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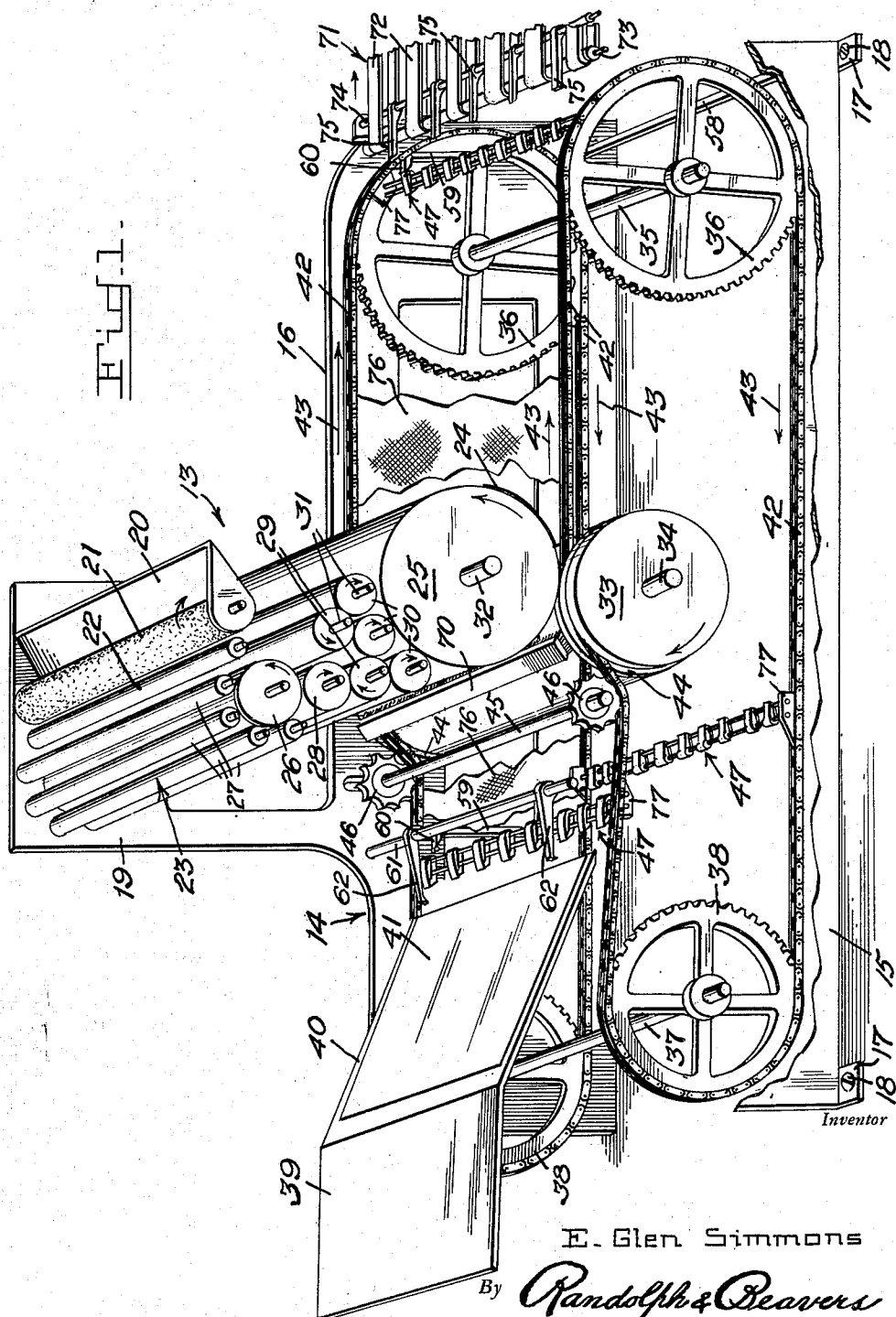
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2,551,060

