Sept. 14, 1937. H. M. BARBER 2,093,228

DELIVERY MECHANISM FOR PRINTING PRESSES

Filed Nov. 14, 1935 4 Sheets-Sheet 1

Fig. 1.

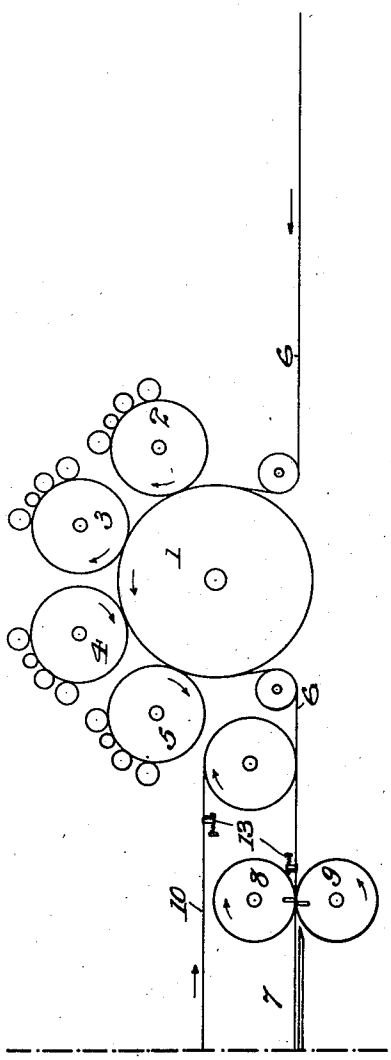


Fig. 1a.

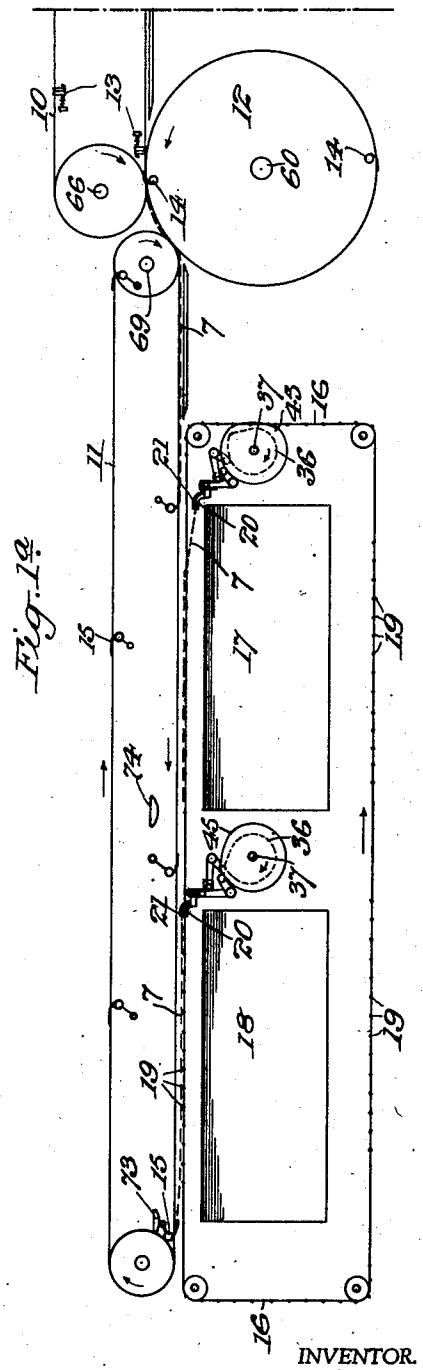
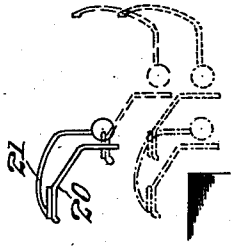


Fig. 1b.



