingers into their closed position.

By the use of this spring the tension which these fingers exert is always uniform, and is independent of the slight amount of lost motion which is liable to occur in the operating connections, as the fingers do not need to be moved tightly down by positive movement of the operating mechanism, because the spring will carry them down farther and insure an even gripping tension.

The means for operating the roll 40 for driving the belts consists of a sprocket wheel 61 mounted on one of the rotating shafts 62 of the bronzer or press 2. On the side member of the feeding mechanism a bracket 63 is mounted which is provided with bearings 64 in which a rotatable stub shaft 65 is carried. A small spur gear 66 is attached to this shaft at its inner end, and this gear meshes with a complementary gear 67 attached to the shaft of the driving roll 40. The outer end of the stub shaft carries a hub 68 provided with clutch teeth 69 and the shaft extends through and beyond this hub. On the outer extending end of the shaft a thimble 70 is rotatably mounted, and this thimble 70 is provided with a yoked spool 71 at its outer end, and at its inner end is provided with a second hub 72. This second hub 72 is loosely mounted on the thimble 70 and is provided with complementary clutch teeth 73. To this second hub a sprocket gear 74 is attached, which will be driven by a chain 75 from the sprocket wheel 61 carried by one of the rotating shafts of the bronzer. Between the yoke and the second hub a coil spring 76 is mounted, which is adapted to normally maintain the two clutch hubs in their operative position.
An arm 77 is pivotally mounted on the bracket, and this arm is provided at its outer end with a yoke 78 engaging the spool 71 on the thimble 70. To the inner end of this pivoted arm a chain 79 is attached which extends back along the feeder frame to an arm 80 which is attached to one end of a rock shaft 81 carried in brackets 82 mounted on the press 1. A handle 83 is provided on the outer end of this rock shaft whereby the shaft can be rocked to operate the chain and throw in the clutch which operates the driving roll and belts. To the inner end of the arm 77 a coil spring 84 is attached which is fastened to the feeder frame and normally operates to hold the clutch in its inoperative position and in operating the chain the operator must first overcome the tension of this spring.

The coil spring 70 on the thimble allows the clutch to be operated at any time, and also allows the bronzing machine to be reversed without backing the feeder or first releasing the clutch, as when the bronzing machine is reversed the clutch teeth on the two hubs back out of each other, and the second hub moves backward against the action of the coil spring 76.

From the side members of the feeding mechanism which extend slightly beyond the frame of the bronzer, depending brackets 90 will be hung, and these brackets will be adapted to carry two adjustable rolls 91 and 92 which are used to provide the correct tension on the belts. As shown in Figs. 2 and 3 the belts travel from the press 1 toward the press 2 over the shoes carried on the press frame and mounted between the adjustable arms, and then over and around the large driving roll 40 and over the small idling roll 41, and then between spacing pins 88 which are carried on a bar 94 mounted between the two side members, and then over the upper of the two adjustable rolls and out below the lower one, back to the loose roll carried by the press 1.

Adjacent the tension fingers are mounted the first or forward set of timing fingers 100 which are carried upon a shaft 101 mounted in brackets 102 attached to the side members of the feeding mechanism. These fingers are operated by a short arm 103 which is attached to the shaft 101 and which is contacted by an arm 104 pivotally mounted upon the bronzer and having an adjustable roll 105 at its lower end which rides on the inner cam which operates gage fingers.

The printed sheets are delivered from the press 1 onto the conveying belts which run at approximately the same speed as the peripheral speed of the bronzing roll, and are carried along the feeding mechanism one at a time to the gage fingers from which they go onto the bronzing roll and are operated upon.

Fig. 5 illustrates the position of the various fingers at the time when the gripping fingers on the bronzing roll take hold of the paper to carry it onto the roll and through the bronzing machine. It will be seen that at this time the other four sets of fingers are all raised. The forward set of timing fingers is adapted to close just after the sheet of paper has passed these fingers, and the roller on the arm is adjustable so that the closing of these fingers may be varied for sheets of varying lengths.

As the conveying belts are bringing up another sheet at this time, this second sheet will move up into contact with the forward set of timing fingers and be held there in the position shown in Fig. 6 until after the gage fingers close, as shown in Fig. 7. The sheet, of course, will not be stopped by the forward set of timing fingers unless it arrives there out of time, that is, ahead of the time when the fingers open. If the sheet is arriving exactly on time, it passes through these timing fingers and up against the gage fingers where it has time enough to aline itself before being taken into the bronzer.