CHAIN CARRIAGE SHEET FEED ROTARY PRINTING PRESS

Filed Nov. 6, 1946

3 Sheets-Sheet 1



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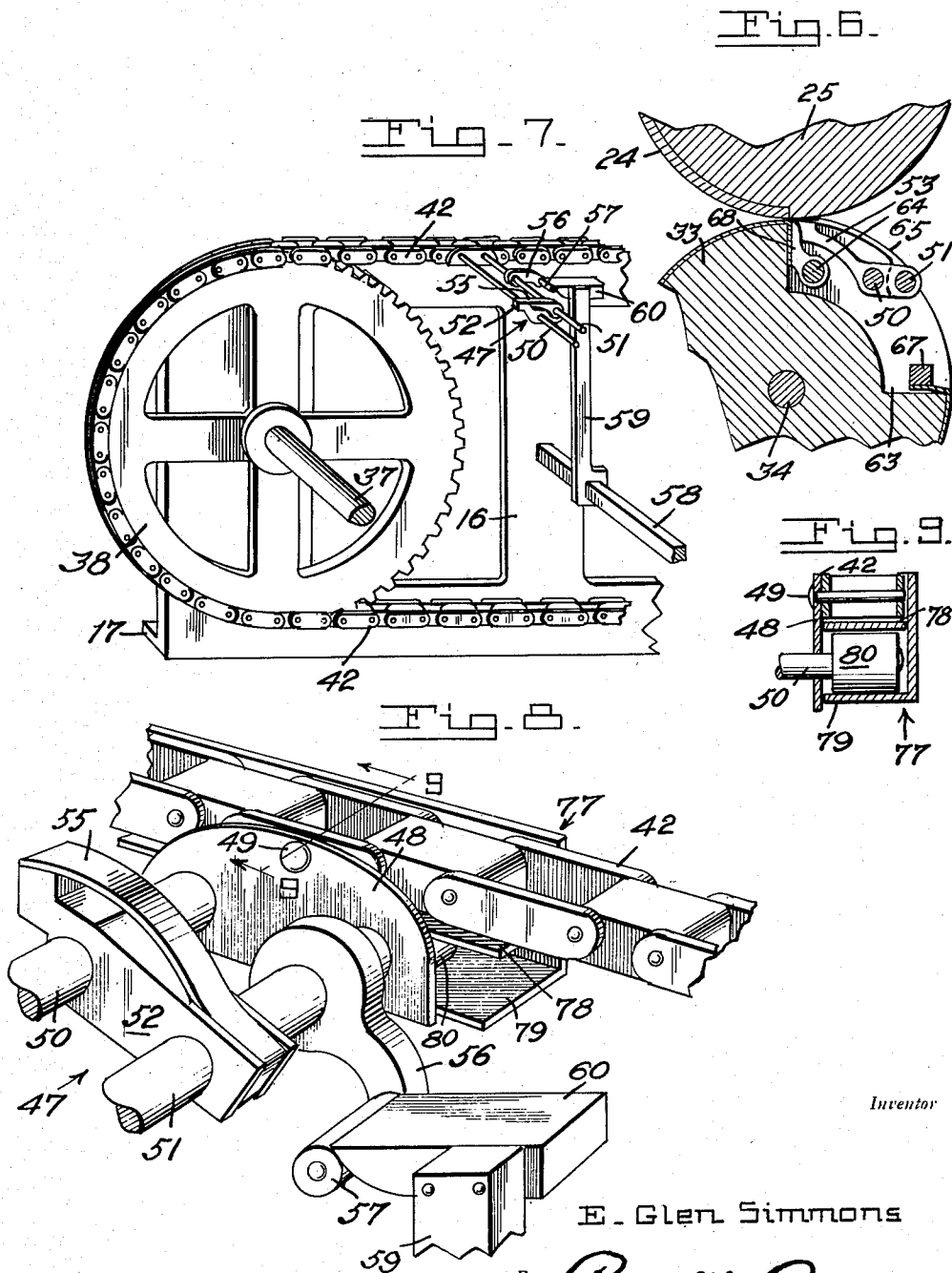
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CHAIN CARRIAGE SHEET FEED ROTARY PRINTING PRESS

