No. 752,383. PATENTED FEB. 16, 1904.

T. C. DEXTER.

SHEET CONVEYING MACHINE.

APPLICATION FILED OCT. 25, 1902.

NO MODEL. 5 SHEETS—SHEET 1.

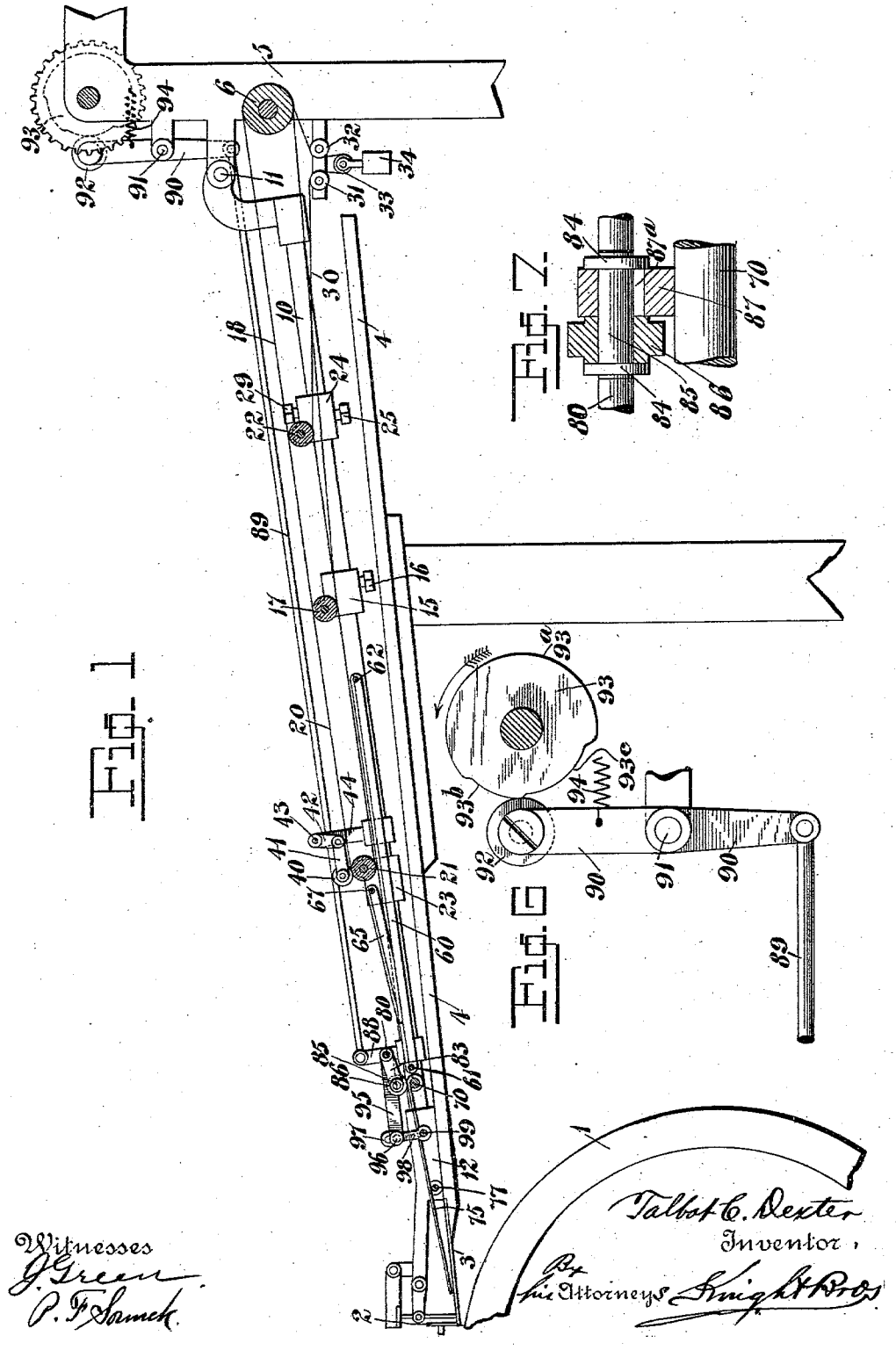

FIG. 1.

FIG. 7.

FIG. 6.

