Jan. 10, 1956 E. R. THOMSEN 2,730,364

CHAIN DELIVERY UNIT FOR PRINTING PRESSES

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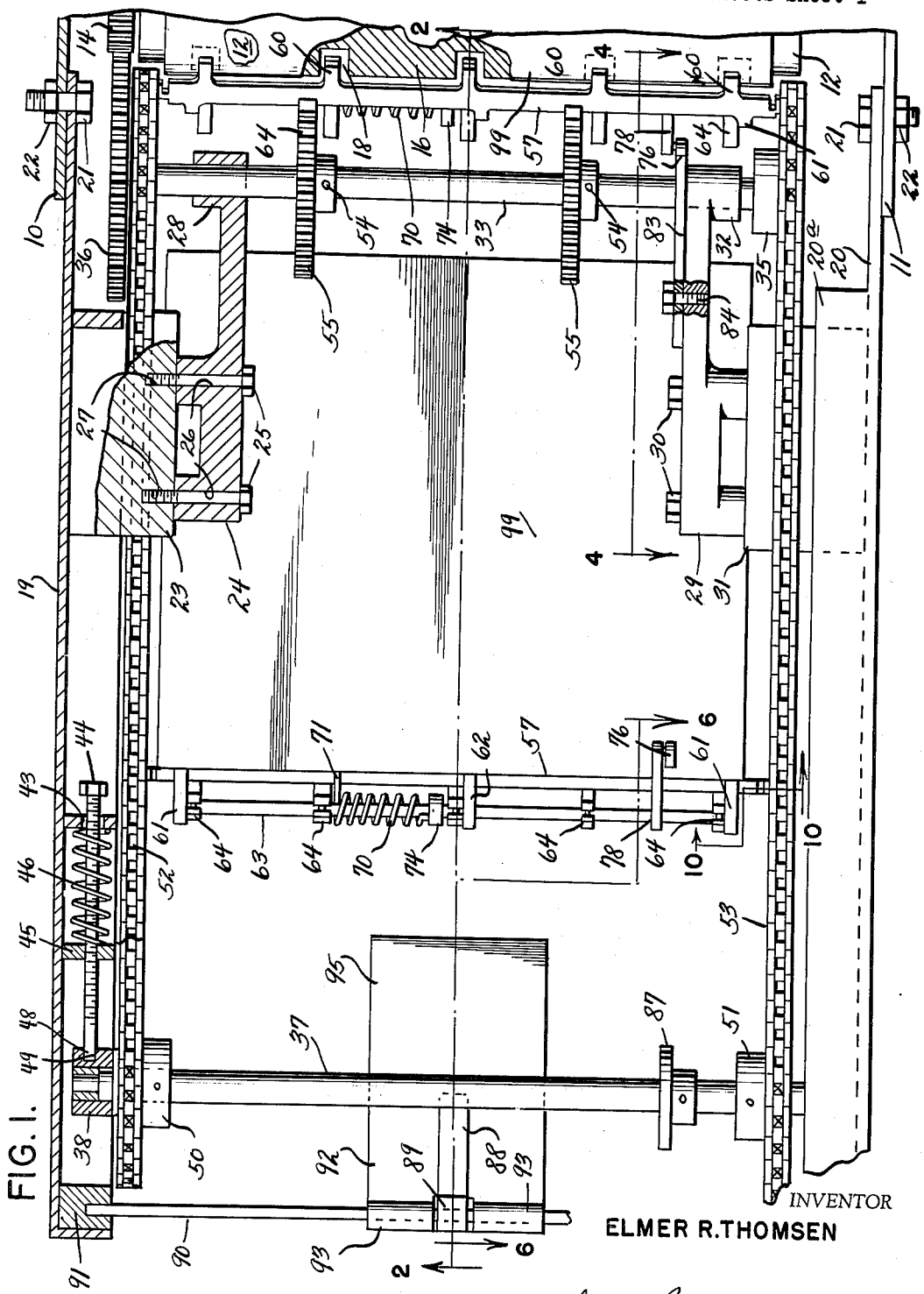


FIG. 1.

