

Dec. 30, 1952

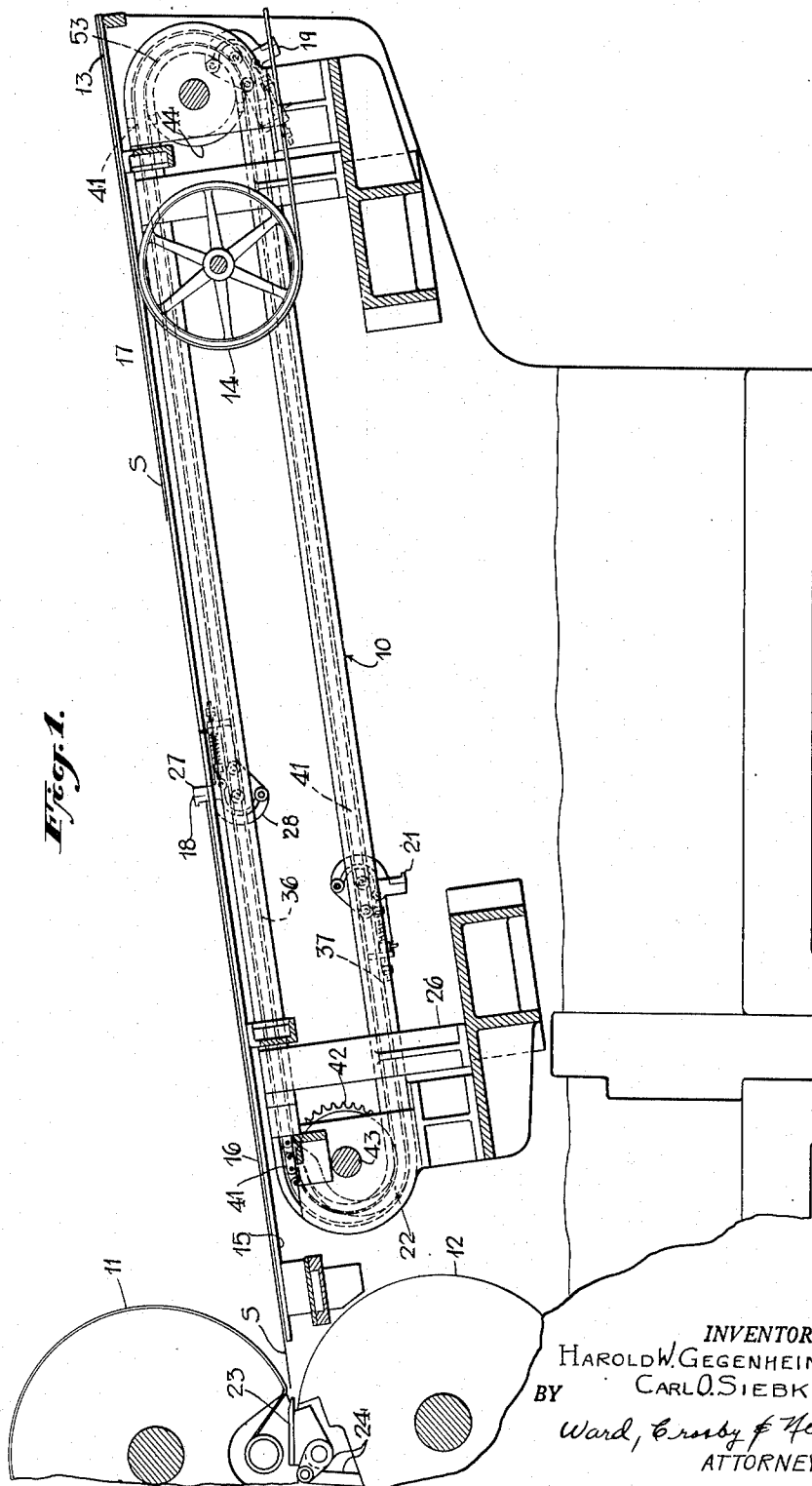
H. W. GEGENHEIMER ET AL

2,623,746

SHEET FEEDING APPARATUS

Filed April 4, 1949

3 Sheets-Sheet 1



Dec. 30, 1952