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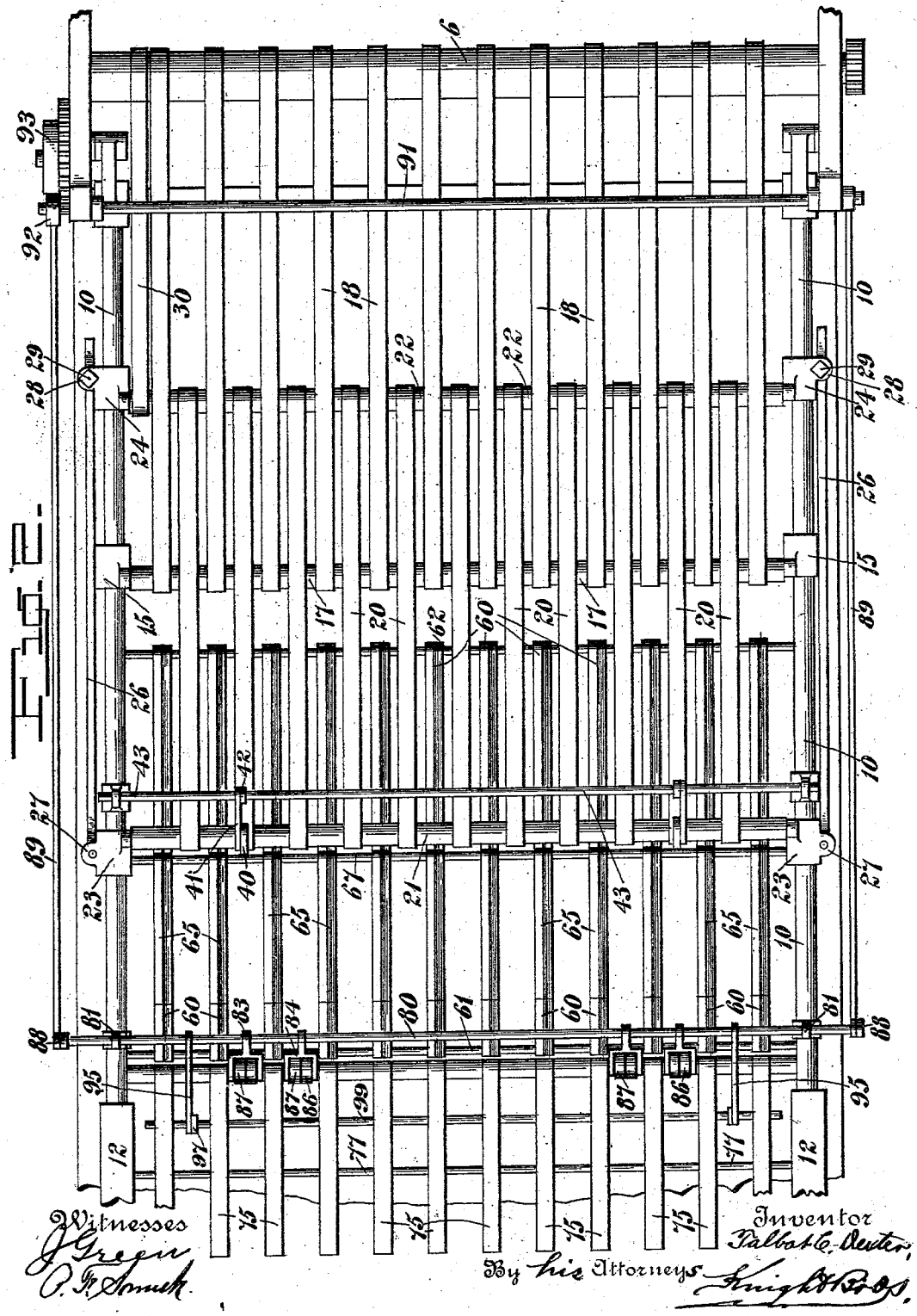
NO MODEL. 5 SHEETS—SHEET 2.



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NO MODEL. 5 SHEETS—SHEET 3.

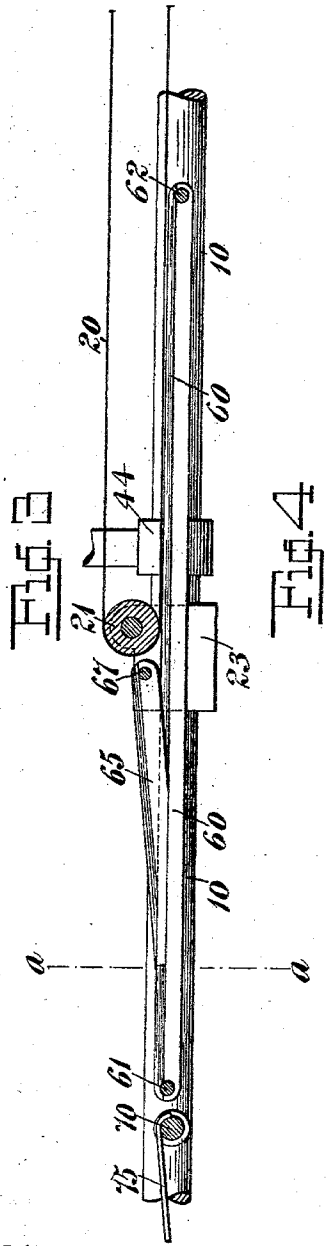

Fig. 3.

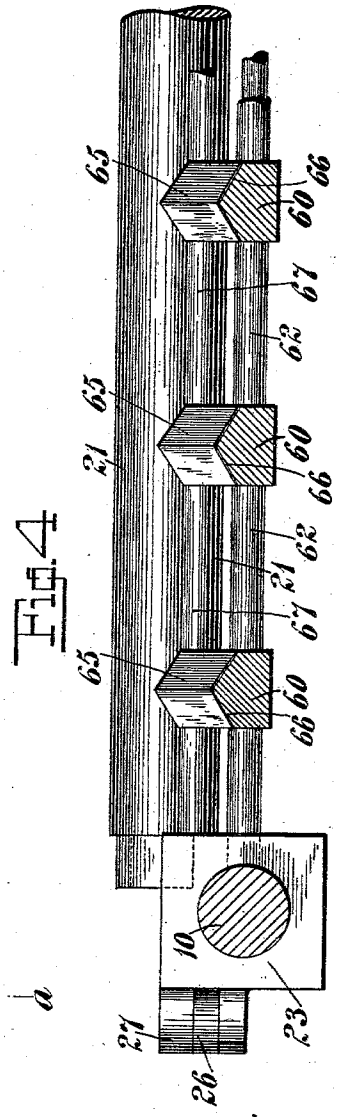

Fig. 4.