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CHAIN DELIVERY UNIT FOR PRINTING PRESSES

Filed Nov. 4, 1953 4 Sheets-Sheet 2

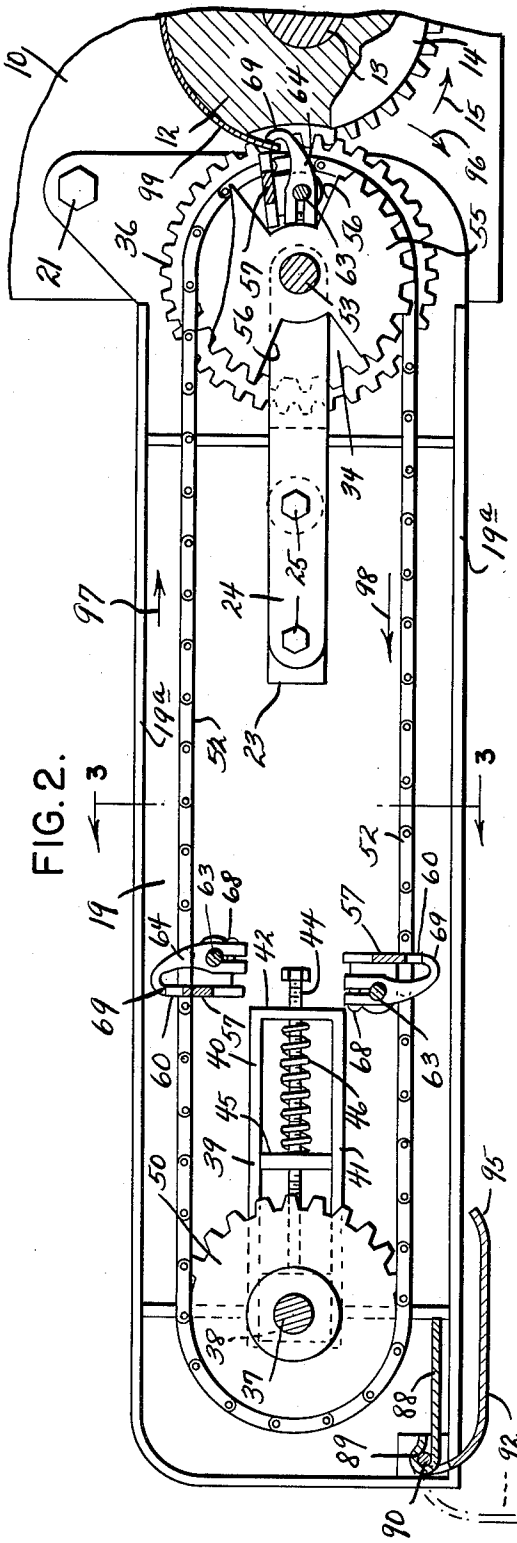


FIG. 2.

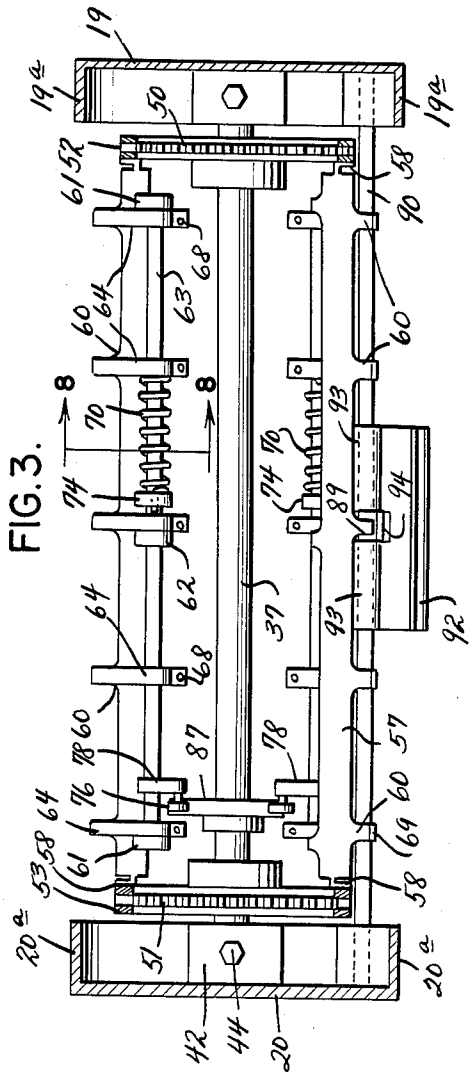


FIG. 3.