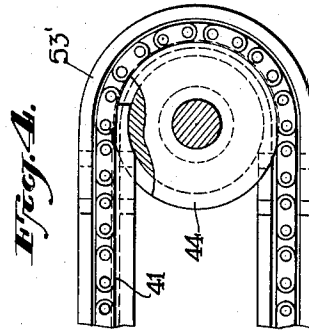
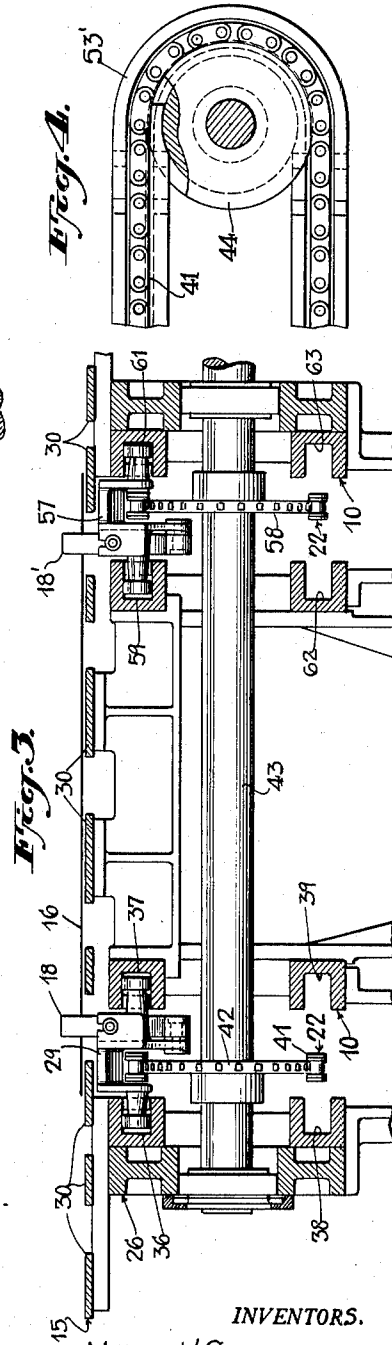
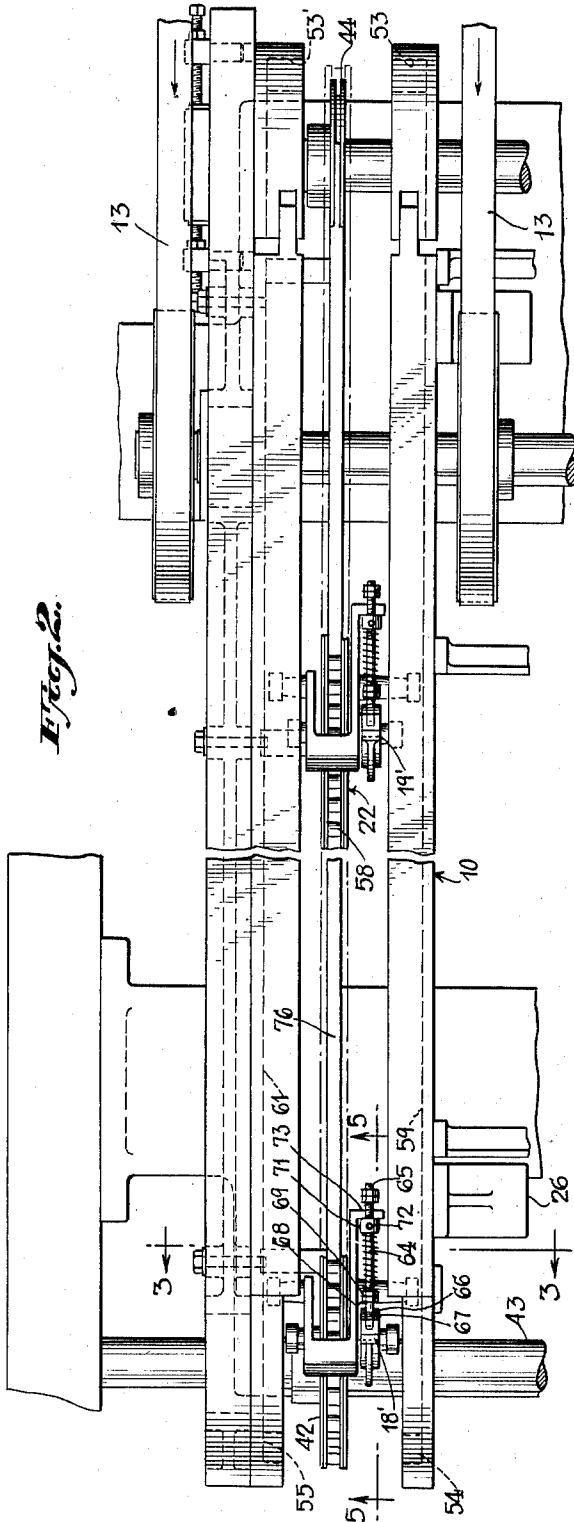
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SHEET FEEDING APPARATUS