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3 Sheets-Sheet 2



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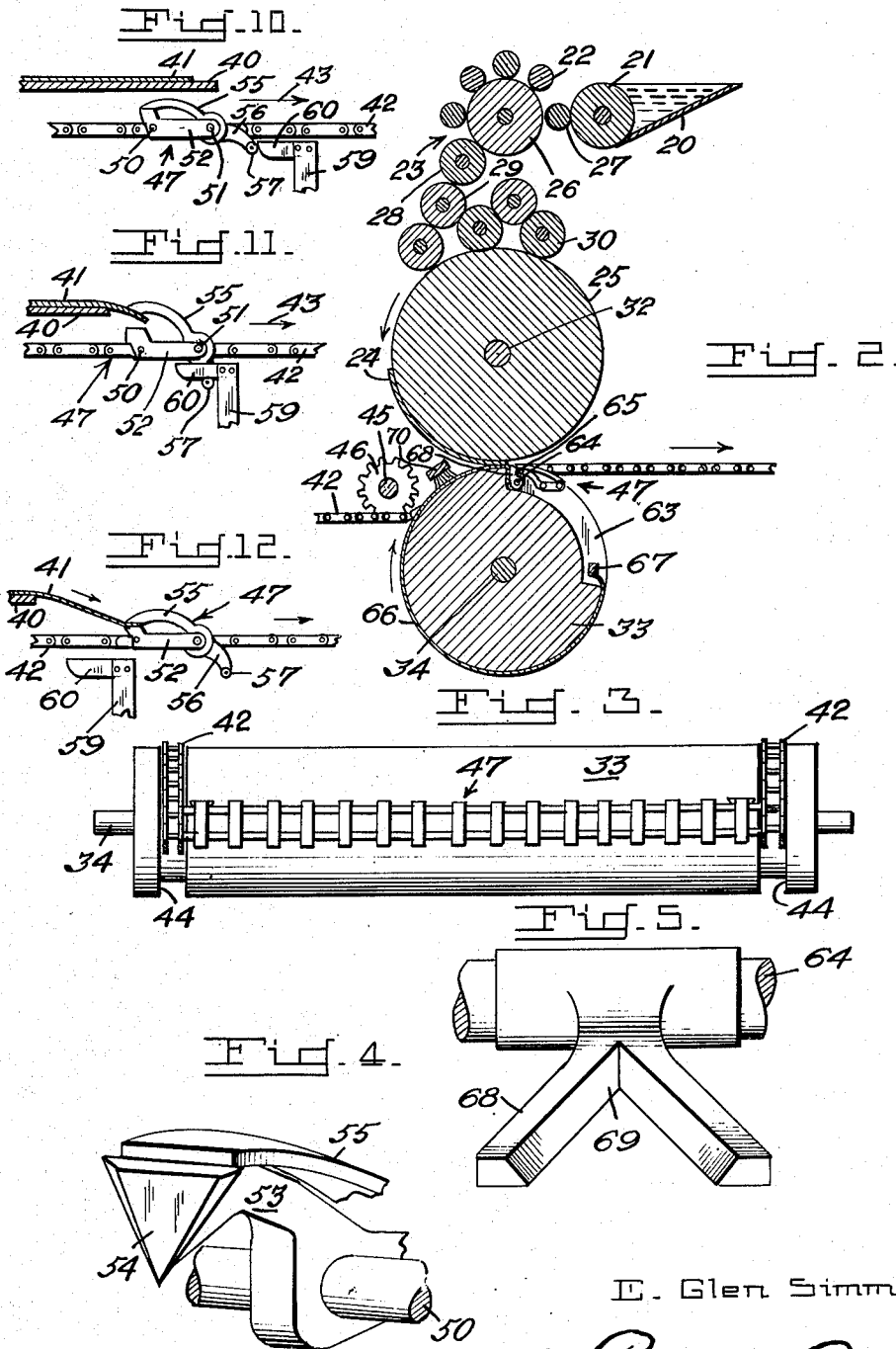
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CHAIN CARRIAGE SHEET FEED ROTARY PRINTING PRESS

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3 Sheets-Sheet 3



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CHAIN CARRIAGE SHEET FEED ROTARY
PRINTING PRESS

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4 Claims. (Cl. 101—232)

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This invention relates to an improved construction of rotary printing press, and has for a primary object to provide a novel feeding arrangement for rotary printing presses which will insure proper positioning of the sheets to be printed on an impression cylinder, so that the accuracy inherent in a flat bed type printing press may be obtained with the speed inherent in a rotary type printing press.

More particularly, it is a primary object of the present invention to provide a chain carriage means for feeding the sheets to be printed and by means of which the sheets will be engaged and carried, without being released, from the feeder board to the delivery end of the press, thus simplifying the feeding operation of enabling the more accurate positioning of the sheets on the impression cylinder for engagement by the plate cylinder.