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CHAIN DELIVERY UNIT FOR PRINTING PRESSES

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FIG. 4.

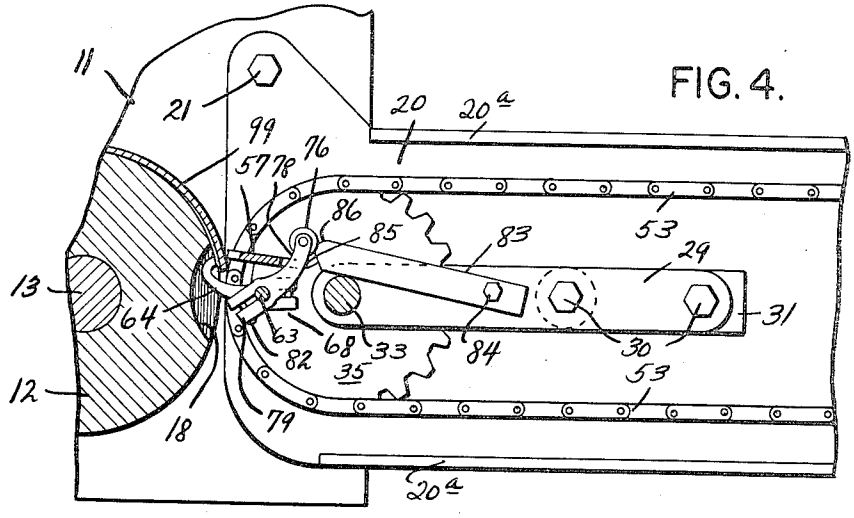


FIG. 5.

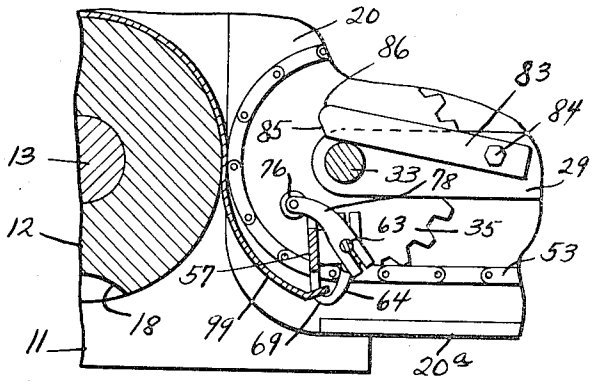
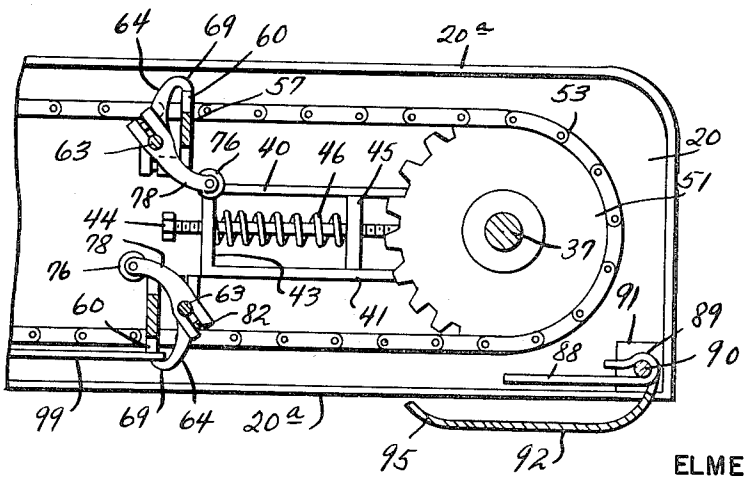


FIG. 6.