Filed April 4, 1949

3 Sheets-Sheet 2



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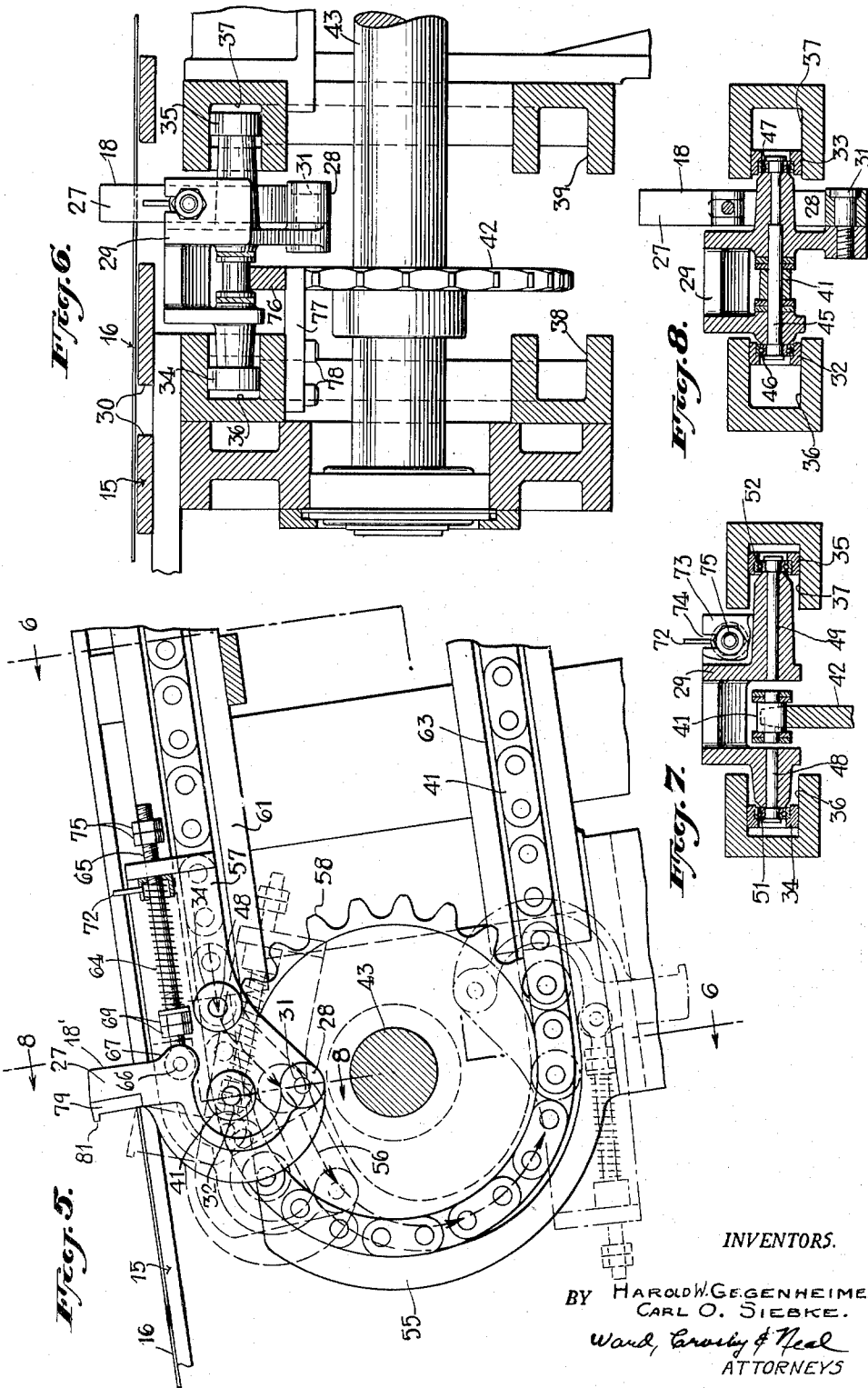
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SHEET FEEDING APPARATUS