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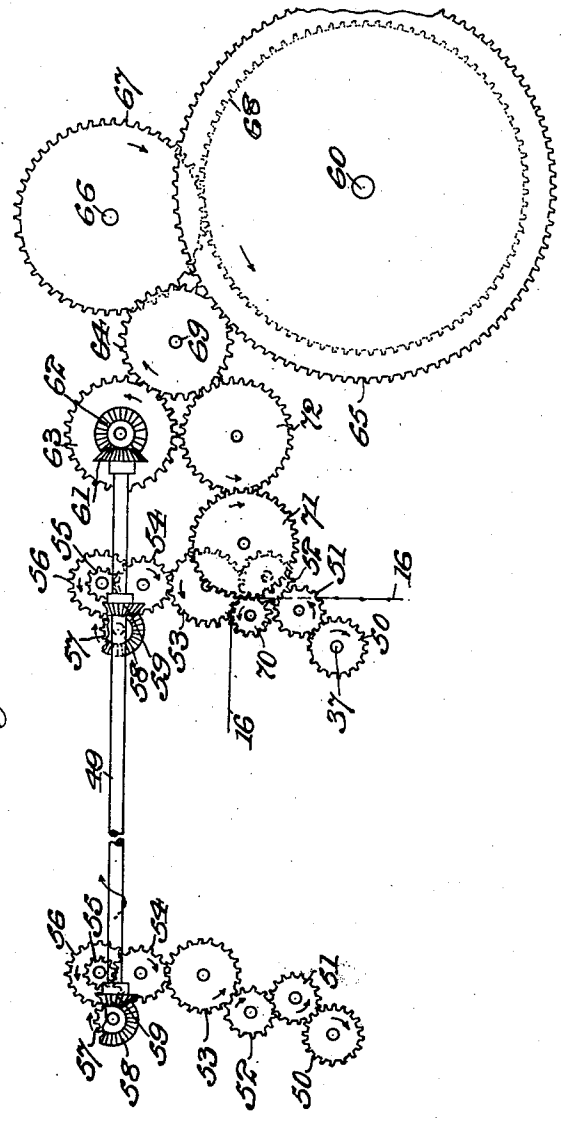


Fig. 2.

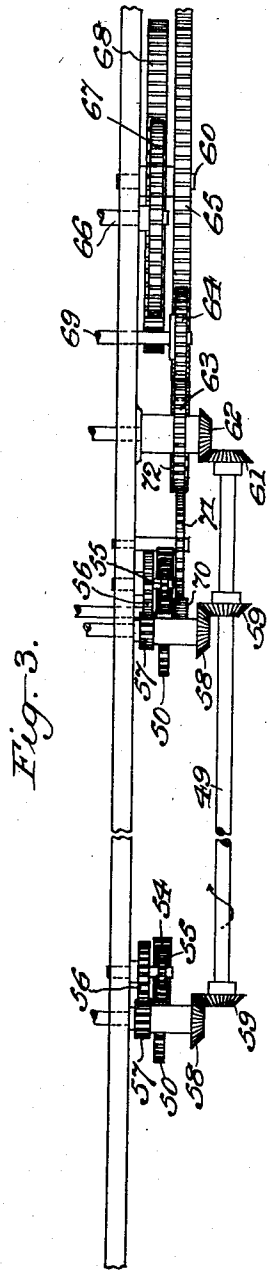


Fig. 3.

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DELIVERY MECHANISM FOR PRINTING PRESSES

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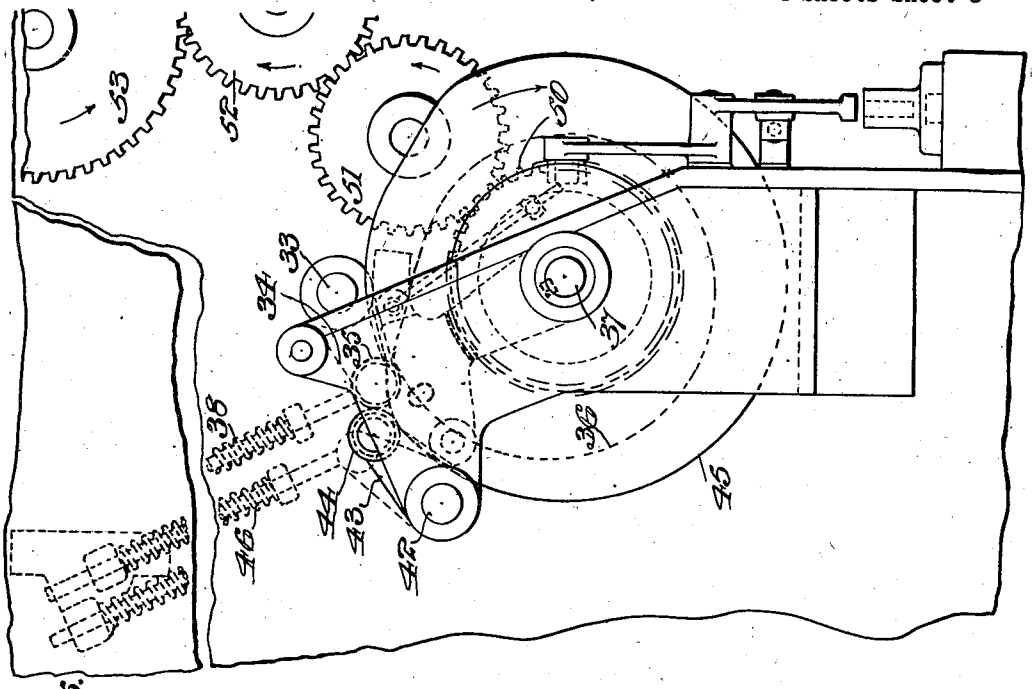