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CHAIN DELIVERY UNIT FOR PRINTING PRESSES

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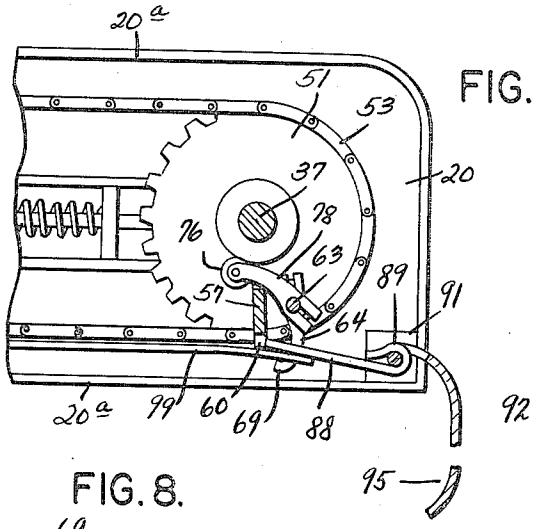


FIG. 7.

FIG. 8.

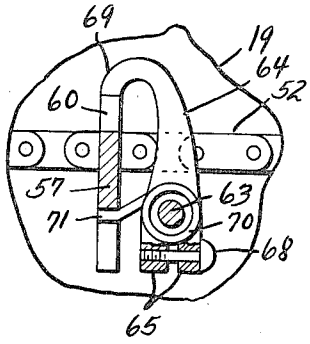


FIG. 9.

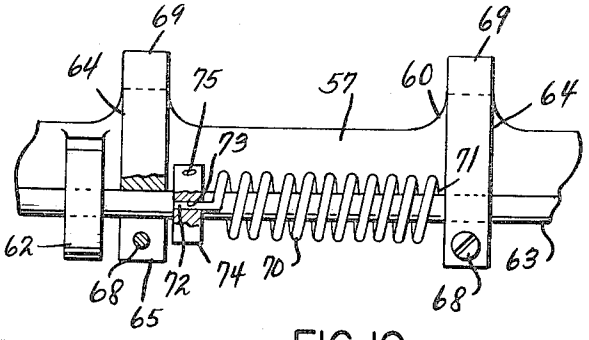


FIG. 11.

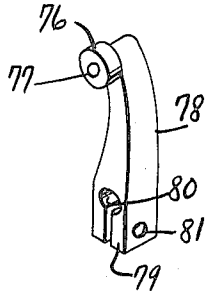


FIG. 12.

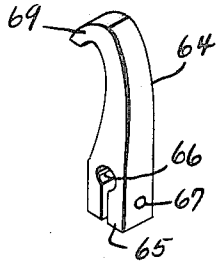
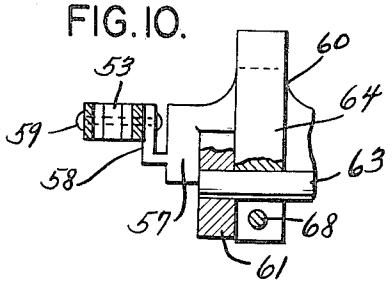


FIG. 10.



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2,730,364

CHAIN DELIVERY UNIT FOR PRINTING PRESSES

Elmer R. Thomsen, Portland, Oreg.

Application November 4, 1953, Serial No. 390,172

2 Claims. (Cl. 271—79)

The present invention relates to a paper chain delivery unit for printing presses, especially for the Multilith offset press and has for an object the provision of a device of this kind which can be driven from the printing press.

Another object of the present invention is to provide a device of this character which is a self contained unit capable of being attached to the frame of the printing press by removing a few parts from the press and utilizing the conventional bolt holes in the frame of the press. The prior art delivery means has been built into the printing press. The Multilith offset press is manufactured without a paper chain delivery, the paper being delivered into the tray mostly by the weight of the paper and by its own momentum so that the problem was to adapt a chain delivery to this type of press without revamping the press. It is an aim of this invention to solve this problem.

A further object of the present invention is to provide a structure of this character in which brackets or arms are attached to the side plates of the improved device for supporting the sprocket shaft.

The invention contemplates the provision of tighteners for the sprocket chains which operate by a push action rather than by the conventional pull action.

