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DRI YING MECHANISM FOR PRINTED SHEETS.

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WITNESSES

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ATTORNEYS
To all whom it may concern:

Be it known that we, Albert V. Feistel and James W. Rocks, both citizens of the United States, and residents of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Drying Mechanism for Printed Sheets, of which the following is a full, clear, and exact description.

This invention relates to the printing art and particularly to an improved drying mechanism for drying printed sheets of paper and has for an object to provide an improved construction which will dry ink in a minimum time.

Another object of the invention is to provide a drying machine which may be applied directly to a printing machine in such a manner that the drying machine will take the printed sheets from the printing machine and move the same to a drying position automatically and as fast as the printing machine discharges the printed sheets.

A still further object of the invention, more specifically, is to provide a drying apparatus which has means operating at the speed of the printing press for removing printed sheets therefrom and then transferring the sheets to a slower moving structure for allowing more time for drying before the sheets are finally discharged.

In the printing art, it is now the practice to apply several colored inks to a sheet of paper as it passes through the printing machine and in some presses to print two sheets at the same time on the same cylinder. By using printing presses of this character, a large number of sheets may be printed in a given time and where several different colored inks are used, as for instance, where different colored pictures are provided, it requires an appreciable time for the ink to set. Heretofore, after the printed sheets had been discharged from the press and moved a certain distance therefrom, heavy sheets of paper were applied thereto as the printed sheets were arranged in piles. These heavy separate sheets are known as slip sheets or fillers and prevent the smearing, smudging or blurring of the printed sheets. Even with the use of fillers, it was necessary to make comparatively small piles and also it was necessary to provide special mechanism for applying these filler sheets at the proper time. After the printed sheets had become dried, it was again necessary to pass the sheets through a machine for removing and recovering the filler sheets to be used a second time. This operation of first applying the filler sheets and then removing the same is expensive as well as requiring a comparatively long time for the ink to become thoroughly dry.

In the present invention, a drying apparatus has been provided which is intended to obviate the use of the filler sheets and, consequently, to eliminate the machines for applying the filler sheets and for removing the filler sheets. This will reduce the floor space necessary to print a given number of sheets and properly dry the same.

In the accompanying drawings—

Figure 1 is a top plan view of the machine, disclosing an embodiment of the invention.

Figure 2 is a longitudinal vertical sectional view through Figure 1 approximately on line 2—2.

Figure 3 is a view similar to Figure 2 but showing the parts in elevation.

Figure 4 is a view similar to Figure 2 but showing the parts on an enlarged scale with the central section broken away, the same being taken on line 4—4 of Figure 7.

Figure 5 is a sectional view through Figure 4, approximately on line 5—5.

Figure 6 is a fragmentary side view of the front part of a sprocket wheel, chain and associated parts, disclosing certain features of the invention.

Figure 7 is an end view of the machine shown in Figures 1 and 2.

Figure 8 is a fragmentary sectional view through Figure 7 on line 8—8.

Figure 9 is a view similar to Figure 8 but showing the parts moved to a further advanced position.

Figure 10 is a view similar to Figure 9 but showing the position of the parts immediately before they assume the position illustrated in Figure 9.

Figure 11 is an enlarged fragmentary sectional view showing one end of one of the gripper bars and how the two pins therein co-operate.

Referring to the accompanying drawings by numeral, 11 indicates a frame of any suitable kind for supporting the mechanism hereinafter fully described. The frame 11 is arranged adjacent a printing machine 12 of any desired kind, as for instance, a multi-
colored printing press which is adapted to discharge the printed sheets in any suitable manner, as for instance, through the rollers 13 and 14. Heretofore, when the sheets were discharged through the rollers 13 and 14, they moved onto a conveyor of some kind and from thence to a machine where a filler sheet was applied and finally the printed sheets and fillers were arranged in piles at some convenient point.