Filed April 4, 1949

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,623,746

SHEET FEEDING APPARATUS

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Application April 4, 1949, Serial No. 85,438

3 Claims. (Cl. 271-45)

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This invention relates to an assembly for automatically feeding sheets of material in successive order to a pair of printing cylinders of a printing press.

In feeding sheets to the printing cylinders where the cylinders are rotated at predetermined speeds, it is desirable that the sheets be fed at a rate of speed slightly less than the surface speed of the cylinders rather than at a rate faster than the surface speed of the cylinders in order not to distort the sheets when they are engaged by the cylinders. To afford additional protection against distortion of the sheets during an automatic and continuous feeding operation, the means employed to move the sheets to the cylinders should be disengaged therefrom as the sheets become engaged by the cylinders. It further is desirable in feeding sheets to the printing cylinders to accurately guide them in their movement toward the cylinders in order that they may be properly positioned between them during the printing operation, thus insuring uniform printing characteristics on each sheet. In order to provide maximum operational efficiency for the printing press, the feeding assembly therefor should be constructed and designed, as well as controlled, in such a manner as to move the sheets to the cylinders in predetermined successive order.

The present invention accordingly aims primarily to provide a new and improved feeding assembly which will perform the above-described operations efficiently and satisfactorily and which will also be economical to manufacture and both reliable and durable in use. Further objects and advantages of the invention will be in part obvious and in part specifically pointed out in the description hereinafter contained which, taken in conjunction with the accompanying drawings, discloses a preferred form of feeding assembly constructed to operate in accordance with the invention; the disclosure, however, should be considered as merely illustrative of the invention in its broader aspects.

In the drawings:

Fig. 1 is a reduced side elevation partly in section showing the feeding assembly of the present invention disposed for use intermediate a belt conveyor and a pair of printing cylinders of a printing press;

Fig. 2 is a fragmentary top plan view of one side of a feeding assembly constructed in accordance with the preferred form of the invention;

Fig. 3 is a view in transverse section of the com-

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plete assembly taken substantially along the line 3-3 of Fig. 2;

Fig. 4 is a side elevation of the rear end of one of the driving means employed in the feeding assembly;

Fig. 5 is a view in section taken substantially along the line 5-5 of Fig. 2 showing one of the sheet engaging fingers in different moved positions;

Fig. 6 is a sectional view taken substantially along the line 6-6 of Fig. 5 and showing the left side of the feeding assembly;

Fig. 7 is a horizontal sectional view through a finger supporting member; and

Fig. 8 is a horizontal sectional view taken substantially along the line 8-8 of Fig. 5 and showing certain further details of construction of the finger supporting member.

The present invention is preferably adapted for feeding to a pair of printing cylinders sheets of relatively stiff material and in accordance with the invention, two series of sheet engaging fingers are provided on respectively opposite sides of a supporting structure which is adapted to receive the sheets of material in successive order and along which the sheets are to be urged by corresponding fingers of the two series successively. The feed fingers are guided along an upper plane during their feed travel and along a lower plane during their return travel. At the end of the feed travel and after the forward edge of the sheet has come into engagement between the pair of cylinders, the active feed fingers are retracted from feed engagement with the rear edge of the sheet.