The invention also contemplates the provision of a delivery device in which the paper gripper bars are cast in one integral solid piece: whereas the gripper bars of the prior art comprises separate blocks, finger pins and rods attached by screws or the like.

The present invention aims to provide in a device of this kind in which a one piece notched out anvil is secured to the impression roller of the press.

With the foregoing and other objects in view, the invention will be hereinafter more fully described and more particularly pointed out in the appended claims.

In the drawings, in which the same parts are denoted by the same reference numerals throughout the several views,

Figure 1 is a top plan view of the improved device applied to a printing press and with parts broken away and parts in section,

Figure 2 is a sectional view taken on line 2—2 of Figure 1,

Figure 3 is a sectional view taken on the line 3—3 of Figure 2,

Figure 4 is a sectional view taken on the line 4—4 of Figure 1,

Figure 5 is a view similar to Figure 4, but showing the paper gripped by the gripper means and being stripped from the impression roller,

Figure 6 is a sectional view taken on the line 6—6 of Figure 1,

Figure 7 is a view similar to Figure 6, but showing the paper being released by the gripper means,

Figure 8 is a sectional view taken on the line 8—8 of Figure 3,

Figure 9 is a fragmentary front elevation view of one of the gripping devices with parts broken away and in section,

Figure 10 is a sectional view taken on the line 10—10 of Figure 1,

Figure 11 is a perspective view of one of the cam followers, and

Figure 12 is a perspective view of one of the gripper fingers.

Referring more particularly to the drawings, 10 and 11 indicate the opposite side pieces of the frame of a conventional printing press, such as a Multilith offset press. At 12 is indicated the impression cylinder or roller of the press which is carried in a conventional manner by a shaft 13, which in turn is mounted in the side pieces 10 and 11.

A gear 14 is carried by the shaft of the impression cylinder and is driven thereby in a counterclockwise direction, as indicated by the arrow 15 shown in Figure 2 of the drawings. An anvil 16 is secured to the leading edge of the impression cylinder by the screws 17. The anvil may be made of any material and of any desired size, such as a strip of iron 5/16" x 1/2" x 11". The leading edge of the anvil 16 is provided with a series of longitudinally spaced apart notches or recesses 18.

The paper chain delivery device comprises a pair of spaced apart side plates 19 and 20 which are screwed to the outer free ends of the side pieces 10 and 11 adjacent the inner ends of the side plates 19 and 20 by bolts 21 which extend through suitable openings formed in the side plates and conventional openings in the side pieces 10 and 11. The bolts 21 may be held in position by nuts 22.

A block 23 is secured to or formed integral with the inner face of the side plate 19 adjacent the inner end thereof. A bracket or arm 24 is secured to the block 23 by bolts or the like 25, which extend through suitable bores 26 formed in the bracket 24 which are received by screw threaded sockets 27 formed in the block 23. The bracket 24 is of increased thickness in the portions through which the bolts 25 extend. The bracket or arm 24 extends inwardly and its extreme inner end portion is of increased thickness to form a bearing 28.

A bracket or arm 29, which is similar in construction and arrangement, is secured by bolts 30 to a block 31, which is similar to the block 23, and is attached to or formed integral with the side plate 20. The arm 29 extends inwardly and its extreme inner end portion is of increased thickness to form a bearing 32.

A sprocket shaft 33 is rotatably carried by the bearings 28 and 32 and the opposite end portions of the shaft 33 extend outwardly beyond their respective bearings and have fixed thereto sprocket wheels 34 and 35. A gear 36 is fixed on the end of the shaft 33 between the sprocket wheel 34 and the side plate 19. The gear 36 may be secured to the sprocket wheel 34 by means of bolts or the like, not shown.

Adjacent the outer ends of the side plates 19 and 20, a second sprocket shaft 37 is adjustably supported at its opposite ends by bearing blocks 38. Each bearing block 38 is slidably received by a guide member or trough 39, one of which is secured to the inner face of each of the side plates 19 and 20, as by welding or the like, or may be formed integrally therewith. Each guide member is substantially U-shaped and comprises an upper and a lower leg 40 and 41 and a crosspiece 42 connecting the inner ends of the legs 40 and 41. The connecting piece 42 has formed therein an opening 43 for slidably receiving therethrough an adjusting screw 44, the diameter of which is less than the diameter of the opening 43 to permit radial movement as well as axial movement of the screw in the opening 43. A non-circular nut 45 is threadedly received by the screw threaded portion of the adjusting screw 44.