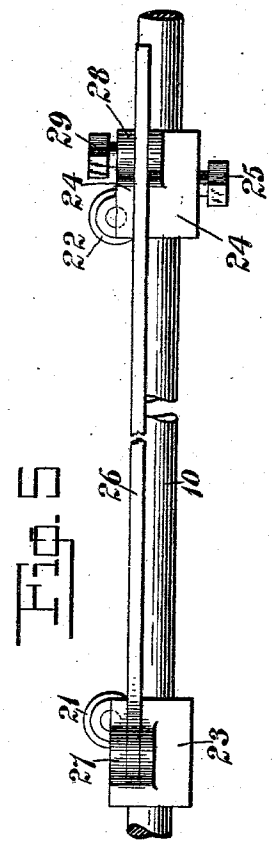

Fig. 5.

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NO MODEL. 5 SHEETS—SHEET 4.

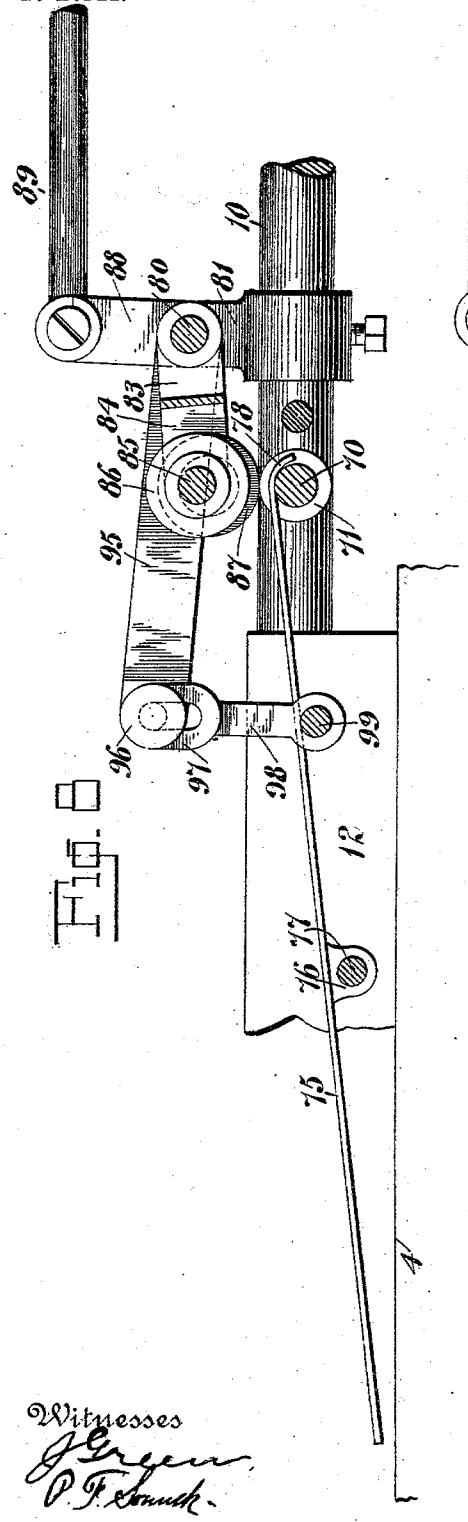

Fig. 5.

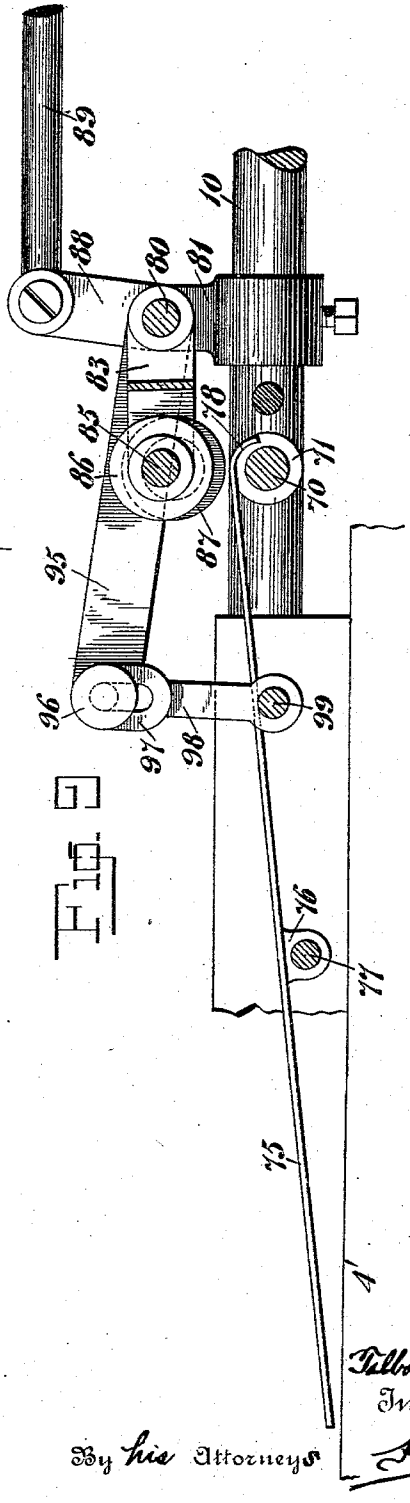

Fig. 6.