Referring now to the drawings, Fig. 1 illustrates in generally schematic form the manner in which the feeding assembly of the present invention may be employed, the feeding assembly being generally indicated at 10 and being disposed intermediate a pair of printing cylinders and a belt conveyor. The printing cylinders are arranged in the usual fashion with the blanket cylinder 11 being positioned above the impression cylinder 12. Suitable means are provided for delivering sheets successively to the supporting shelf or feed table 15. For example, a conveyor may be used which comprises a belt indicated at 13 and an idler wheel 14 about which the belt rotates disposed beneath the inclined sheet supporting shelf such that as the sheets of material to be printed, indicated at 16 and 17, move along with the belt 13, they will be deposited upon the inclined supporting shelf. The sheet engaging fingers are indicated at 18, 19

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and 21 (the corresponding opposite fingers not being shown in this view) and are supported on and driven by a sprocket chain drive indicated at 22, the rear end of which is positioned beneath the forward end of the belt conveyor whereby as the sheet 17, for example, is deposited on the supporting shelf, finger 19 and its corresponding opposite finger (not shown) will engage the rear edge thereof to urge the sheet along the supporting shelf as the fingers are driven forwardly.

The impression cylinder 12 is provided with a finger 23 suitably biased as by the linkage 24 and is adapted to engage the forward edge of the sheets as they are moved to the cylinders and after this occurs and during the movement of the fingers about the forward end of the chain drive, the fingers will be disengaged from the rear edges of the sheets in a manner to be described in detail hereinafter. Although we have shown a belt conveyor as the means by which sheets may be placed upon the supporting shelf in successive order, it readily will be understood that this has been done merely for the purpose of illustrating the invention and that any suitable means may be used for this purpose so long as the sheets are deposited upon the shelf in timed relation with respect to the movement of the fingers.

With the foregoing general description in mind, the detailed description of the various parts and their inter-relation which follows will be better understood.

Referring now to Figs. 2 through 8 of the drawings, the various elements of the feeding assembly will be described in detail. As can best be seen from Fig. 1, fingers 18, 19 and 21 extend adjacent one side of the shelf 15 which is carried on a supporting structure indicated generally at 26, Fig. 3, the feed shelf 15 in the present embodiment having a smooth inclined top surface constituted by spaced plates such as 30. A second series of fingers, such as 18' and 19', extend along the opposite side of the supporting structure. Since each finger is constructed in precisely the same manner, it, therefore, will only be necessary in describing the construction thereof to do so with reference to finger 18. Each finger comprises a straight upper portion 27, Fig. 5, adapted to engage the rear edge of a sheet of material and a lower portion 28 of generally semi-circular construction, pivotally mounted on a carriage body member 29 as by a stepped screw 31. Rolling action of the finger carriage is provided by a pair of front wheels 32 and 33, Fig. 8, and a pair of rear wheels 34 and 35, Fig. 7, the gauge of which is greater than that of the front wheels.

To guide the movement of the carriage, a pair of upper tracks 36 and 37 and a pair of lower tracks 38 and 39 are mounted on the supporting structure and extend substantially from adjacent one extremity of the inclined top surface of the supporting structure to the other, the upper and lower tracks being so constructed and arranged as to receive therein both the narrow gauge front wheels and wider gauge rear wheels of the carriage. To move the carriage along the upper and lower tracks, we have provided the chain drive 22 comprising an endless sprocket chain 41 movable through a substantially horizontal loop and adapted to mesh with a driving sprocket wheel 42 keyed to a shaft 43, the rear end of the sprocket chain passing over an idler 44.