Still another object of the invention is to provide novel means carried by and forming a part of the feeding mechanism for engaging and effectively holding the sheets during their travel through the press, and which means is engageable with means on the impression cylinder for accurately positioning the paper gripping unit, relatively thereto and while the sheet is traveling over the impression cylinder and receiving the impression from the plate cylinder.

Still a further object of the invention is to provide a feeding mechanism of the aforescribed character especially adapted for use in multicolor printing, and by means of which a sheet may be conveyed between a plurality of impression and plate cylinders, without being released from the feeding mechanism to thus insure more accurate positioning of the sheet for each impression received.

Various other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating a preferred embodiment thereof, and wherein:

Figure 1 is a perspective view of a preferred embodiment of the invention, illustrating its adaptation to a single color printing, rotary type press;

Figure 2 is a fragmentary longitudinal sectional view through a portion of the printing press;

Figure 3 is a plan view of the impression cylinder and with a portion of the feeding mechanism shown passing thereover;

Figure 4 is a perspective view of a portion of the paper gripping mechanism of the press;

Figure 5 is a plan view of one of the register block guides, carried by the impression cylinder;

Figure 6 is an enlarged sectional view through portions of the impression cylinder and plate cylinder and showing the paper gripping mechanism disposed in the impression cylinder;

Figure 7 is an enlarged perspective view of a portion of the press and illustrating the means for opening the sheet gripping fingers, preparatory to engaging a sheet to be conveyed through the press;

Figure 8 is an enlarged perspective view of a portion of the structure as shown in Figure 7, and taken at a different angle with reference thereto;

Figure 9 is a cross sectional view, on a reduced scale, taken substantially along a plane as indicated by the line 9—9 of Figure 8;

Figure 10 is a longitudinal sectional view of a portion of the feed mechanism and of a portion of the feeder board, showing the paper gripping mechanism approaching a position for engaging a sheet of paper to be fed from the board;

Figure 11 is a similar view showing the paper gripping mechanism opened and with the paper being fed thereto, similar to Figure 10, and

Figure 12 is a view similar to Figures 10 and 11 and showing the paper gripping mechanism closed and engaging the paper, and at the beginning of the travel of the paper through the press.

Referring more specifically to the drawings, the rotary printing press in its entirety and constituting the invention is designated generally 13 and includes a frame, designated generally 14 which includes corresponding side members 15 and 16 which are disposed substantially upright and which extend longitudinally of the press 13. The side members 15 and 16 are provided with outwardly projecting feet 17 which are apertured to receive fastenings 18 for securing the frame 14 to any suitable supporting surface. The frame side 15 is shown broken away in Figure 1, for illustrating details of the press, hereinafter to be described, but it is to be understood that said side 15 corresponds to the side 16 and that both of said sides includes an upstanding frame portion 19.

An ink fountain 20 is mounted between the frame portions 19 and adjacent the upper parts thereof and has a fountain roller 21 journaled in the open rear side thereof and adapted to supply ink to a ductor roller 22 which forms a part of a stand of rollers, designated generally 23 and by means of which ink is applied to a printing plate

