E. O. CARTWRIGHT.

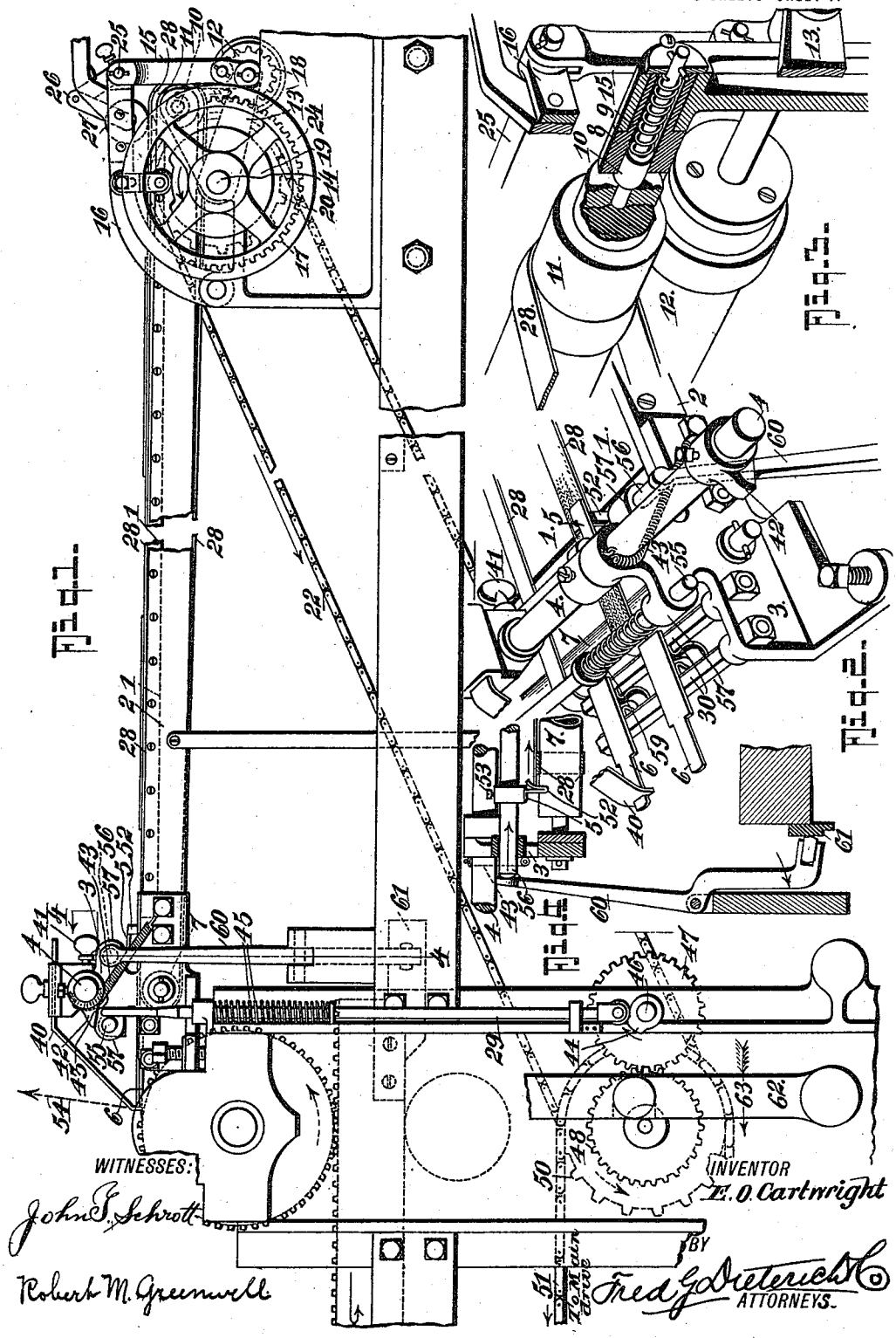
SHEET CONVEYER.

APPLICATION FILED FEB. 10, 1913.

1,151,082.

Patented Aug. 24, 1915.