The front wheels 32 and 33 of the carriage are

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mounted for rotation about a pin 45 and roller bearings 46 and 47 disposed at the extremities thereof, the pin extending through one link of the sprocket chain 41 in order that the carriage may be driven by the chain. The rear wheels 34 and 35 are mounted for rotation about stub or half axles 48 and 49 and roller bearings 51 and 52 disposed at the extremities thereof, it being noted that no direct connection between the rear wheels and the sprocket chain is provided. Since the carriage follows the movement of the sprocket chain, it is necessary to provide at the front and rear ends of the upper and lower tracks means by which the carriage may be transferred therebetween and for this purpose, we provide at the rear end of the upper and lower tracks supplemental tracks, such as 53 and 53', shown in Fig. 2, which are substantially semi-circular in form and are adapted to receive both the front and rear wheels of the carriage in transferring the carriage from the lower track to the upper track.

It will be understood, of course, from a consideration of Fig. 3 of the drawings that fingers 18' and 19' of the oppositely disposed series are mounted on carriages, indicated at 57, constructed in the same manner as that heretofore described and that the carriages are adapted to be driven by another sprocket chain 58 within upper tracks 59 and 61 and lower tracks 62 and 63. It further will be understood, of course, that supplemental tracks, such as those shown in Fig. 2, are provided for the carriages 29 at the rear end of the sprocket chain.

Referring now to Figs. 2 and 5 of the drawings, we have provided at the forward end of the upper and lower tracks a pair of cams 54 and 55 serving to connect the upper tracks 59 and 61 with the corresponding lower tracks 62 and 63, similar cams being positioned to interconnect the other pairs of tracks. It will be noted, however, that these cams are positioned in the path of movement of the rear wheels only of the carriage and that the front wheels thereof during the transfer of the carriage from the forward end of the upper tracks to the forward end of the lower tracks remain free of any guiding surface since they are keyed to the sprocket chain. Cams 54 and 55 are so constructed that as the rear wheels of the carriage are received therein, as seen in Fig. 5, they will engage the cam grooves of the cams 54 and 55 and will be directed downwardly immediately, thus causing the carriage and its associated finger to tilt rearwardly, as shown in dashed outline in Fig. 5, the effect of which is to disengage the finger from the rear edge of the sheet being moved to the printing cylinders. Stated another way, as the carriage reaches the forward extremity of the upper tracks and is transferred to the lower tracks, the front wheels thereof travel around the sprocket wheel in a path concentric with the shaft 43. The rear wheels of the carriage, however, enter the grooves in the cams 54 and 55 which cause them to move in a path which is non-concentric with and nearer to shaft 43, which path is indicated by the series of arrows 56. The non-concentric motion of the rear wheels in the cams ceases, however, before the front wheels enter the lower tracks such that the carriage will be restored to its normal sheet engaging position, shown in dot-dash outline in Fig. 5, when the front wheels enter the lower tracks. The disengagement of the fingers from the sheets during the transfer from the upper to the lower track, after the sheets are engaged by

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the cylinders, obviates any distortion of the sheets which might otherwise result from the fact that the fingers tend to speed up during their movement from one track to the other.

In operation, the fingers are moved at a speed which is slightly less than the surface speed of the printing cylinders in order that the sheets upon entering the cylinders will not be distorted by the forward movement of the fingers. In order to provide for position adjustment and to allow some resiliency or cushioning of the feed finger engagement with the sheets, we employ with each finger a helical compression spring, such as 64 (Fig. 2) which is positioned between the free end of the finger and the carriage body, the spring being disposed about a threaded member 65 having its forward end pivotally secured to the finger by means of a pin 66 which extends through the threaded member and through ears 67 and 68 formed on the finger. The spring 64 surrounds the member 65 and the forward end of the spring abuts against a nut 69 adjustably secured thereon while the rear end thereof is received in a cup member 71 having a pin 72 associated therewith for convenience in removing the spring. The carriage 29 is provided with a flange 73 having a recess 74 therein adapted to receive the rear end of the threaded member 65, the cup member 71 being disposed forwardly of the flange. The forward movement of the finger under the influence of spring 64 may be controlled by means of locking nuts 75 positioned on the threaded member rearwardly of the flange 73 such that if the nuts 75 are initially positioned on the threaded member close to the flange, the forward movement of the finger under the influence of the spring is lessened while if the nuts are positioned on the threaded member farther away from the flange, the finger may be moved forwardly by the spring a greater distance.