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NO MODEL. 5 SHEETS—SHEET 5.

Fig. 10

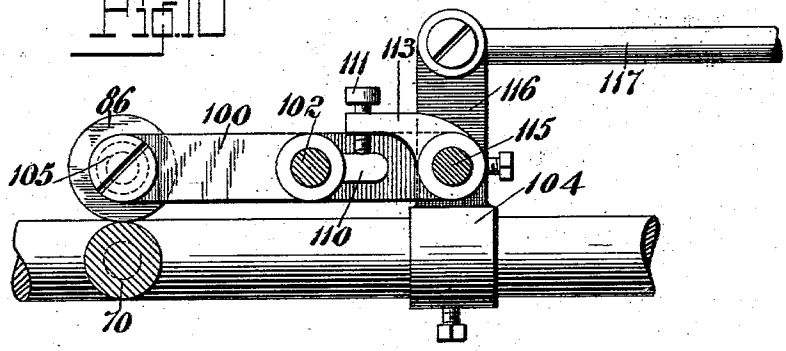


Fig. 11.

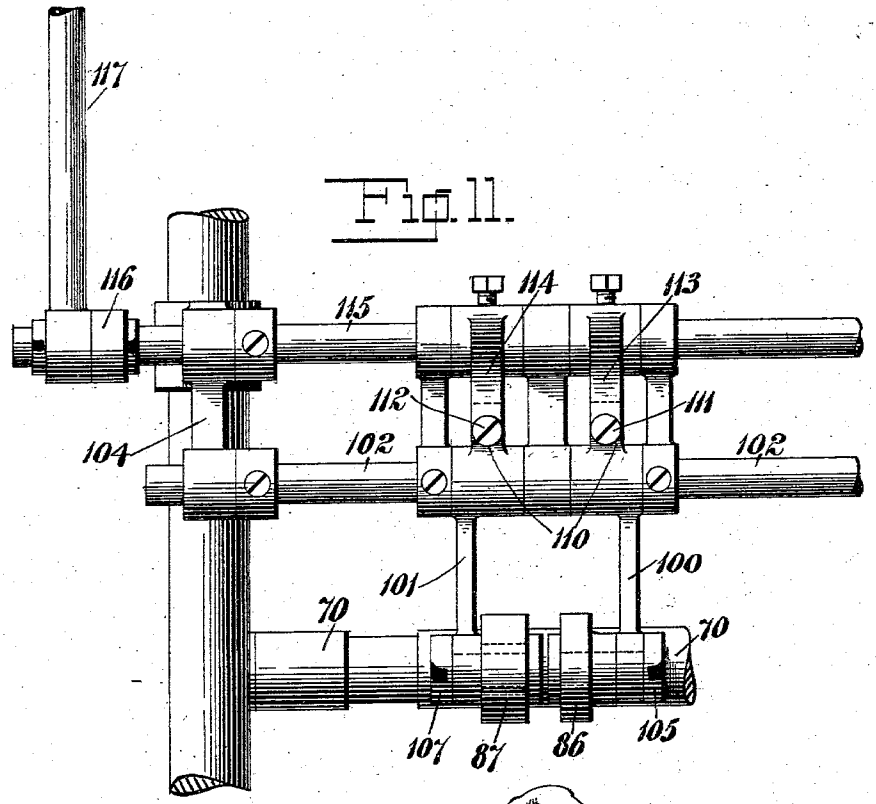
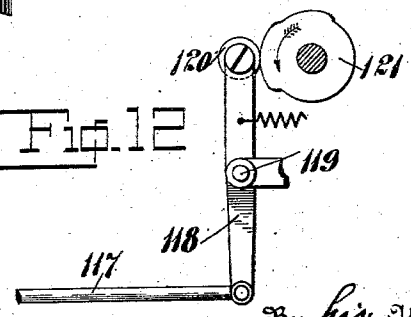


Fig. 12



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UNITED STATES PATENT OFFICE.

TALBOT C. DEXTER, OF PEARL RIVER, NEW YORK.

SHEET-CONVEYING MACHINE.

SPECIFICATION forming part of Letters Patent No. 752,383, dated February 16, 1904.

Application filed October 25, 1902. Serial No. 128,715. (No model.)

To all whom it may concern:

Be it known that I, TALBOT C. DEXTER, a citizen of the United States, residing at Pearl River, in the county of Rockland and State of New York, have invented certain new and useful Improvements in Sheet-Conveying Machines, of which the following is a specification.