24 which is secured to a portion of the periphery of a plate cylinder 25. The stand of rollers 23 includes in addition to the roller 22, a steel drum roller 26, a plurality of drum vibrator rollers 27, which engage the roller 26, a rider roller 28, disposed beneath and engaged by the roller 26, a pair of steel vibrator rollers 29 and a plurality of form rollers 30, which engage the plate 24 during a portion of each rotation thereof. All of the rollers of the stand of rollers 23, are provided with shafts which extend therethrough or stub shafts which project from the ends thereof, as seen at 31, and which are journaled in the frame portions 19, for rotatably supporting each of the rollers of the stand of rollers 23, therebetween. Likewise, the cylinder 25 is provided with a shaft 32, which extends therethrough, and an impression cylinder 33, which is disposed beneath the cylinder 32 and is also provided with a shaft 34 extending longitudinally therethrough. The shafts 32 and 34 are keyed to the cylinders 25 and 33 respectively, and have protruding ends which are journaled in portions of the side members 15 and 16 and the frame 14. A shaft 35 is journaled in the side members 15 and 16, adjacent the discharge end of the press 13 and has a pair of sprocket wheels 36 keyed thereto and disposed on the inner side of and adjacent said side members 15 and 16. A shaft or axle 37 is journaled adjacent the opposite end of the frame 14 in the side members 15 and 16, is also provided with a pair of sprocket wheels 38, keyed thereto and disposed in longitudinal alignment with the sprocket wheels 36. The shaft 37 and its sprocket wheels 38 are disposed beneath a feeder board 39, having a forwardly and downwardly inclined feeder surface 40, over which the paper 41 to be printed, is adapted to be fed either mechanically or by hand, and in any conventional manner, well known in the printing art. A pair of endless sprocket chains 42 are trained over the aligned sprocket wheels 36 and 38 and are disposed for movement longitudinally of the machine 13 and in the direction as indicated by the arrows 43, disposed adjacent the upper and lower flights of each of the chains 42. As indicated by the arrows, the chains 42 are driven in a direction so that the upper flights thereof are moving from left to right of Figure 1 or toward the discharge end of the press 13, and accordingly the sprocket wheels and shafts will rotate in clockwise directions, as seen in Figure 1. The upper flights of the chains 42 are adapted to move through annular grooves 44 in the periphery of the impression cylinder 33 and adjacent the ends thereof, as best seen in Figure 3. A shaft or axle 45 is journaled transversely of the press 13 and in the frame sides 15 and 16 and disposed between the feeder board 39 and the cylinders 25 and 33. A pair of sprocket wheels 46 is keyed to the shaft 44 and each of said wheels is disposed to mesh with the upper flight of one of the chains 42 and on the upper side thereof, for forcing said upper flights downwardly, as they enter the grooves 44.

The shaft 37 is preferably mounted in any conventional manner for longitudinal adjustment, for varying the tension of the chains 42, and either or both of the shafts 35 and 45 may be connected to suitable driving means, not shown, for driving the chains 42, in a manner conventional in the printing art. The shaft 45 is also adapted to be mounted for vertical adjustment in any suitable manner, for varying the extent that the sprocket wheels 46 will depress the upper

flights of the chains 42 as they approach the grooves 44.

Corresponding portions of the chains 42 are connected at a plurality of points by paper gripping units, designated generally 47 and each of which includes a pair of supporting plates 48, one of which is pivotally connected by a fastening 49 to the inner side of a link of each of the chains 42. Two shafts 50 and 51 are disposed between and connected at their ends to each pair of plates 48. The shafts 50 are disposed rearwardly of the shafts 51, as considered in view of their direction of movement, and said shafts 50 are fixedly connected to the plates 48, and the shafts 51 are rotatably mounted therein. The paper gripping units 47 include a plurality of fixed gripper fingers 52 and 53 which are supported by both of the shafts 50 and 51 of said units. The fixed gripper fingers 53, differ from the gripper fingers 52 only in that the free ends thereof terminate in substantially triangular shaped portions 54 forming register blocks, for a purpose which will hereinafter become apparent. Swingably mounted gripper fingers 55 are fixed at their forward ends to the shaft 51 of each unit 47, one of said gripper fingers 55 being disposed in alignment with each of the fingers 52 and 53 and being normally disposed with its free end bearing against the upper side of its associated, fixed gripping finger, as seen in Figures 4 and 8. A crank 56 is keyed to each of the shafts 51, adjacent one of the plates 48 thereof, and each of said cranks is provided with an inwardly projecting extension carrying a roller 57. As best seen in Figure 7, the frame 14 supports a rod 58, which is disposed transversely thereof, and adjacent the shaft 37. An arm 59 is keyed to and projects upwardly from the rod 58 and supports a laterally offset cam 60 on its upper end, which is disposed so that the under, rounded side thereof will ride over the rollers 57, of each unit 47, for depressing the crank 56 thereof and rotating the shaft 51, as the unit 47 passes from beneath the inclined feed board 40 for opening the fingers 55, keyed thereto, for receiving the leading edge of a sheet of paper, as will hereinafter be more fully described, and as illustrated in detail in Figures 10, 11 and 12. A similar unit 58, 59 and 60 is disposed on the outer side of the shaft 35 for again engaging and opening the fingers 55 as the gripper units 47 move around the sprocket wheels 36, for a purpose hereinafter to be described.