3 SHEETS—SHEET 1.



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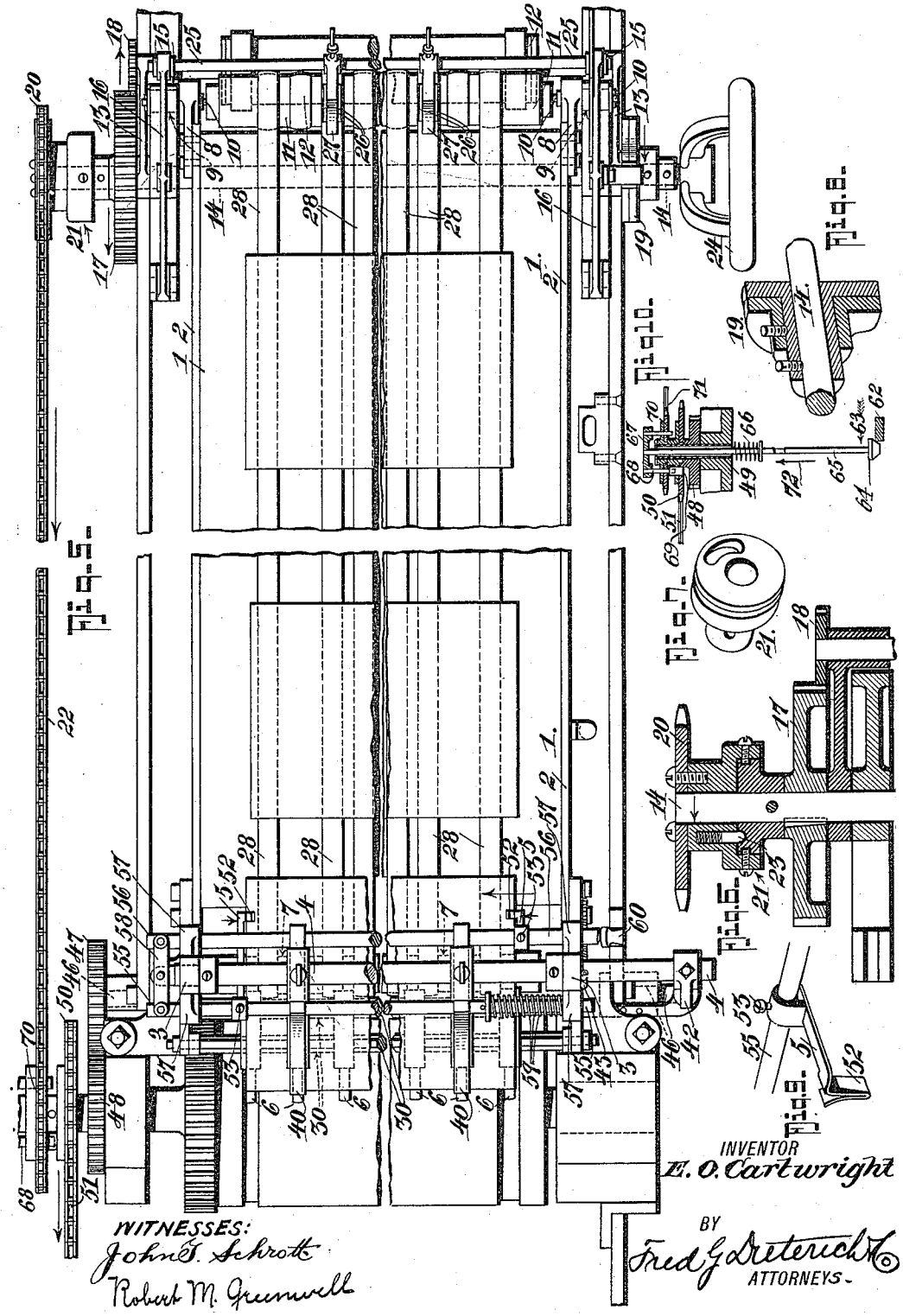


Fig. 5.

Fig. 8.

Fig. 10.

Fig. 7.

Fig. 6.

Fig. 9.