The present invention relates to improvements in sheet-feeding mechanism for conveying successive sheets of paper from an automatic paper-feeding machine to a printing-press, folding-machine, ruling-machine, or other machine designed to operate upon sheets of paper.

The object of my invention is to provide an improved construction of such sheet-conveying mechanism which can readily be adjusted to suit different sizes of sheets which are to be fed to the press or other machine and which has adjustable means for regulating the feed of the successive sheets into registered position against the front guides of the press or other machine.

Considerable difficulty has been experienced with mechanical feeding mechanisms for feeding sheets to printing-presses and other machines from the tendency of the machines to crowd the sheets against the front gages. In feeding sheets by hand the successive sheets are gently laid against the front gages without any tendency to crowd them forward. This gentle action of the hand-feeder is exactly what is required in feeding sheets to a press and is what has been aimed at in the improvements which have been made in such mechanical feeding devices, since it is very important to have the registered sheets entirely relieved of any pressing forward during the interval which elapses between the raising of the front gages and the clamping of the registered edge of the sheet by the grippers on the impression-cylinder of the press.

My present invention is designed to imitate as nearly as practicable the operation of feeding sheets by hand. In accomplishing this object I provide the sheet-conveyer, having adjustable sheet-carrying belts or tapes for taking the successive sheets from the feeding-machine, with a series of rods or bars arranged in a lower plane than the sheet-carrying tapes and adapted to receive the sheets from said tapes and a roller-feed mechanism between said sheet-supporting rods or bars and the registering-gages, said roller-feed mechanism consisting of two or more pairs of automatically-operated drop-rollers coöperating with a constantly-driven under feed-roller. The drop-rollers are controlled by suitable cam mechanism, so that during the main part of the feeding operation both rollers of each pair of drop-rollers will be in operative engagement with the sheet over the under feed-roller, while during another part of the operation one roller of each pair will be raised into inoperative position, and the other roller of each pair will continue to operate, and during a third part of the operation both rollers will be elevated into inoperative position. In addition to this improved roller-feed mechanism and the sheet-supporting rods or bars I provide a second series of pivotally-mounted rods or bars between the roller-feed and register gages with suitable controlling devices arranged to elevate said rods or bars the moment the sheet reaches register position for relieving the sheet of the action of the lower feed-roller. These plates or bars are in practice connected with the controlling mechanism of the drop-rollers, so that the sheet is raised away from the lower feed-roller at the same instant that the drop-rollers are raised into inoperative position.

I prefer to construct each pair of drop-rollers of a heavy metal roller snugly mounted upon its supporting shaft or journal and a wooden roller mounted alongside the metal roller, but formed with a journal-opening of considerable larger diameter than the supporting shaft or journal, so that the first lift of the drop-rollers away from the under feed-roller will raise the metal roller into inoperative position and allow the wooden roller to remain in frictional contact with the sheet which is passing over the under feed-roller. The second lift of the drop-rollers will raise the wooden roller into inoperative position.

The sheet-supporting rods or bars which receive the sheets from the sheet-carrying tapes are preferably made of wood with angular upper faces to afford the least possible

resistance to the passage of the sheets. The delivery-roller of the sheet-carrying tapes from which the sheets drop to the said supporting rods or bars is made adjustable toward and away from the registering-gages, and to reduce the fall of the sheets from the said delivery-roller (which fall is for the purpose of allowing the leading edge of each sheet to overlap the rear edge of the sheet which precedes it to facilitate rapid feeding) I provide a series of inclined transfer bars or fingers which are pivotally mounted upon the delivery roller-carriage and are formed with grooved under faces to enable them to fit snugly and slide upon the angular upper faces of the main sheet-supporting rods or bars. These transfer bars or fingers have the same angular upper faces as the main sheet-supporting rods or bars. The adjustment of the delivery-roller of the sheet-carrying tapes also causes the transfer bars or fingers to move longitudinally upon the sheet-supporting rods or bars.

In order that my invention may be fully understood, I will first describe the same with reference to the accompanying drawings and afterward point out the novelty more particularly in the annexed claims.

In said drawings, Figure 1 is a detail side elevation of my improved sheet feeding or conveying mechanism. Fig. 2 is a plan view of the same. Fig. 3 is a detail longitudinal sectional view of part of the same. Fig. 4 is detail transverse sectional view taken on the section line *a a* of Fig. 3. Fig. 5 is a detail elevation showing the connected carriages of the second set of sheet-conveying tapes. Fig. 6 is a detail elevation of the drop-roller-operating mechanism. Fig. 7 is a detail sectional view of one pair of drop-rollers. Figs. 8 and 9 are detail longitudinal sectional elevations of the drop-roller feed mechanism, showing the parts in two positions. Fig. 10 is a detail side view, partly in section, of a modified form of the drop-roller feed mechanism. Fig. 11 is a detail plan view of the same. Fig. 12 is a detail view of the cam mechanism for operating the modified form of drop-roller mechanism shown in Figs. 10 and 11.

1 represents the impression-cylinder, 2 the front gage, 3 the under guides, and 4 the feed-board, of a printing-press.

5 represents part of the frame of an automatic paper-feeding machine.

6 is the feeding-machine tape-roller, driven by a part of the feeding-machine in a manner well understood.