As the gage fingers close, the rear timing fingers also drop, thus preventing another sheet from moving up and becoming entangled with the sheet which is about to be fed into the bronzer. This position of the rear timing fingers is maintained until the bronzing mechanism on the bronzing roll begins to act. At this point, the tension fingers open and the rear timing fingers open to allow the next sheet to advance along the conveyor. The cycle of operations is then repeated.

The purpose of the rear set of timing fingers, which are those mounted on the rock shaft carried by the adjustable arms, is to operate and prevent forward movement of only those printed sheets which are being conveyed along the belts in such a way that they would arrive at the gage fingers at the wrong time. Only such sheets as would arrive at the gage fingers in time to position themselves properly are passed through the two sets of timing fingers without being acted upon. The rear set of timing fingers may drop down upon any portion of the sheet and will hold that sheet there until the preceding sheet moves into the bronzer, when the rear timing fingers will lift and allow the next sheet to move toward the forward set of timing fingers, where it will again be stopped until the gage fingers are closed and ready to receive it. The forward timing fingers are adapted to receive the sheets and allow them to move properly to the gage fingers. This forward set of timing fingers prevents the sheet from passing beyond the gage fingers and becoming entangled in the bronzer roll.

The distance between the gage fingers and...
the forward set of timing fingers will be proportional to the speed of the belts, so that the sheets, when released by the forward set of timing fingers, will have an opportunity to position themselves against the gage fingers before the latter open. The rear set of timing fingers will be adjusted, so that a sheet which is caught at its rear edge by them, will, upon being released, reach the forward set of timing fingers just after they have been closed. This, of course, is determined partially by the speed of the belts and partially by the speed at which the bronzing machine is acting.

The press which delivers the partially printed sheets must operate at a speed no greater and preferably less than the speed of the machine which receives the sheets from the conveyer. It is of course obvious that this is necessary, as otherwise the sheets would pile up faster than they could be fed into the second press or bronzing machine. The belts should also be driven at a speed which is slightly less than the speed of the machine to which they deliver the sheets. The two presses can be operated at any desired speed up to their capacity as long as the bronzer runs slightly faster than the press. The rear set of timing fingers is adapted to hold the incoming sheet only long enough to allow the prior sheet to move onto the bronzing roll, and even if this rear set of fingers stops the sheet by closing in front of the same, to open in time for the sheet to reach the first set of timing fingers while they are still closed. This gives the sheet time to position itself against the fingers before they open and the sheet moves against the gage fingers.

As the position of the rear set of fingers may be changed, they will be set at such a point that two sheets cannot come in contact during their travel along the conveyer, and the position of the rear set of timing fingers will vary with the width of the sheet.

It has been found that the present automatic feeding mechanism, as used in conjunction with the press and bronzing machine, increases the production of the outfit from twenty to forty per cent. over the old methods of feeding the two machines by hand, and this does not take into account the saving which is effected by the fact that an operator is not required to feed the bronzer.

There is also a slight saving of ink and bronze affected by using this device.

Another added feature is the fact that when the present device is used, the partially printed sheets, as they come from the press, are not piled up, and therefore the ink which is used on the sheets and which is still in a sticky condition when the sheets come from the press, does not get a chance to become smeared over the backs of the sheets, as it did when the sheets were stacked, and then refed by hand, because the backs of the sheets are always clean, the necessity for cleaning the bronzing roll is eliminated.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In mechanism for feeding printed sheets and the like, the combination with a press to be fed provided with positive operated, sheet positioning and gripping mechanism, of a belt conveyer adapted to receive sheets at irregular intervals and carry the same to said positioning and gripping mechanism, a frame mounted on said press, a rack adjustably attached to said frame and movable longitudinally along said conveyer, and timing means mounted on said rack and operable from said press, said timing means being adapted to allow single sheets to reach said positioning and gripping mechanism in its receiving position.

2. In mechanism for feeding printed sheets and the like the combination with a press to be fed provided with positive operated, sheet positioning and gripping mechanism, of a belt conveyer adapted to receive sheets at irregular intervals and carry the same to said positioning and gripping mechanism and timing means operated from said press and adjustably mounted over and adjacent said conveyer, said means adapted to control movement of such sheets along said conveyer to allow only single sheets to reach said positioning and gripping mechanism when in its receiving position.