It will be understood that each of the fingers is positioned on its respective chain in predetermined spaced relation in order to allow sheets of varying lengths to be fed by the assembly to the cylinders but the fact that sheets may be of varying lengths in no way affect the continuous operation of the feeding assembly so long as the sheets are received on the supporting structure in proper time relation to allow the fingers to successively engage the rear edges of the sheets as they are received. It further will be understood, of course, that the fingers are positioned on their respective chains in such a manner that one finger on each chain will be in transverse alignment with the corresponding finger of the other, thus preventing any out-of-phase movement by one finger with respect to the corresponding other finger which might otherwise tend to tilt the sheet sideways as it is fed to the cylinder.

Referring now to Fig. 6 of the drawings, we have provided a longitudinally extending bar 76 positioned beneath the upper loop of the sprocket chain and supported by a plate member 77 secured to the upper track 59 as by bolts 78. This bar 76 serves as a support for the sprocket chain while it is passing through the upper loop of its endless motion and prevents any sagging thereof which might otherwise cause the fingers driven thereby to sag sufficiently to become disengaged from the sheets. To further insure, however, the continued engagement of the fingers with the sheets, we have provided an insert 79 on the fingers having a flange 81 formed at the upper

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end thereof which is adapted to be positioned over the sheets during engagement therewith by the fingers.

While the invention has been described in particularity with reference to the preferred form thereof, it readily will be apparent to those skilled in the art after understanding the invention that further modifications and changes may be made therein without departing from the spirit and scope thereof, as defined by the claims appended hereto.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. In a printing press having a pair of driven printing cylinders and a feed shelf along which sheets to be printed are fed to the printing cylinders, the combination of, fingers adjacent respectively opposite sides of the shelf for engaging the rear edges of the sheets to be printed and urging them toward the printing cylinders, carriage members for each finger including a pair of front and rear wheels with the latter being spaced farther apart than the former, upper and lower tracks adjacent respectively opposite sides of the shelf within which said wheels move, driving means associated with each upper and lower track for moving the carriage members therein and for transferring the carriage members therebetween, and a pair of cams respectively positioned in the path of movement of the rear wheels of said carriage members at the forward end of the tracks to first position the fingers carried by the carriage members out of engagement with the rear edges of the sheets during the transfer from the upper track to the lower track and after the sheets are engaged by the printing cylinders and for subsequently inverting said fingers.

2. In a printing press having a driven printing cylinder and a feed shelf along which sheets to be printed are fed to the printing cylinder, the combination of, a finger extending above said shelf for engaging the rear edges of the sheets to be printed and for urging them toward the printing cylinder, a carriage member for said finger including a pair of front and rear wheels with the latter being spaced farther apart than the former, upper and lower tracks mounted adjacent said shelf and within which said wheels move, driving means associated with each upper and lower track for moving said carriage member and for transferring the carriage member therebetween, and a cam respectively positioned in the path of movement of the rear wheels of said carriage member at the forward end of said tracks to first position the finger carried by the carriage member out of engagement with the rear edge of a sheet during the transfer from the upper track to the lower track and after the sheets are engaged by the printing cylinder and for subsequently inverting said finger.

3. In a printing press having a driven printing cylinder and a feed shelf along which sheets to be printed are fed to the printing cylinder, the combination of, a finger extending above said shelf for engaging the rear edges of the sheets to be printed and for urging them toward the printing cylinder, a carriage member for said finger including a pair of front and a pair of rear wheels, one of said pairs of wheels being spaced farther apart than the other, upper and lower tracks mounted adjacent said shelf and within which said wheels move, driving means associated with each upper and lower track for moving said carriage member and for transfer-

ring the carriage member therebetween, and a cam respectively positioned in the path of movement of one of said pairs of wheels of said carriage member at the forward end of said tracks to first position the finger carried by the carriage member out of engagement with the rear edge of a sheet during the transfer from the upper track to the lower track and after the sheets are engaged by the printing cylinder and for subsequently inverting said finger.

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