10 represents the side bars of the frame, which support the sheet-conveying mechanism, which carries the successive sheets from the feeding-machine to the printing-press or other machine. These bars 10 are pivotally mounted upon the feeding-machine frame at 11 and carry upon their forward ends the side brackets 12, upon which are mounted the side registering mechanism (not shown) and the press-controlling devices, which are partly indicated, but not described in detail, since they do not form any part of my present invention. These side brackets 12 rest upon the feed-board 4 and also carry the metal plates or bars 75, which form an incline leading from the delivery-roller 70 to the gage end of the feed-board.

15 indicates one of a pair of adjustable brackets or carriages, which are mounted upon the side bars 10 and are provided with set-screws 16 for clamping them in the desired adjusted position upon the side bars. Freely journaled in these brackets or carriages 15 and extending from side to side of the machine is a tape-roller 17. The receiving conveyer-tapes 18 pass around the feeder tape-roller 6 and the tape-roller 17. A second set of adjustable sheet-carrying tapes is provided for transferring sheets from the receiving-tapes 18 to the sheet-supporting rods or bars hereinafter referred to. This second set of tapes 20 is supported on tape-rollers 21 and 22, which are freely journaled, respectively, in the adjustable pairs of brackets or carriages 23 and 24. These brackets or carriages 23 and 24 are mounted upon the side bars 10 of the conveyer-frame, set-screws 25 being threaded into the carriages 23 to engage the side bars 10 and hold the said carriages in the desired adjusted position. Connecting-bars 26 are pivotally mounted upon the ears 27 of carriages 23 and adjustably held in sockets 28 by set-screws 29 upon the carriages 24. By adjusting the carriages 24 upon connecting-rods 26 the tape-roller 22 can be moved toward or away from the tape-roller 21 for loosening or tightening the tapes 20. By means of the adjusting-screw 25 both sets of carriages 23 24 can be adjusted in the plane of feed by sliding upon the side bars 10. This adjustment is for the purpose of bringing the delivery tape-roller 21 nearer to or farther from the registering-gages of the press or other machine to which the conveying mechanism is applied.

The tapes 20 are driven by means of a band or tape 30, passing around the roller 22 and roller 6, the intermediate pulleys 31 32, and belt-tightening pulley 33, carrying the weight 34. The upper carrying portion of tapes 20 is in the same plane as the carrying portion of tapes 18, and the tape-roller 22 is arranged between tape-rollers 6 and 17, so that tapes 20 are interlapped with tapes 18 and can be adjusted in the plane of feed without interfering with the feeding relation between the tapes.

Friction-rollers 40 are journaled in the free ends of pivoted arms 41, mounted on rock-arms 42, depending from an adjustable shaft 43, which is mounted in bracket-arms 44, extending up from the side bars 10. These friction-rollers 40 are arranged above the delivery tape-roller 21 to confine the sheets thereon

as they pass from the second set of tapes 20 to the supporting rods or bars, which will presently be explained. By adjusting the shaft 43 the friction-rollers 40 may be moved forwardly or backwardly upon the tape-roller 21 to cause the leading edge of the sheets to be deflected more or less toward the rods or bars upon which they are deposited.

Parallel sheet-supporting bars 60 are mounted at their opposite ends upon transverse rods 61 62, which are secured between the side bars 10 of the conveyer-frame. These main sheet-supporting bars 60 are formed with angular upper faces, as shown in Fig. 4, and they rest in a plane lower than the feeding plane of the sheet-carrying tapes 18 and 20 and extend from a point a little in front of the tape-roller 17 to a point a little beyond the limit of forward adjustment of the delivery-roller 21 of the second set of tapes 20. These sheet-supporting bars 60 are adapted to receive the successive sheets from the carrying-tapes and deliver them to the final feeding and transferring devices hereinafter described.

The drop from the delivery-roller 21 to the sheet-carrying bars is sometimes sufficient to cause trouble in the proper forward movement of the sheets, and to reduce the extent of this drop (the drop being necessary to allow the successive sheets to overlap) I provide a series of bars or fingers 65, having angular upper faces corresponding to the upper faces of bars 60 and angular grooves 66 in their under faces, which enable them to fit snugly over and slide upon the bars 60. These fingers 65 are pivotally mounted upon a rod 67, supported in the adjustable carriages 63 of the second set of tapes. Their pivotal connection with said carriages enables them to rest freely upon the bars 60, and by reason of their connection with the carriages they will be moved forwardly or backwardly when the second set of tapes is adjusted, as above explained. In this manner the fall of the sheets from the second set of tapes to the rods is very much reduced and the sheets are caused to pass more freely through the machine, a sufficient fall being at the same time provided for the purpose of overlapping the sheets, as explained.

Just in front of the rod 61, supporting the forward ends of the sheet-supporting bars 60, is mounted a freely-journaled under feed-roller 70, which is formed at intervals with peripheral grooves 71, for the purpose which will presently appear. This lower feed-roller 70 is positively driven by any suitable means, (not shown,) such as by a driving-belt connecting it with any rotating part of the machine.

75 75 are a plurality of plates or bars formed with central lugs 76, projecting from their lower surfaces and by which they are pivotally mounted upon a transverse rod or bar 77, mounted in the brackets 12. These plates or bars 75 rest in inclined position just above the gage end of the feed-bar, their rear ends being formed with downwardly-curved fingers 78, which curve around and rest in the peripheral grooves 71 of the under feed-roller 70.