In the present invention, however, a conveyor and filler applying machine are eliminated and the drier is positioned in immediate proximity to the machine 12 and in fact, may be bolted thereto so as to receive the sheets directly from the printing roller. Arranged on the frame 11 are suitable shafts 15 and 16 supported in suitable journal members and carrying suitable sprocket wheels, the shaft 15 carrying a sprocket wheel 17 near each end while the shaft 16 carries a sprocket wheel 18 near each end. These sprocket wheels accommodate the chains 19 and 20 which may be of any desired type but which are provided with a number of pins 21 secured to the chains in any suitable manner, said pins being spaced apart a proper distance for causing the various gripper bars 22 to come opposite the rollers 13 and 14 at the proper time to grip a sheet of printed paper as the same leaves the printing press 12. Each of the gripper bars 22 is provided with a central section 23 which is preferably square in cross section and with end sections 24 and 25 preferably square in cross section. Suitable pins 26 and 27 connect the end sections 24 and 25 with the central section 23, said pins connecting these sections in such a manner that the central section 23 may swing independently of the end sections.

Surrounding the respective sprocket wheels 17 are guards 28 and 29 and inner guiding arc-shaped members 30 which are preferably a quarter of a circle or a little more. The guiding arc-shaped members 30 co-act with the guards 28 and 29 as indicated in Figures 8 to 10 for holding the respective end sections 24 and 25 against turning while permitting the central section 23 to swing. In Figure 8, it will be noted that the gripper fingers 32 and associated parts are hanging downwardly and in dotted lines in this figure they are still hanging downwardly while the end section 25 is being guided by the guiding members 29 and the arc-shaped member 30. It will also be observed that the various pins 21 will force the gripper bars along with the chain but in order to prevent the gripper bars from falling downwardly when passing around the respective sprocket wheels 17, a special pin-wheel 31 is secured to the shaft 15 near each end, said pin-wheel being provided with a number of pins 33 spaced apart a distance substantially equal to the thickness of the respective sections 24 and 25 so that when these sections are moving downwardly over the sprocket wheels 17, pin 21 will be in back of these sections while one of the pins 33 will be in front and will support the sections and in fact the entire gripper bar.

When the gripper bar reaches a point near the bottom, the body or central section 23 engages the cam surface 34 and is rotated as shown in Figure 10. As this occurs, the printing machine 12 feeds a sheet of paper 35 until the same overlaps somewhat the finger 32. As the gripper bar and paper move at the same speed from this point on, this same relative position will remain until the arm 36 strikes the inclined track 37 whereupon the gripping finger 32 will be raised and the edge of the paper allowed to drop against the fixed fingers 32'. As soon as the arm 36 passes off the high end of the track 37, the spring 38 acting on the gripper finger 32 will immediately close the same and cause the finger to firmly grip the paper and pull the same along as indicated in Figure 4. It will be noted that the gripper bar 22 moves at the same speed as the paper 35 and, consequently, there is no tearing or crumbling of the paper. As soon as the paper 35 has been moved past the cam 34, it automatically drops downwardly and assumes a vertical position under the action of gravity, the section 23 and the gripper bar rotating on the pins 26 and 27. As soon as the end of the paper 35 has moved away from the cam 34, a new gripper bar will approach and also a new sheet of paper will approach the cam and the same operation will be repeated. This continues as long as the printing press and the drier are used.

The printing press or printing machine and drier may be directly connected so as to positively operate at the same speed or may be driven from a separate power if preferred. The chains 19 and 20 are comparatively short and move the sheets of paper 35 comparatively rapidly. If these chains were made long enough to support the sheets 35 until the ink thereon was set, too much floor space would be required and, consequently, these chains have been made comparatively short and the various gripper bars 22 shifted to a slow moving set of chains 39 and 40 which receive the gripper bars from chains 19 and 20 and move the gripper bars slowly for a predetermined time, with the sheets 35 hanging vertically.

The chains 39 and 40 may be of any desired length and preferably are of considerable length so as to give the ink on the sheets 35 time to set. It is not necessary to cause the ink to completely dry but it is necessary to allow sufficient drying to permit the ink to set and when this occurs, the sheets may be properly stacked without smearing or smudging the same. On the re-
spective chains 39 and 40 are arranged pins 41, said pins being only sufficiently far apart to accommodate a gripper bar so that the sheets 35 will be spaced apart only slightly more than the thickness of the gripper bars and, consequently, instead of the gripper bars on the chains 39 and 40 moving at the speed of the paper 35 as it issues from the printing machine, they move at a much slower speed. The pins 21 are preferably flexible bars that are sufficiently strong to move the bars along when the gripper bars are transferred to the chains 39 and 40, these pins may flex sufficiently to pass without being injured or without injuring the bars.