A shaft 61 is journaled in the frame sides 15 and 16 and adjacent and above the inclined feed surface 40 and is provided with a plurality of drop guides or feed fingers 62. The shaft 61 may be oscillated in any suitable manner to impart thereto an oscillating movement timed to the movement of the chains 42, so that as a unit 47 reaches the position of Figure 10, a sheet 41 will be fed by the fingers 62 downwardly on the surface 40 to position the leading edge of the sheet 41 in the openings formed by the stationary fingers 52 or 53 and the pivoted fingers 55 and so that the shaft 61 will be turned for raising the drop guides or fingers 62, as the cam roller 57 moves out from beneath the cam 60 to permit the fingers 55 to return to closed position for clamping the leading edge of the sheet 41 between the fingers 52 or 53 and 55, as illustrated in Figure 12.

As best illustrated in Figure 2, the impression cylinder 33 is provided with a circumferentially extending recessed portion 63 in the trailing end portion of which is disposed a rod or shaft 64 which extends longitudinally of the cylinder 33,

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The shaft 64 mounts a plurality of packing clamps 65 which are adapted to clamp an end of a packing or cover strip 66 in the trailing end wall of the recess 63. The opposite end of the strip 66 is fastened to a bar 67 mounted in the recess 63 and adjacent its leading end and the portions of the strip 66 therebetween are disposed around the periphery of the impression cylinder. The shaft 60 also supports a number of fixed register block guides 68, as seen in Figure 5, which correspond in number to the fixed fingers 53, which are disposed so that the V-shaped notches 69 thereof will receive the register blocks 54, when the gripper units 47 are disposed in the recess 63.

A brush 70 is supported transversely of the frame 14 and between sides 15 and 16 and is disposed between the shafts 45 and the contacting portions of the peripheries of the cylinders 25 and 33 so that the bristles of said brush which normally engage the cylinder 33 will by wiping engagement with the sheet 41 to smoothly dispose it over the packing strip 66 to receive the impression from the plate 24, as said plate rides over the sheet.

An endless conveyor, designated generally 71, including a plurality of endless tapes 72 as partially disclosed in Figure 1, has a forward end defined by a shaft 73 which is journaled in the sides 15 and 16 and beyond and adjacent the sprocket wheels 36. The tapes 72 may be driven in any suitable manner so that the upper flight thereof will move in a direction away from the frame 14 for conveying the printed sheets 41 away from the press 13, after printing. A shaft 74 is fixedly mounted in the frame members 15 and 16 and extends through the flights of the tapes 72, adjacent the shaft 73 and is provided with a plurality of fixed stripping fingers 75 which extend over the shaft 73 and which are adapted to strip the leading edges of the printed sheets 41 from the open gripper units 47 and direct said leading edges into engagement with the tapes 72, so that the sheets 41 will be thus conveyed by the conveyor 71 away from the press 13. As previously stated, the cam rollers 57 of the gripper units 47 engage the cam 60, located beneath and adjacent the inner end of the conveyor 71 for opening the fingers 55 as the stationary stripper fingers 75 engage under the leading edges of the sheets 41, so that the sheets will thus be released to be conveyed away from the press 13, by the tapes 72.

The frame 14 includes strips of canvas or other material 76 which are disposed between the sides 15 and 16, beneath the upper flight of the chains 42 and between the feed board surface 40 and the cylinders 25 and 33 and between said cylinders and the sprocket wheels 36, for supporting the trailing edge of each sheet of paper 41 in its movement toward and away from the impression cylinder 33.

As best illustrated in Figure 8, the rotary press 13 is preferably provided with sections of guide rails, designated generally 77 which are secured to and project inwardly from the inner sides of the frame sides 15 and 16 and which include surfaces 78 for slidably supporting the flights of the chains 42, and inwardly opening channel portions 79 for receiving and guiding rollers 80, as seen in Figures 8 and 9, which are journaled on the ends of the shafts 50 and 51 and which are disposed on the outer sides of the end plates 48.

From the foregoing it will be readily apparent that the stand of ink rollers 23 will maintain the printing plate 24, covered with a coating of ink

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at all times, when the press 13 is in operation, in a conventional manner. The cylinders 25 and 33 may be driven in any suitable manner timed to the movement of the chains 42 and the drop guides or feed fingers 15.