Fig. 3.

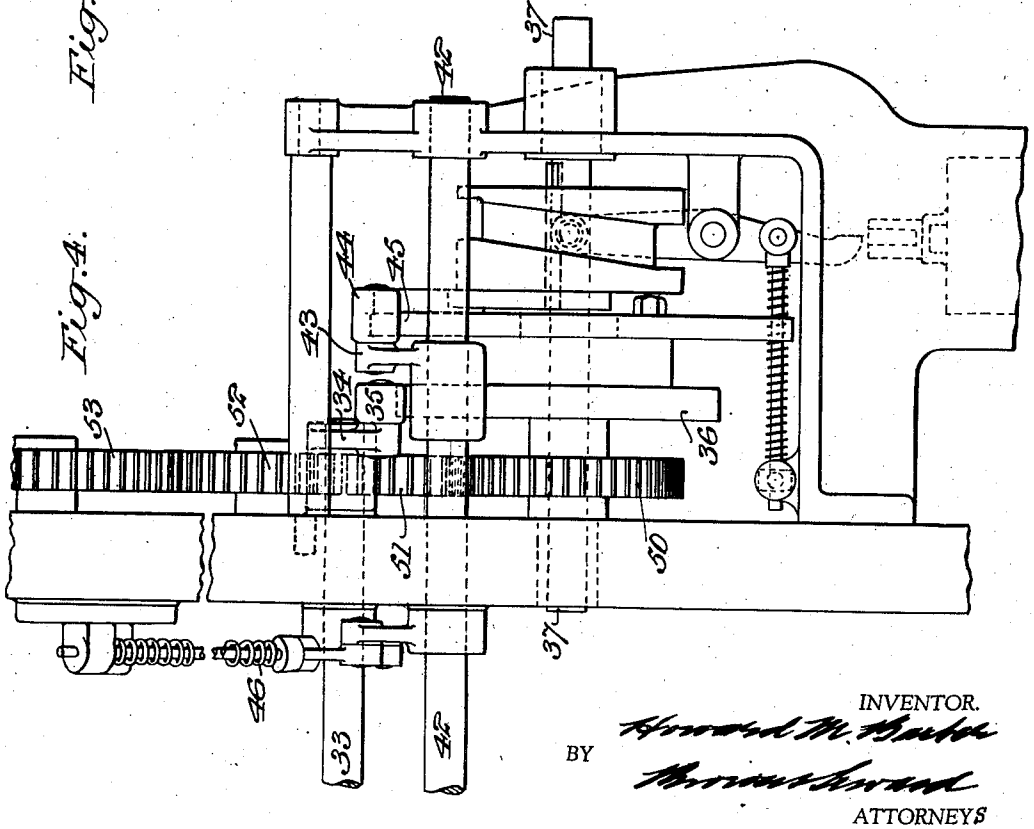


Fig. 4.