80 is a rock-shaft suitably journaled in the brackets 81, mounted upon the side bars 10. This rock-shaft 80 carries two or more rock-arms 83, which are keyed to the shaft and project forwardly therefrom and are formed with yoke-shaped forward ends 84, in which are mounted the journal pins or shafts 85. These journal pins or shafts 85 support a heavy metal roller 86 and a light wooden roller 87, which operate in conjunction with the lower feed-roller 70 in a manner similar to drop-rollers. The metal roller 86 fits snugly upon its journal or shaft 85, so that it will follow the movement of said journal toward and away from the lower feed-roller 70. The wooden roller 87 is formed with a journal-opening of considerably larger diameter than its supporting-shaft 85, so that it may move eccentrically upon shaft 85 and still remain in frictional contact with the roller 70 or the sheet passing thereover after the shaft 85 is raised slightly away from the under feed-roller.

The rock-shaft 80 carries an upwardly-extending rock-arm 88, which is connected through a rod 89 with the lower end of a lever 90, pivoted to the feeding-machine frame at 91 and carrying in its upper end an antifriction-roller 92, which operates upon the periphery of a cam 93, formed with a main high portion 93^a, an intermediate portion 93^b, and a low portion 93^c. A spring 94 connects lever 90 with the feeding-machine frame for holding the lever in operative relation to its cam 93. The cam 93 may be mounted upon the main cam-shaft of the feeding-machine or upon any other rotating part of said machine. The rock-shaft 80 also carries the forwardly-projecting rock-arms 95, in the forward ends of which are mounted pins 96, which work in the elongated slots 97, formed in the upper ends of arms 98, extending up from a rod 99, which rests beneath the series of pivotally-mounted sheet-supporting plates or bars 75. The purpose and operation of the parts just described will be explained hereinafter in the description of the operation of the machine.

As a modification of the drop-roller mechanism just described I may employ the mechanism illustrated in Figs. 10, 11, and 12 of the drawings. In this modified form of the mechanism I employ the same under feed-roller 70, above described and the same heavy metal drop-roller 86 and wooden drop-roller 87. In place, however, of mounting the drop-rollers 85 and 87, as above described, I journal each of these rollers upon a separate rock-arm. 100 and 101 are rock-arms freely journaled upon a shaft 102, which extends transversely of the machine and is mounted in the forwardly-extending bracket-arms 103 of brackets 104. The rock-arm 100 carries in its forward end a journal-pin 105, upon which is

snugly journaled the metal drop-roller 86. The rock-arm 101 carries in its forward end a journal-pin 107, upon which is loosely journaled the wooden drop-roller 87, the drop-roller 87 being formed with a bore or journal-opening 87^a of larger diameter than the supporting journal-pin 107. Each of the rock-arms 100 and 101 is formed with a rearwardly-projecting heel 110, which rests beneath a set-screw 111 or 112, carried in a rock-arm 113 or 114. The screws 111 and 112 are adjustable in their supporting rock-arms to properly engage the heels of the rock-arms 100 and 101. The rock-arms 113 and 114 are adjustably secured to a rock-shaft 115, which is journaled in the brackets 104 and carries an upwardly-projecting rock-arm 116, which is connected through a rod 117 with the cam-operated lever 118, journaled at 119 and carrying an antifriction-roller 120, which operates on the periphery of the cam 121 of proper formation to impart the required movements to the rock-shaft 115 described. The cam 121 is just the reverse of cam 93 above referred to for reasons which will be apparent.

The operation of my improved sheet-conveying machine may be briefly described as follows: The sheets of paper fed from the automatic-feeding machine are deposited and carried forward upon the interlapped tapes 18 and 20. The sheets pass from the delivery-roller 21 of tapes 20 onto the fingers 65 and then to the sheet-supporting bars 60, from which they pass over the constantly-driven under feed-roller 70. As the sheet reaches the feed-roller 70 the drop-rollers 86 and 87 are lowered into engagement with it, and the inclined plates or bars 75 are resting in their normal position, with their curved ends in grooves 71 beneath the periphery of feed-roller 70. Both drop-rollers 86 87 of each pair continue in frictional contact with the sheet over the lower feed-roller 70 until the sheet reaches a point near the register-gages, when the rock-arms 83 are given their first lift away from the feed-roller 70 to elevate the heavy metal rollers 86 away from the sheet. The wooden rollers 87 move eccentrically upon their supporting-journals and remain in contact with the sheet, exerting a slight pressure thereon, so as to feed the sheet the remainder of the distance into registered position with a gentle pressure. Immediately after the sheet reaches registered position the second lift in the rock-arms 83 takes place to raise the wooden rollers 87 away from the feed-roller 70 and to cause rock-arms 95 to elevate the rear curved ends of plates 75 to a point just a trifle above the periphery of the feed-roller 70. This action entirely relieves the sheet from the frictional engagement of the feed-roller 70, so as to allow the sheet to remain in registered position without any further pressing forward. The side-registering mechanism then operates in the manner well understood, and the sheet is taken by the grippers of the impression-cylinder.