A coil spring 46 encircles the adjusting screw 44 between the crosspiece 42 and the nut 45 and the opposite ends of the spring 46 engage the crosspiece 42 and the nut 45.

The inner end portion 48 of the screw 44 is received by a smooth walled recess 49 formed in the adjacent end of the block 38. The pressure of the spring 46 against the nut 45 causes a constant thrust of the portion 48 of the screw into the recess 49.

The non-circular nut 45 is held against rotation by the legs 40 and 41 of the guide member 39. Sprocket wheels 50 and 51 are fixed to the sprocket shaft 37 adjacent the opposite ends thereof and inwardly of the bearing blocks 38. A sprocket chain 52 is entrained over the sprocket wheels 34 and 50 and a second sprocket chain 53 is entrained over the sprocket wheels 35 and 51.

The shaft 33 has fixed thereto, by any suitable means such as Allen head screws 54, a pair of toothed wheels 55. The wheels 55 are longitudinally spaced apart on the shaft 33 and have substantially diametrically opposite cut away segments 56.

Three gripper bars 57 are attached at their opposite ends to the chains 52 and 53 and are longitudinally spaced apart on the chains. Each end of each gripper bar is secured to its sprocket chain by a substantially L-shaped clip 58, one flange of which is provided with two appropriate holes through which two of the adjacent rivets 59 extend to secure the clip 58 to the sprocket chain. The other flange of the clip 58 is cast integral with the gripper bar 57. One edge of each gripper bar is provided with a plurality of longitudinally spaced apart pads 60 which are raised above the edge of the gripper bar. Adjacent each end of each gripper bar is a bearing 61 which is formed integral with the gripper bar 57. An intermediate bearing 62 is also formed integral with each gripper bar 57.

A gripper finger shaft 63 extends through the bearing 62 of each gripper bar and has its opposite ends rotatably received by the end bearing 61. A plurality of gripper fingers 64 are attached to each gripper finger shaft 63 at longitudinally spaced apart points thereon. The number of gripper fingers 64 correspond to the number of pads 60 and the gripper fingers 64 are positioned so that they will cooperate with the pads 60 for holding the edge portion of a sheet of paper which is to be stripped from the impression cylinder 12.

Each gripper finger has a bifurcated end 65 with a substantially circular recess 66 formed in the inner end of the bifurcated portion 65. The shaft 63 is also circular in cross section and extends through the recess 66 of the fingers 64. The bifurcated portion 65 of each finger 64 has a through screw threaded bore 67 therein outwardly of the recess 66 for receiving a screw threaded fastening element, such as an Allen head screw 68, for clamping the fingers upon the shaft 63. Each finger 64 tapers from the bifurcated end thereof towards the opposite end and terminates in a hook-like portion 69 which in the closed position of the fingers engages its pad 60.

In order to resiliently hold the fingers 64 on their pads 60, a coil spring 70 encircles an intermediate portion of each finger gripper shaft 63. One end portion 71 of the coil spring engages the edge of the gripper bar which is opposite to the edge of the gripper bar upon which the pads 60 are formed. The opposite end portion 72 of the coil spring is received by an eccentrically located opening 73 formed in an adjusting collar 74 which is adjustably held on the shaft 63 by a set screw 75. In order to increase or decrease the tension of the spring 70 on the fingers 64, the set screw 75 is loosened and the collar 74 rotated in the proper direction for increasing or decreasing the spring tension and the set screw 75 is again tightened.

A cam follower 76 is rotatably mounted on a pivot pin 77 which is carried by one end of an arm 78. The opposite end of the arm 78 has a bifurcated portion 79 and a substantially circular recess 80 at the inner end of the bifurcated portion. A screw threaded bore 81 extends through the bifurcated end 79 outwardly of the recess 80. The shaft 63 extends through the recess 80 of the arm 78 and a fastening element, such as an Allen head screw 82, extends through the bore 81 and fixes the arm 78 to the shaft 63 for rotation therewith.