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DELIVERY MECHANISM FOR PRINTING PRESSES

Filed Nov. 14, 1935 4 Sheets-Sheet 4

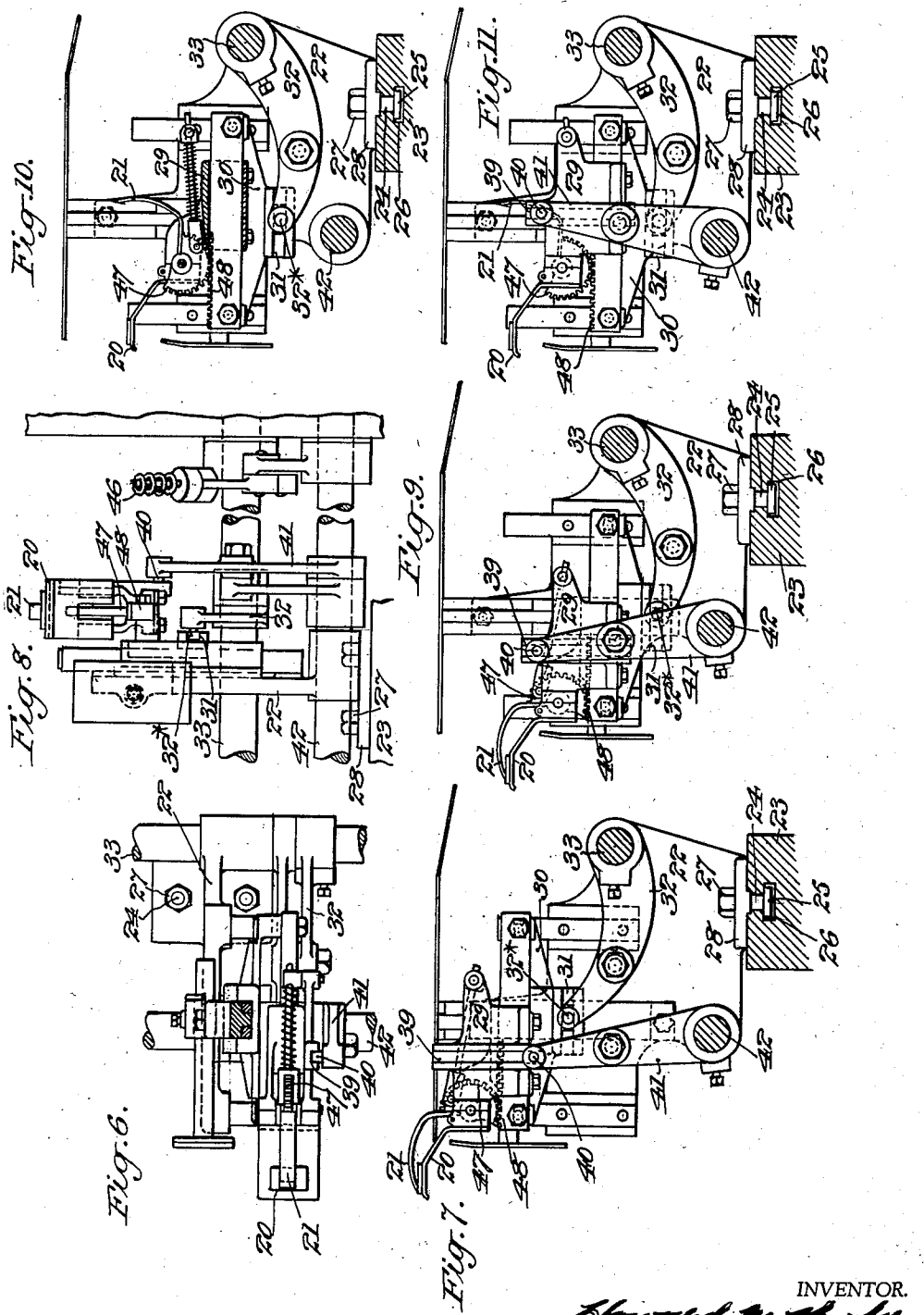


Fig. 10.

Fig. 11.

Fig. 8.

Fig. 9.

Fig. 6.

Fig. 7.

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BY Howard M. Barber

Brownell & Brownell

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Patented Sept. 14, 1937

2,093,228

UNITED STATES PATENT OFFICE

2,093,228

DELIVERY MECHANISM FOR PRINTING PRESSES

Howard M. Barber, Pawcatuck, Conn., assignor to C. B. Cottrell & Sons Company, Westerly, R. I., a corporation of Delaware

Application November 14, 1935, Serial No. 49,683

10 Claims. (Cl. 271—68)

My invention is directed to improvements in flat sheet deliveries for web printing presses and more particularly to novel means for operating the sheet tail end engaging devices whereby they are moved in an endless path and operated to successively grasp the tail end of a sheet, stop its travel and depress it below the path of its endless delivery carrier and then to release the tail end of the sheet after its supporting surface on the delivery carrier has moved out from under it, thereby permitting the sheet to drop onto its pile.