As indicated in Figure 2 a suitable platform 42 is provided on which a pile 43 of the sheets 35 may be made. A roller 44 is arranged a suitable distance above the platform 42 so that the paper will be bent to substantially a horizontal position before the gripper fingers 32 release the sheets whereby the sheets will fall flatwise on the pile 43. This release is caused by the arm 35 striking the stationary cam 45 and opening the gripper finger 32 against the action of the springs 38. After the sheets of paper have been released, the various gripper bars 22 pass around the respective guides 46 and 47 and then back on top of the chains 39 and 40 to the chains 19 and 20 where the pins 21 receive them and quickly move them in succession to a position for securing another sheet of paper as heretofore described. It will be noted that the various gripper bars as they move outwardly or away from the printing press 12 are supported by suitable tracks 47 which engage the end sections 24 and 25 while the respective pins 21 and 41 act to force the bars along. In order that the chains 19, 20, 39 and 40 may move in proper synchronism, the shaft 16 projects beyond the frame 11 and has sprocket wheels 48 and 49 secured thereto, said sprocket wheels accommodating the chains 50 and 51 passing over the sprocket wheels 52 and 53 which are rigidly secured to a shaft 54, said shaft carrying a pinion 55 meshing continually with the gear wheel 56, which gear also continually meshes with the gear 57 rigidly secured with shaft 58. The shaft 58 has sprocket wheels 59 and 60 rigidly secured thereto, said sprocket wheels accommodating the chains 39 and 40, which chains pass over suitable sprocket wheels 62 and 63 at the front, which latter sprocket wheels are loosely mounted on shaft 16. As indicated in Figure 1, shaft 17 carries a sprocket wheel 64 which accommodates the chain 65 passing over the sprocket wheel 66 rigidly secured to the shaft 67 which carries the roller 68 forming part of the printing press 12 and which is driven with the remaining mechanism of the printing press. By this means, the chains 19 and 20 are synchronized with the printing machine though if desired, some other form of connection could be provided without departing from the spirit of the invention.

When the gripper bars move downwardly from the position shown in Figure 8 to that shown in Figures 9 and 10, it is usually necessary to have some means for holding the support for the gripping fingers in place when this gripping finger is raised by the lever or arm 30. In order that this may be properly accomplished the central section 28 of the gripper bar is provided with a groove 68 which is slightly more than half a circle which accommodates the stop pin 69 secured to the end or section 25. When the parts move from the position shown in Figure 8, they will first assume the position shown in Figure 10 and then the position shown in Figure 9 whereby the pin 69 is resting in one end of the slot and preventing any further relative rotation of the members 22 and 23 in one direction. When the gripper arrives at the opposite end of the structure, as for instance, adjacent the guide 46, the parts may rotate in a reverse direction for half a revolution in order to pass around this guide.

What we claim is:

1. The combination with a printing machine, of means including an endless chain for successively receiving printed sheets from the printing machine, said means acting to immediately suspend said sheets side by side in a vertical position while conveying the same through space a predetermined distance, and a second conveying apparatus including an endless chain adapted to receive said sheets and convey the same in a vertical position to a discharge point, said second conveying means acting to automatically bring said sheets nearer together to move the same at a slower speed than the means which receive the sheets from the printing machine.

2. The combination with a printing machine, of a drying mechanism for receiving sheets directly from the printing mechanism and moving the same over a given path for permitting a drying action, said drying mechanism including a conveyor, a plurality of gripper bars carried by the conveyor, gripping members arranged on each bar, wheels for supporting the conveyor and for causing the conveyor to move the gripper bars to a point near the discharge of sheets of printed paper from the printing machine, a wheel formed with a plurality of spaced pins arranged adjacent the first mentioned wheels and positioned so that two of the pins will straddle each gripper bar as they move around the first mentioned wheels, said pin-wheels moving at the same peripheral speed as the first mentioned wheels whereby the gripper bars are not
permitted to drop under the action of gravity, a cam arranged below the first mentioned wheels, said cam acting to turn the gripper bars to a horizontal position, an actuating arm connected with the gripping members on each gripper bar, and an inclined track engaging said actuating arm for opening the gripping members as the arm passes over the track, said track being so positioned as to cause the opening of the gripping members simultaneously with the insertion of a sheet of paper into the gripping members.

3. In an ink drying mechanism for printing machines, a plurality of gripping bars, each of said gripping bars being divided into three sections, the end sections being comparatively short and acting as guiding members, and a plurality of gripping members positioned on the central section.

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