In the modified form of drop-roller mechanism the effect is the same as just described with relation to the preferred form, the heavy metal drop-rollers 86 being first lifted and the light wooden rollers being subsequently lifted during the feeding operation.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. In a sheet-conveyer, the combination of a series of sheet-supporting rods or bars, with sheet-carrying tapes overlapping said supporting rods or bars and adjustable with relation thereto, and transfer-fingers adjustable with said tapes and arranged to lead sheets from the tapes to the supporting rods or bars, substantially as set forth.

2. In a sheet-conveyer, the combination of a series of sheet-supporting rods or bars, with sheet-carrying tapes overlapping said rods or bars and adjustable with relation thereto in the plane of feed, and transfer-fingers resting upon and movable longitudinally on said rods or bars, substantially as set forth.

3. In a sheet-conveyer, the combination of a series of sheet-supporting rods or bars, with sheet-carrying tapes, an adjustable carriage supporting one of the tape-rollers, and transfer-fingers pivotally mounted upon said adjustable carriage and resting upon said supporting rods or bars, substantially as set forth.

4. In a sheet-conveyer, the combination of a series of sheet-supporting rods or bars, with sheet-carrying tapes, an adjustable carriage supporting one of the tape-rollers, and transfer-fingers pivotally mounted upon said adjustable carriage and resting upon said supporting rods or bars, said transfer-fingers being grooved to fit snugly upon said rods or bars, substantially as set forth.

5. In a sheet-conveyer, the combination of a series of sheet-supporting rods or bars, formed with angular upper faces, and sheet-carrying tapes overlapping said rods or bars and adjustable with relation thereto, and transfer-fingers pivotally mounted upon the adjustable carriage of the tapes and formed with angular grooves in their lower faces which rest snugly upon the angular upper faces of the supporting rods or bars, substantially as set forth.

6. A drop-roller feed mechanism comprising an under feed-roller, a pair of drop-rollers, and suitable operating devices, the drop-rollers and their operating devices being constructed and arranged to permit the simultaneous lowering of said drop-rollers and the successive elevation of said drop-rollers, substantially as set forth.

7. A drop-roller feed mechanism comprising an under feed-roller, a pair of drop-rollers, and means for raising and lowering said drop-rollers with relation to the under feed-roller,

one of said drop-rollers being snugly journaled upon its shaft, and the other of said drop-rollers being loosely journaled and eccentrically movable upon its shaft, substantially as set forth.

8. A drop-roller feed mechanism comprising an under feed-roller, a pair of drop-rollers, and means for raising and lowering said drop-rollers with relation to the under feed-roller, one of said drop-rollers being a relatively heavy roller snugly journaled upon its shaft, and the other of said drop-rollers being a relatively light roller loosely journaled and eccentrically movable upon its shaft, substantially as set forth.

9. A drop-roller feed mechanism comprising an under feed-roller, a pair of drop-rollers, and means for raising and lowering said drop-rollers with relation to the under feed-roller adapted to impart a double lifting movement and a single lowering movement to the drop-rollers, one of said drop-rollers being snugly journaled upon its shaft and the other of said drop-rollers being loosely journaled and eccentrically movable upon its shaft, substantially as set forth.

10. In a sheet-conveyer, the combination of an under feed-roller, and means for feeding sheets to said under feed-roller, with a pair of drop-rollers, a rock-arm supporting said drop-rollers, and means for operating said rock-arm, one of said drop-rollers being snugly journaled upon its supporting-shaft, and the other of said drop-rollers being loosely journaled and eccentrically movable upon its supporting-shaft, substantially as set forth.

11. In a sheet-conveyer, the combination of a grooved feed-roller, and means for feeding sheets to said feed-roller, with a series of pivotally-mounted plates or bars supported in front of said under feed-roller and formed with downwardly-curved rear ends which rest in the grooves of said feed-roller, and means for intermittently raising the curved rear ends of said plates or bars, substantially as set forth.

12. In a sheet-conveyer, the combination of a grooved under feed-roller, drop-roller coöperating therewith, and means for feeding sheets to said under feed-roller, with a series of pivotally-mounted plates or bars supported in front of said under feed-roller and having their rear ends resting in the grooves of said under feed-roller, and means for intermittently raising the rear ends of said plates or bars, substantially as set forth.

13. In a sheet-conveyer, the combination of an under feed-roller formed with peripheral grooves, coöperating drop-rollers mounted upon suitable rock-arms, means for operating said drop-roller, and means for feeding sheets to said under feed-roller, with a series of plates or bars pivotally mounted in front of said under feed-roller, with their rear ends resting in the grooves of the same, and means connecting the drop-roller-operating mechanism with said pivotally-mounted plates or bars, substantially as set forth.

14. In a sheet-conveyer, the combination of a peripherally-grooved under feed-roller, drop-rollers coöperating therewith, a rock-shaft upon which said drop-rollers are supported, cam mechanism for operating said rock-shaft, a series of pivotally-mounted plates or bars having their rear ends resting in the grooves of said under feed-roller, a rod resting beneath the rear portions of said plates or bars, slotted arms secured to said rod, and rock-arms extending from said rock-shaft and engaging the slotted ends of said arms, substantially as set forth.

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