A practical embodiment of my invention is represented in the accompanying drawings in connection with a two pile flat sheet delivery for a rotary web printing press.

Figs. 1 and 1ª represent in diagram a side elevation of so much of the printing press and delivery as includes my invention.

Fig. 2 represents a detail side elevation, on a larger scale, of the gear trains connecting the inner and outer sets of sheet tail end engaging devices with each other and with their drive.

Fig. 3 represents a detail top plan view of the same.

Fig. 4 represents a detail end view, on a still larger scale, of the cam mechanism for controlling the movement and operation of the sheet tail end engaging devices.

Fig. 5 represents a detail side view of the same.

Fig. 6 represents a detail horizontal section showing one of the sheet tail end engaging devices and its adjacent parts.

Fig. 7 represents a detail vertical longitudinal section of the same.

Fig. 8 represents a detail end view of the same.

Fig. 9 represents a vertical longitudinal section of the same with the sheet tail end engaging device in a second position.

Fig. 10 represents a detail vertical longitudinal section of the same with the sheet tail end engaging device in a third position.

Fig. 11 represents a detail vertical longitudinal section in another plane showing the sheet tail end engaging device in the said third position.

Fig. 12 represents in diagram a side view showing the sheet tail end engaging device in full lines in one position, in dot and dash lines in a second position, in short dotted lines in a third position and in long dotted lines in a fourth position.

The rotary web printing press is herein shown as arranged to print in four colors on one side of the web, the impression cylinder being denoted by 1 and the form cylinders by 2, 3, 4, 5. The web is denoted by 6 and the sheets cut from the web are denoted by 7. The pair of rotary coacting cutters for severing the sheets from the web are denoted by 8, 9.

The inner horizontally disposed carrier 10 travels in an endless path and it is driven at the surface speed of the press.

The outer horizontally disposed carrier 11 travels in an endless path and it is driven at a surface speed somewhat in excess of the surface speed of the press and the inner endless carrier.

A rotary transfer carrier 12 is interposed between the outer end of the inner endless carrier 10 and the inner end of the outer endless carrier 11.

Side grippers 13 on the inner endless carrier 10 serve to advance a web through the coacting rotary cutters 8, 9 to the head grippers 14 on the rotary transfer carrier 12, which head grippers in turn transfer the sheets cut from the printed web to the head grippers 15 on the outer endless carrier 11.

A horizontally disposed delivery carrier 16 travels in an endless path around the inner and outer piles 17 and 18, which delivery carrier travels at the surface speed of the outer endless carrier 11. This endless delivery carrier 16 is provided with spaced sheet supporting surfaces 19 arranged in the travel of the carrier to pass between the outer endless carrier 11 and the tops of the piles 17 and 18.

The sheet tail end engaging devices are herein shown as tail grippers, the relatively fixed lower jaw of each gripper being denoted by 20 and the swinging upper jaw by 21. These tail grippers are moved in an endless path and operated to take the sheets from the endless delivery carrier 16 and deposit the sheets onto their respective piles.

A stationary bracket 22 is laterally adjustable along the cross frame bar 23 and it is locked in its lateral adjustment by providing uprising bolts 24 having their heads 25 slidable in an undercut groove 26 in the cross frame bar 23, said bolts being provided with clamp nuts 27 engaging the lateral base flanges 28 of the said stationary bracket 22.

The vertical and longitudinal movements of the tail grippers are provided for as follows:

The fixed and movable jaws 20 and 21 of the tail grippers are mounted on a block 29 which is fitted to slide outwardly and inwardly on another block 30 which is fitted to slide vertically on uprights of the bracket 22, which vertically slid-

ing block 30 has a horizontal channel 31 in which a stud or roller 32* on the free end of a lever arm 32 slides. This lever arm is fast on a rock shaft 33. Another lever arm 34 which is also fast on the rock shaft 33 is provided with a stud or roller 35 engaging the face of a lift cam 36 which is fast on a rotary cross shaft 37. Spring pressed means 38 serve to hold the stud or roller 35 in contact with its cam 36.