3. In mechanism for feeding printed sheets and the like the combination with a press to be fed having sheet positioning and gripping mechanism, driving means for operating said mechanism from said press, of a belt conveyer adapted to receive sheets at irregular intervals and to convey the same to said positioning and gripping mechanism, timing fingers mounted over and adjacent to said conveyer, said fingers being adjustably mounted along said conveyer, driving mechanism for operating said timing fingers in synchronism with said positioning and gripping mechanism, said fingers being adapted to prevent movement of such sheets to synchronize their arrival at said positioning and gripping mechanism with the correct receiving position of the same.

4. In mechanism for feeding printed sheets, from one press to a second press provided with positioning and gripping mecha-
nism, said second press being adapted to be run at the same or greater speed than said first press, the combination of conveyor means adapted to connect said two presses to carry printed sheets from the first to the second, a forward set of timing fingers near the press positioning and gripping means, operating mechanism for said fingers, said mechanism being adjustable to allow for sheets of different lengths, said fingers being adapted to close after the passing of a sheet, a rack adjustably mounted along said conveying means, a second set of timing fingers carried by said rack, said rack being so positioned that said second set of fingers are spaced to the rear of said first set more than the length of one sheet, and means for operating said second set of fingers to prevent two sheets from overlapping between said two sets of fingers.

5. In mechanism for feeding printed sheets, from one press to a second press provided with positioning and gripping mechanism, said second press being adapted to be run at the same or greater speed than said first press, the combination of conveyor means adapted to connect said two presses to carry printed sheets from the first to the second, a forward set of timing fingers near the press positioning and gripping means, operating mechanism for said fingers, said mechanism being adjustable to allow for sheets of different lengths, said fingers being adapted to close after the passing of a sheet, a rack adjustably mounted along said conveying means, a second set of timing fingers carried by said rack, said rack being so positioned that said second set of fingers are spaced to the rear of said first set more than the length of one sheet, and means for operating said second set of fingers to prevent overlapping of two sheets between said two sets of fingers.

6. In mechanism for feeding printed sheets from one press to a second press provided with positioning and gripping mechanism, said second press being adapted to be run at the same or greater speed than said first press, the combination of conveyor means adapted to connect said two presses to carry printed sheets from the first to the second, a forward set of timing fingers near the positioning and gripping mechanism, operating mechanism for said fingers, said mechanism being adjustable for sheets of different lengths, said fingers being adapted to close after the passing of a sheet, a frame attached to said second press and extending toward said first press, a rack adjustably mounted in said frame so as to be movable longitudinally along said conveyor, timing fingers carried by said rack over said conveyor, and means for operating said fingers to prevent two sheets from overlapping each other between said fingers and the sheet positioning and gripping mechanism.

7. In mechanism for feeding printed sheets from one press to a second press provided with positioning and gripping mechanism, said second press being adapted to be run at the same or greater speed than said first press, the combination of conveyor means adapted to connect said two presses to carry printed sheets from the first to the second, a forward set of timing fingers near the positioning and gripping mechanism, operating mechanism for said fingers, said mechanism being adjustable for sheets of different lengths, said fingers being adapted to close after the passing of a sheet, a frame attached to said second press and extending toward said first press, a rack having two side members adapted to be adjustably connected to said frame so as to position said rack longitudinally of said conveyor, a rock shaft mounted in said rack, over said conveyor, near timing fingers attached to said shaft and movable therewith, and operating mechanism connected with the operating mechanism for the positioning and gripping mechanism and said first and said timing fingers and adapted to rock said shaft and near fingers into position to prevent overlapping of two sheets between said two sets of timing fingers.

8. In mechanism for feeding printed sheets from one press to a second press provided with positioning and gripping mechanism, said second press being adapted to be run at the same or greater speed than said first press, the combination of conveyor means adapted to connect said two presses to carry printed sheets from the first to the second, a forward set of timing fingers near the positioning and gripping mechanism, operating mechanism for said fingers, said mechanism being adjustable for sheets of different lengths, said fingers being adapted to close after the passing of a sheet, a frame attached to said second press and extending toward said first press, a rack having two side members adapted to be adjustably connected to said frame so as to position said rack longitudinally of said conveyor, a rock shaft mounted in said rack, over said conveyor, near timing fingers attached to said shaft and movable therewith, and adjustable operating mechanism adapted to rock said shaft in adjusted positions of said rack to close said fingers to prevent two sheets from overlapping between said two sets of timing fingers.

Signed by me, this 3rd day of January, 1918.

HERBERT O. TIBBittS.