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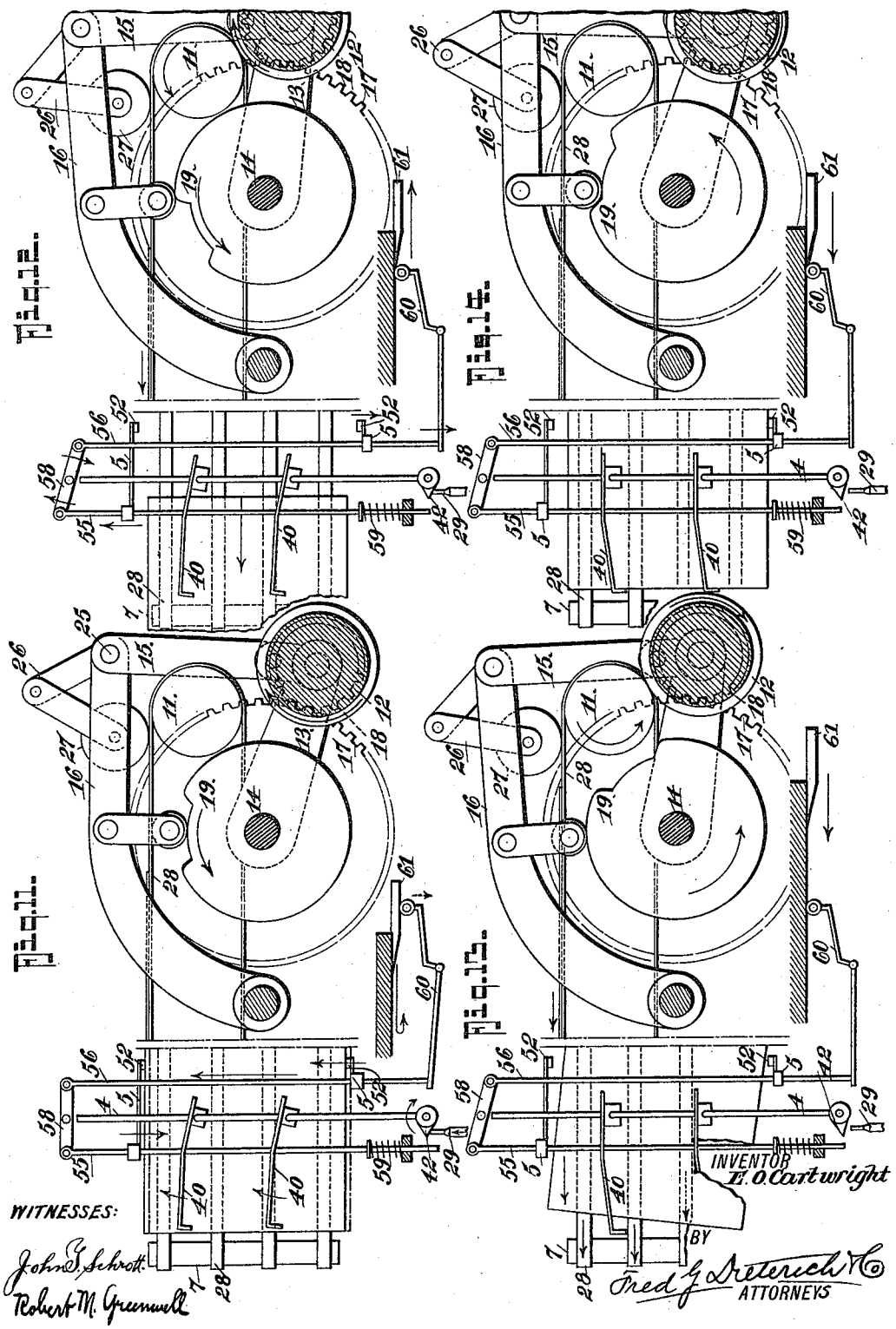
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

ERNEST O. CARTWRIGHT, OF SPRINGFIELD, OHIO, ASSIGNOR OF ONE-THIRD TO LOUIS K. FISHER, OF DAYTON, OHIO, AND ONE-THIRD TO BYRON D. CAMPBELL, OF WEST MILTON, OHIO.

SHEET-CONVEYER.

1,151,082. Specification of Letters Patent. Patented Aug. 24, 1915.

Application filed February 10, 1913. Serial No. 747,376.

To all whom it may concern:

Be it known that I, ERNEST O. CARTWRIGHT, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Sheet-Conveyers, of which the following is a specification.

My present invention has for its object to provide a simple and inexpensive means adapted for use in connection with paper feeding machines, for primarily forwarding the fed sheets to the guides of a printing press or similar machine, and while my present invention, with slight variations in details, may be used with different types of printing presses, it is more particularly designed to form a coöperating part of my complete automatic high speed rotary printing press that forms the subject matter of my copending application, Serial No. 747,375 filed on even date with this application. In the present case I have illustrated so much of the mechanism, particularly the form bed and other parts of my complete press before referred to, in connection with my present improvements, as is necessary to properly disclose the structure, the operation and the advantages of my said conveyer mechanism.