The longitudinally sliding block 29 has a vertical channel 39 in which a stud or roller 40 on the free end of an uprising lever arm 41 slides. This lever arm 41 is fast on a rock shaft 42. Another lever arm 43 which is also fast on the rock shaft 42 is provided with a stud or roller 44 engaging the face of a cam 45 fast on the before mentioned rotary cross shaft 37. Spring pressed means 46 serve to hold the stud or roller in contact with its cam 45.

The swinging movement of the movable jaw 21 of the tail grippers to open and close the grippers is provided for as follows:

The jaw 21 which is carried by the longitudinally movable block 29 is provided with a toothed segment 47 which meshes with a horizonally disposed rack bar 48 carried by the vertical movable block 30, so that as the block 29 is moved outwardly and inwardly the segment 47 is rolled along the rack bar 48, thereby rocking the movable jaw 21 to close and open the tail grippers.

It will be understood that while there may be as many tail grippers as desired it is only necessary to employ one cam 36 and its lever arm 34 and one cam 45 and its lever arm 43 for each set of several grippers, as the rock shafts 33 and 34 extend entirely across the machine and are provided with their necessary number of lever arms 32 and 41 respectively.

Where a double pile delivery is employed the inner and outer cam shafts 37 are each geared to a longitudinally disposed shaft 49 through a train of gears 50 to 59 inclusive. The shaft 49 is geared to the shaft 60 of the "speed-up" rotary carrier 12 through the train of gears 61 to 65 inclusive. This shaft 60 may be driven from the shaft 66 at the outer end of the inner endless carrier 10 through the gears 67, 68 to cause the rotary carrier 12 to travel at a considerably greater surface speed than that of the said endless carrier 10. The gear 64 is fast on the shaft 69 at the inner end of the outer endless carrier 11 so that this carrier is caused to travel at substantially the same surface speed as the rotary carrier 12. It will also be understood that the endless delivery carrier 16 may be driven at substantially the same surface speed as that of the endless carrier 11, by providing the gear 70 which is driven from the gear 64 through the gears 71 and 72.

Cams 73 and 74 are positioned to open alternate head grippers 15 on the outer endless carrier 11 as their sheets reach points over their respective inner and outer delivery piles 17 and 18.

In operation: As the printed web leaves the press it is engaged by successive side grippers 13 of the inner endless carrier 10 and advanced through the rotary cutters 8, 9 which sever the sheets 7 from the web. As the sheets are severed the head grippers 14 on the rotary carrier 12 grasp successive sheets, speed up their travel and transfer them to successive sets of head grippers 15 on the outer endless carrier 11. These head grippers 15 advance the sheets outwardly over the inner and outer piles, the sheets at the same time being supported by successive sheet supporting surfaces 19 of the endless delivery carrier 16, which surfaces travel along with and under the outer endless carrier 11.

The alternate head grippers 15 are opened by their respective cams 73 and 74 to release the leading ends of their respective sheets as the sheets reach positions over the inner and outer piles 17 and 18 respectively.

As the leading ends of the sheets are released by the grippers 15 the tail grippers which have been moved upwardly and outwardly through the spaces between the supporting surfaces 19 of the endless delivery carrier 16 are closed to grasp the tail ends of the sheets and stop their outward travel. The tail grippers while still grasping the tail ends of the sheets are then moved downwardly to points below the path of the said supporting surfaces of the endless delivery carrier, partway toward the tops of the piles. The tail grippers are caused to hold the sheets in this position until the supporting surfaces of the endless delivery carrier 16 have passed out from their respective sheets. The tail grippers are then started on their inward movement which will cause the grippers to open and release the rear ends of the sheets, thereby allowing the sheets to drop down onto their respective piles. After the tail grippers reach the limit of their inward movement they are moved upwardly and outwardly to complete their cycle of movement and operation.

While I have described the invention in connection with a double pile sheet delivery it is obvious that the cam mechanism can be successfully used to operate a single set of tail grippers for a single pile delivery. It will also be understood that while I have described a gear mechanism for operatively connecting the several parts any other suitable gear mechanism may be used for this purpose.

The delivery, except the tail grippers and their operating mechanisms, shown, described, but not claimed herein forms the subject matter of my copending application filed of even date herewith, its serial number being No. 49,684 which has matured into Patent No. 2,065,300, Dec. 22, 1936.