Accordingly, as one of the gripper units 47 moves to the position of Figure 10 beneath the surface 40, the fingers 62 will advance a sheet 41 toward and to the position of Figure 11, to be received in the openings formed by the fingers 52 or 53 and 55, as said fingers 55 are cammed to open position by engagement of the roller 57 with the cam 60, as previously described. As the roller 57 rides out from beneath the cam 60, fingers 55 will return to closed positions of Figure 2, for engaging and conveying the sheet 41 toward the impression cylinder 33. The sprocket wheels 46 will press the chains 42 downwardly and into the grooves 44 to thereby force the closed gripper unit 47 into the recess 63 and the guide blocks 54 will be seated in the guide notches 69 to accurately position the gripper unit 47 within the recess 63 for correctly positioning the engaged sheet 41 relatively to the impression cylinder 33. As the upper flights of the chains 42 continue to move from left to right and as the cylinder 33 revolves in a clockwise direction, as seen in Figures 1 and 2, the sheet 41 will be disposed smoothly over the packing strip 66 by the brush 70 so as to receive the impression from the plate 24, after which the gripper unit 47 will move out of the recess 63 and will draw the sheet 41, after being printed, out of engagement with the cylinder 33. As the gripper unit 47 is passing around the sprocket wheels 36, its roller 47 will again be engaged by the other cam 60 for again opening the fingers 55 as the leading edge of the sheet 41 passes over the stationary stripper fingers 75, so that the sheet will be guided by said fingers into engagement with the upper flights of the tapes 42 to be conveyed away from the printing press thereby.

It will be readily understood that the other gripper unit 47 will accomplish the same conveying of the next sheet 41 through the press 13, and the number of said units 47 may be varied, depending upon the size of the printing press. Likewise, any number of sets of cylinders 25 and 33 and stands of rollers 23 may be provided, through which the sheets 41 can be conveyed by the gripper units 47, between the feeder board 39 and the conveyor 71, without being released by the gripper unit, for accurately accomplishing multicolor printing.

Various other modifications and changes are likewise contemplated and may obviously be resorted to, without departing from the spirit and scope of the invention as hereinafter defined by the appended claims.

I claim:

1. A sheet gripping and conveying apparatus for use with a rotary type printing press, comprising a pair of driven endless chains having corresponding flights adapted to pass between an impression cylinder and a plate cylinder of a rotary printing press, a sheet gripping unit connected at its ends to corresponding portions of the chains and extending transversely therebetween, said sheet gripping unit including plates pivotally connected to the complementary portions of the chains, a pair of shafts extending between said plates and connected thereto, a plurality of spaced fixed gripping fingers each supported by and connected to both of the shafts, one of said shafts being journaled in said plates

and in the fixed gripping fingers, movable gripping fingers cooperating with said fixed gripping fingers and secured to said rotatable shaft for oscillating movement therewith, each movable gripping finger having a rear, trailing free end normally disposed in engagement on the upper side of the free ends of one of the fixed gripping fingers whereby said fixed and movable gripping fingers are normally disposed in closed sheet gripping positions, a crank fixed to and depending from the rotatable shaft, a cam roller projecting laterally from the lower free end of said crank, and means for momentarily opening the gripping unit comprising a stationary cam element disposed in the path of travel of said cam roller having a bottom cam surface beneath which said cam roller is movable for rocking the rotatable shaft to swing the movable gripping fingers away from and out of contact with the trailing ends of the fixed gripping fingers.

2. A sheet gripping and conveying apparatus as in claim 1, stationary inwardly opening guide channels over the upper surfaces of which said complementary flights of the chains are movable and on which said chain flights are slidably supported, said plates slidably engaging the inner open sides of said stationary guide channels, and rollers journaled on the ends of said shafts and engaging in said guide channels.

3. A sheet gripping and conveying apparatus as in claim 1, each of said fixed gripping fingers having a recessed forward, leading end through which the rotatable shaft extends and in which

the leading end of one of the movable gripping fingers is swingably disposed and secured to said rotatable shaft.

4. A sheet gripping and conveying apparatus as in claim 1, certain of said fixed gripping fingers having triangular shaped trailing free ends, and a plurality of centering elements adapted to be disposed in a recess of the impression cylinder each provided with an outwardly opening V-shaped notch for receiving one of said V-shaped free ends to retain the sheet gripping unit against lateral displacement relatively to the longitudinal axis of the printing press and longitudinal movement relatively to said impression cylinder while the gripping unit is moving with the chains between the cylinders.

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