In the development of my sheet conveyer mechanism the coöperating parts have been assembled on such lines whereby to cause them to properly coöperate with the printing mechanism, *per se*—the sheet pile elevating—the sheet feeding and sheet separating means disclosed in my aforesaid copending application.

In presses of the front delivery and rapidly operated cylinder job printing kind, it is very essential that easy access may be had to the printing cylinder and other parts of the printing machine for the purpose of facilitating the rapid make ready and adjustments of the operating mechanism. Again in printing presses of the general type hereinbefore outlined, trouble frequently occurs during the printing and feeding operation, done by the action of the air upon the front edge of the sheet, causing the said edge to turn up or buckle when it is advanced with sufficient rapidity to take the sheet from the separator and put it against the guides, at one impulse of the machine. To overcome the objections before noted, I have provided a simple and effectively operating means for feeding the sheets by successive steps, that is, under intermittent progress, and for eliminating the back lash on the sheet caused by the action of the air, as stated. Further, in my construction of sheet conveying means is included a special construction and arrangement of feed boards adapted for being quickly adjusted or moved and held out of the way of access to the printing cylinder without in the slightest disarranging the operative parts of the conveying or other mechanisms.

My conveying mechanism, about to be described, is especially designed for coöperating with the timing devices that regulate the different coactions of other mechanisms in my complete printing press construction before referred to and in such manner that all the desired functions of a sheet conveyer are accomplished with a lesser number of parts than is usual in mechanisms of like class.

In my sheet conveying mechanism, the working principle is based on the fact that it is necessary to move the sheet only a little more than its own width at each performance of the served machine, in order to serve the guides and grippers, that form a cooperative part of the printing mechanism proper, with another sheet on time.

With other objects in view that will be hereinafter explained my present invention resides in a sheet conveying means that embodies the peculiar construction and novel arrangement of parts, all of which will be hereinafter explained, specifically pointed out in the appended claims and illustrated in the accompanying drawings, in which:

Figure 1 is a side elevation of my sheet conveyer mechanism, only so much of a printing press being shown as is necessary to illustrate a practical application of my said mechanism. Fig. 2 is an enlarged detail perspective of one corner of the conveyer frame, and showing one of its terminals, the front paper guides and sheet supporters and the cam lever by which the front guides are raised, at times. Fig. 3 is an enlarged detail sectional perspective view of the rear conveyer roll pivot and its coöperating parts. Fig. 4 is a detail section on the line 4—4 on Fig. 1, showing the manner of registering the paper at the front

guides, after the paper sheet has finally come to rest against the said guides, and when the form bed of the printing mechanism is at the limit of its forward position. Fig. 5 is a plan view of the parts shown in Fig. 1, the sheet being at rest against the front guides, and the paper sheet eveners being shown in the act of placing the sheet in its proper position relative to the tympan. Fig. 6 is an enlarged detail section of the "overthrow clutch devices" hereinafter specifically referred to. Fig. 7 is a detail perspective view of the clutch member having the "overthrow" slot. Fig. 8 is a sectional perspective view of the two part cam mounted on the main conveyer shaft. Fig. 9 is a detail perspective view of one of the paper eveners. Fig. 10 is a detail sectional view of the clutch device located on the main framing, by means of which the operation of the conveying mechanism is suspended when the printing operation of the press is suspended. Figs. 11—12—13 and 14 are a series of diagrammatic views that illustrate the different positions of the cam, on the main conveyer shaft and its coöperating drop roll which, by reason of its intermittent engagements with the conveyer roll governs the forward conveyance of the fed sheets, also the various positions of the front guides and paper evener devices and their relative positions to the before-mentioned cam devices, the said several views being hereinafter also specifically referred to.

The conveying mechanism about to be described while, susceptible for being readily adapted for any kind of printing machines is more especially designed for coöperating with the printing machine disclosed in my copending application, since the several parts that constitute my conveying mechanism are adapted for use with the timing devices that regulate the different coactions of the printing, the pile elevating and sheet delivering and separating mechanisms, of my form of printing press mentioned.