It is also evident that various changes may be resorted to in the construction, form and arrangement of the several parts without departing from the spirit and scope of my invention, and hence I do not intend to be limited to the particular embodiment herein shown and described, but what I claim is:

1. A sheet delivery comprising a delivery pile, a horizontally disposed traveling endless carrier having spaced sheet advancing devices, a second horizontally disposed traveling endless carrier located beneath the first named carrier and having spaced sheet supporting surfaces, a sheet tail end engaging device, and means for causing it to engage the tail end of the sheet, stop its travel and to release the sheet.

2. A sheet delivery comprising inner and outer delivery piles, a horizontally disposed traveling endless carrier having spaced sheet advancing devices, a second horizontally disposed traveling endless carrier located beneath the first named carrier and having spaced sheet supporting surfaces, sheet tail end engaging devices, and means for causing them to engage the tail ends of their respective sheets, stop their travel and to release the sheets.

3. A sheet delivery comprising a delivery pile, a horizontally disposed carrier traveling in an endless path above said pile and having spaced sheet advancing devices, a second horizontally

disposed carrier located beneath the first named carrier and traveling in an endless path around the delivery pile and having spaced sheet supporting surfaces, a sheet tail end engaging device, and means for causing it to engage the tail end of the sheet, stop its travel and to release the sheet.

4. A sheet delivery comprising a delivery pile, a horizontally disposed carrier traveling in an endless path above said pile and having spaced head grippers for advancing the sheets, a second horizontally disposed carrier located beneath the first named carrier and traveling in an endless path around the delivery pile and having spaced sheet supporting surfaces, tail grippers, and means for causing them to engage the tail end of the sheet, stop its travel and to release the sheet.

5. A sheet delivery comprising inner and outer delivery piles, a horizontally disposed carrier traveling in an endless path above said piles and having spaced sheet head grippers for advancing the sheets, a second horizontally disposed carrier located beneath the first named carrier and traveling in an endless path around the delivery piles and having spaced sheet supporting surfaces, tail grippers for each delivery pile, and means for causing them to engage the tail ends of their respective sheets, stop their travel and to release the sheets.

6. A gripper mechanism for sheet deliveries comprising a stationary support, a block slidable vertically thereon and having a longitudinally disposed rack bar, another block slidable longitudinally on the vertically slidable block, tail grippers comprising fixed and rocking jaws mounted on the longitudinally slidable block, the rocking jaw having a toothed segment meshing with the rack bar, and means for moving the respective blocks vertically and longitudinally, to cause the tail grippers to be moved bodily and operate to grasp and release the sheet.

7. A gripper mechanism for sheet deliveries comprising a stationary support, a block slidable vertically thereon and having a longitudinally disposed rack bar, another block slidable longitudinally on the vertically slidable block, tail grippers comprising fixed and rocking jaws mounted on the longitudinally slidable block, the rocking jaw having a toothed segment meshing with the rack bar and two rotary cams operable to move their respective blocks vertically and longitudinally, to cause the tail grippers to be moved bodily and operate to grasp and release the sheet.

8. A gripper mechanism for sheet deliveries comprising a stationary support, a block slidable vertically thereon and having a longitudinally disposed rack bar, another block slidable longitudinally on the vertically slidable block, tail grippers comprising fixed and rocking jaws mounted on the longitudinally slidable block, the rocking jaw having a toothed segment meshing with the rack bar and two coaxially mounted rotary cams operable to move their respective blocks vertically and longitudinally, to cause the tail grippers to be moved bodily and operate to grasp and release the sheet.

9. A gripper mechanism for sheet deliveries comprising a stationary support, a block slidable vertically thereon and having a longitudinally disposed rack bar, another block slidable longitudinally on the vertically slidable block, tail grippers comprising fixed and rocking jaws mounted on the longitudinally slidable block, the rocking jaw having a toothed segment meshing with the rack bar, and two rotary cams operating to move their respective blocks vertically and longitudinally, to cause the tail grippers to be moved bodily and operate to grasp and release the sheet.

10. A gripper mechanism for sheet deliveries comprising a stationary support, a block having a longitudinally disposed rack bar, a rotary cam, a rock lever operated thereby for moving the block vertically, a second block, a second rotary cam, a rock lever operated thereby for sliding the second block longitudinally on the first named block, and tail grippers comprising fixed and rocking jaws mounted on the longitudinally slidable block, the rocking jaw having a toothed segment meshing with the rack bar whereby the tail grippers are bodily moved and operated to grasp and release the sheet.

HOWARD M. BARBER.