A cam bar 83 is secured to the bracket 29 by a screw threaded fastener element 84. The cam bar extends inwardly towards the sprocket shaft 33 and above and beyond it where it terminates in a downwardly and outwardly beveled surface 85. Between the upper edge of the bar and the surface 85 the bar is rounded as at 86. The cam followers 76 are longitudinally adjusted on the finger shafts so that the cam bar will be disposed in the path of the followers as they are carried around by the sprocket chains.

A cam 87 is fixed to the sprocket shaft 37 and is disposed in the path of the cam followers 76. A stripper finger 88 has one end portion bent upon itself to form a clip 89 for frictionally engaging a bar 90 which is fixedly mounted in blocks 91 which in turn are secured to the inner face of the side plates 19 and 20 at the outer end portions thereof.

A gate 92 is pivotally mounted on the bar 90 and has a birfurcated end, two portions of which are rolled upon themselves to form knuckles 93 which encircle the bar 90. The bifurcated end of the gate is cut away as at 94 so as to accommodate the clip 89 of the stripper finger 88. The gate 92 has its lower half portion curved inwardly as indicated at 95.

In order to attach the improved paper chain delivery unit to the printing press, the following conventional parts of the printing press are removed:

(*a*) The two ejector rollers that ride on the impression cylinder;

(*b*) The long ejector roll and the two rollers that ride on it;

(*c*) The idler gear and shaft and the gear on the end of the roller;

(*d*) The ejector pins that operate inside of the cylinder.

The side plates 19 and 20 will then be bolted to the opposite side pieces 10 and 11, using the bolt holes that conventionally hold the removed upper ejector roller brackets. This will bring the gear 36 of the unit into mesh with the gear 14 of the impression cylinder 12. The printing press will now be set in operation and the impression cylinder 12 will rotate in the direction of the arrow 15, that is in a counterclockwise direction, looking at Figure 2 of the drawings. This will cause the gear 36 and the sprocket shaft 33 to rotate in the direction of the arrow 96, that is in a clockwise direction, looking at Figure 2 of the drawings.

This rotation of the shaft 33 will be imparted to the sprocket wheels 34 and 35 so that the upper runs of the sprocket chains 52 and 53 will be moved in the direction indicated by the arrow 97, that is to the right, looking at Figure 2 of the drawings, and the lower runs of the sprocket chains will be moved in the direction indicated by the arrow 98, that is to the left, looking at Figure 2. This will cause the gripper bars on the upper runs of the sprocket chains to move toward the impression cylinder 12 and the cam bar 83.

As the cam follower 76 on the foremost gripper finger shaft 63 engages and rides up the upper surface of the cam bar 83, the shaft 63 will be rotated in a direction to cause the gripper fingers 64 thereon to be moved away from their pads 60 so that the leading edge portion of the sheet of paper will be received between the separated fingers 64 and their pads 60. This reception of the leading edge portion of the paper 99 between the gripper fingers and their pads is assisted by the fact that the opened fingers are received by the recesses 18 formed in the anvil 16. As soon as the cam follower 76 is carried beyond the free edge of the cam bar 83, the spring 70 which has been placed under tension by the rotation of the shaft 63 will come into play and urge the fingers 64 instantly towards their pads 60 so that the leading edge portion of the paper 99 will be firmly gripped therebetween and stripped from the impression cylinder 12.

At the same time the conventional gripping fingers

on the impression cylinder 12 will release their grip on the trailing edge portion of the paper 99 to prevent tearing of the paper. The toothed wheels 55 will engage the paper and maintain it in the proper contour as it leaves the impression cylinder and is carried downwardly and around to the delivery position of the tray, not shown, but which is conventionally positioned beneath the chain delivery unit.

Continued operation of the impression cylinder 12 will cause the fingers 64 which are gripping the paper 99 to move in the direction of the arrow 98 until the cam follower 76 on that particular gripper finger shaft engages the cam 87 which will cause the shaft 63 to again rotate to open the finger 64 and release the paper 99. At this time the stripper finger 88 will engage the upper surface of the leading edge portion of the paper 99 and strip it from the gripper fingers and be deflected downwardly towards the bottom of the receiving tray. The gate 92 will engage the leading edge of the paper and prevent it from escaping from the collection tray.