In my conveying means is included a feed board 1 of a length from between the guides at the printing cylinder end and the point where the sheets are separated, equal to a multiple of the widest sheet within the capacity of the sheet separating means plus an addendum for the pausing of the conveyer mechanism, for the purpose of positioning the sheet against the guides. The side frames 2 of the feed board 1 terminate at their front ends in a housing that consists of the opposite conveyer terminals 3 which support the front guide shaft 4, the end guides 5, the sheet supporters 6 and the front tape roll 7, all of which will be presently explained. The other, or inner terminals of the side frames 2 carry brackets 8, each formed with a hollow sleeve 9 journaled on the machine framing, the said sleeves, as it were, forming a hinge connection for the feed board 1, they also accommodating center pins 10 on which the rear tape roll 11 revolves. At a suitable point below the tape roll 11 is located a friction roll 12. The roll 12 is journaled at both ends in links 13 loosely held at one end, on the driving shaft 14 of the conveyer.

15 designates levers that work in a clearance space in the framing and are located in proximity to the journals of the friction roll 12, and they are pendently suspended from a pair of oppositely disposed levers 16 pivotally mounted on the machine to swing in the vertical plane.

That end of the driving shaft 14 adjacent the drive end carries a gear 17 that meshes with a pinion 18 on the friction roll shaft for driving the latter continuously. Conveyer shaft 14 also carries an adjustable cam 19 whose function is to raise the pivoted levers 16 that carry the friction roll 12 to hold it in contact with the tape roll 11 for a predetermined time, and then permit the said levers 16 to lower and thereby move the friction roll 12 out of contact with the tape roll 11.

When arranged as shown in the drawings the conveyer shaft 14 receives its motion from the served machine through a drive chain 22 and a sprocket 20 in connection with an overthrow clutch 21, the construction of which is best shown in Figs. 6 and 7 by reference to which it will be noticed the clutch has but one point, indicated by 23, of engagement in order to preserve its timing with the served machine. The overthrow clutch feature is taken advantage of to permit the conveyer to be moved by hand in its forward direction at will, while the printing cylinder mechanism is at rest, as well as to prevent reversed motion of the power from backing up the conveyer. On that end opposite its sprocket wheel 20, the drive shaft 14 has a hand wheel 24 for advancing the conveyer without the machine power and to facilitate the handling of the sheets on the feed board. On a brace rod 25 located between the levers 16, at a point above the tape roll 11 and in jointed connections 26, are adjustably supported a plurality of gravity rolls 27, which are held to always rest in contact with the said tape roll 11, and by reason of the said jointed connections 26 of the gravity rolls 27 with the said levers 16, permits the said rolls 27 to always gravitate against one or more of the tapes on the said tape roll 11.

28 designates the endless feed tapes of the conveyer which take over front tape rolls 7 and tape roll 11, and the said tapes travel close to the top surface of the feed board 1, as shown. Brace rods 30 are mounted in

the conveyer terminals 3 on the front end of the feed board and on the said rods are mounted a series of sheet supporters or fingers 6, and these are laterally adjustable to give them the desired distance relative apart.

Mounted at a convenient point above the sheet supporters 6 is a rock shaft 4 on which a plurality of front paper guides 40 are adjustably held by the collar and set screw connection 41. The rock shaft 4 has a lever-like lug 42 on one end thereof and the said shaft, with its lug 42 is rocked to and held at the normal position by the coiled spring connection 43. Rock shaft 4, at predetermined times, is oscillated by a lift rod 29, that has a roller bearing at the lower end that is normally held in contact with a cam 44 by means of a spring 45, see Fig. 1. Cam 44 is located in one end of a cross shaft 46 journaled in the machine framing and at the other end the shaft 46 has a spur gear wheel 47 held in mesh with a driving gear 48 on a hollow shaft 49 as is best shown in Fig. 10. Gear 48 has an integral sprocket wheel 50 over which takes an endless chain 51 driven from sprocket wheel on the intermediate driving shaft of the printing press to which my conveying devices are attached.