As soon as the cam follower 76 has been moved past the cam 87, the spring 70 will again close the gripper finger 64 upon their pads 60. The cut away segments 56 of the toothed wheels 55 are so correlated to the spacing of the gripper bars and the finger shafts on the sprocket chains that one of the segments 56 will be in a position to receive the gripper bars and finger shafts to prevent the toothed wheels 55 from interfering with the uninterrupted movement of the sprocket chains. The spacing of the gripper fingers on the sprocket chains is correlated to the speed and diameter of the impression cylinder so that a set of opened gripper fingers will be in a position to receive the leading edge portion of the paper. The sprocket chains may be kept at any desired tension by adjusting the screw 44 in the desired direction. If desired, for the purposes of strengthening the side plates 19 and 20, they may be provided with upper and lower flanges 19*a* and 20*a*, respectively.

It will be noted from Figures 1 and 2 of the drawings that when the side plates 19 and 20 of the delivery unit frame are attached to the side pieces 10 and 11 of the press frame, all of the operating parts of the unit frame, including the gear 36, will be disposed outboard of the operating parts of the press. This arrangement simplifies the attachment of the delivery unit to presses already in service and will not interfere with ready access at all times to all parts of the press without the necessity of moving all or part of the delivery unit as is necessary in the prior art structures.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims.

What I claim is:

1. A paper chain delivery unit for a multilith printing press having a frame and an impression cylinder having a recessed leading edge driven by a gear comprising a unit frame, attaching means on the unit frame adapted to attach the unit frame to the press frame, an anvil adapted to be mounted in the cylinder recess having recesses therein, a first sprocket shaft rotatably carried by said unit frame and adapted to be placed near the impression cylinder, a second sprocket shaft rotatably carried by said unit frame and remote from said first shaft, a sprocket wheel fixed to each shaft adjacent each end thereof, the sprocket wheels at one end of the two sprocket shafts being in alignment and constituting a pair and the sprocket wheels at the opposite end of the two sprocket shafts being in alignment and constituting a pair, a sprocket chain entrained over each pair of sprocket wheels, a gear on said first sprocket shaft adapted to mesh with the press gear, a plurality of paper gripping devices carried by said sprocket chains and spaced from one another a distance sufficient to bring said devices successively into gripping relation to the leading edge of successive sheets of paper carried by the impression cylinder, each device comprising a gripper bar extending between said chains and having its opposite ends secured to the chains, a gripper finger shaft rotatably carried by said bar, gripper fingers on said finger shaft and angularly adjustable with respect to the axis thereof and cooperating with said bar to grip the paper, means for urging said fingers into gripping position, cam means for opening said fingers when they reach the leading edge of the paper, said opened fingers being received by the recesses in the anvil to facilitate gripping of the paper, second cam means for opening said fingers adjacent said second sprocket shaft for releasing the paper, and toothed wheels fixed to said first sprocket shaft and adapted to engage the paper as it leaves the impression cylinder to maintain the proper contour of the paper, each of said toothed wheels having two substantially diametrically opposite cut away segments for accommodating the paper gripping devices when adjacent the impression cylinder.

2. A paper chain delivery unit for a multilith offset printing press having an impression cylinder comprising means adapted to strip the paper from the cylinder and deposit it at a preselected point comprising at least one gripper bar and at least one gripper shaft having cooperating members thereon to strip the paper from the cylinder and to deposit it at the preselected point, a rotatable shaft adapted to move said bar and gripper shaft towards the cylinder, and a toothed wheel fixed on said rotatable shaft and disposed in the path of movement of the bar and gripper shaft towards the cylinder and rotated by said rotatable shaft to engage the paper and maintain it in proper contour as it is stripped from the cylinder and carried to the preselected deposit point by the gripper bar and gripper shaft, said wheel having at least one recess for receiving the gripper bar and gripper shaft as they approach the cylinder so that the wheel will not interfere with the movement of the gripper bar and gripper shaft.

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