Referring now more particularly to Figs. 2 and 5 it will be noticed a pair of transversely and parallelly disposed rods 55—56 are mounted to slide endwise in the bracket bearings 57 and these are arranged one to each side of the rock shaft 4 that carries the front paper guides and are integral with the casting 3. The ends of the rods 55—56 project beyond the bearings 57 and at one end they are joined by a centrally pivoted link 58, see Fig. 5, whose ends pivotally connect with the said extended ends of the said rods 55—56. A coiled spring 59 is mounted on the rod 55 and is arranged so it maintains a certain normal position of the said two rods 55—56, whose connections are such that as one rod moves longitudinally in one direction, the other rod likewise moves in the opposite direction, and vice versa. The rod 56 is adapted for receiving a thrust movement in one direction by means of a vertically positioned rocker lever 60 that is actuated, at predetermined times, by a cam 61 on the form bed of the printing machine, as indicated on Fig. 4. 5—5 designate a pair of end guide members and they are adjustably mounted for lateral positioning on the cross rods 55—56 by adjusting screws 53. Each guide member 5 includes a pendent finger 52 for engaging the outer edges of the sheet as it is fed to the front guide. By mounting the guide 5 as stated, positive motion is imparted to the end of one rod 55 and a like motion to the other rod 56, through the link connection, but in a direction opposite to the movement of the rod 55, the guides 5, having, as it were, movement toward the center of the feed board, which affords the use of an end guide, on either end of the sheet, being fed to the front guides, without altering the movement of the rods 55—56.

One of the objects in constructing the guide devices so they receive their movements from means upon the served machine to which my conveyer mechanism is applied in the manner shown, is to make it possible to lift the feed board, together with its guides and other mechanisms carried thereby, away from the normal position and without disarranging the operative parts elevated therewith, and to restore it to its working gear without having to make any adjustments or connections. By reason of the manner in which the feed board and its co-operating mechanism is arranged, admits of readily lifting the feed board high from the printing mechanism proper, (see arrow 54 on Fig. 1.) thereby giving easy access to the form and mechanisms of the press with which my conveyer mechanism is used. The rear tape roll 11 before referred to, is located closely adjacent to the separator used in connection with it and as the gravity roll contacts with the tape roll, they receive and forward the sheet separated from the pile.

Briefly stated, the operation of the conveying mechanism described, is as follows: The timing cam 19 is set to bring the friction roll 12 into contact with the tape roll 11, simultaneously with the beginning of the separation of a sheet of paper from the pile of sheets by the separator; they being also set to maintain this contact for the desired time and then released. Rotation of the main shaft 14 causes the friction roll 12 to revolve the tape roll 11, and advance the sheet the distance governed by the timing cam 19. Further rotation of the cam 19 on the main shaft 14 causes the friction roll 12 to drop, see Fig. 14, the contact with the roll 11 to be broken, and the tapes on the rolls to pause. Repeating the operation, the first sheet is advanced to the front guides 40 where it is engaged by either of the end guides 5 and properly centered to be engaged by the printing cylinder carried grippers during the pause of the tapes and then taken away to make room for the following or next sheet. It should be here stated, that the cam 19 is usually set to continue the rotation of the tape rolls a little time after the sheet has reached the front guides, (see position shown in Fig. 13), in order that the advance of the tapes, after the sheet has come to rest against the said front guides may serve to straighten up the front edge of any sheet that may have been advanced out of proper alinement. The end guides 5, do not come into action for centering the sheet until the said sheet has finally come

to rest against the front guides and the form bed has returned to its forward position as in Fig. 11. After the end guiding is done, the grippers on the printing cylinder close on the front edge of the sheet, the front guides are lifted by the oscillatory movement of the shaft 4 carrying them, and the sheet is then taken toward its destination.

Since the construction hereinbefore described and illustrated in the drawing is such that the endless conveyer, during a complete cycle of movement, conveys the sheet a little more than its own width, so that the said sheet be discharged to the printing cylinder on time and in a properly straightened position, to make the aforesaid operation of my conveying mechanism and the advantages of its construction clear, I have diagrammatically illustrated, by Figs. 11, 12, 13 and 14 the general arrangement of the conveyer actuating and feed controlling means and the relative position of a sheet that has been fed up to and crosswise up and endwise straightened against the front end guides and another or following sheet as being fed into proper position on time and to be properly straightened for being delivered to the cylinder, after the first sheet has been printed and delivered from the said cylinder. In the said Figs. 11, 12, 13 and 14 I have not shown the printing cylinder, it being however shown in Fig. 1 of the drawing at a proper operative position with respect to the front guides, for the conveyer mechanism.

Referring now specially to Fig. 11, it will be noticed that the cam 19 on the continuously rotating or driving shaft 14 is so positioned that the friction roll 12 is down and the endless conveyer or sheet carrying tapes are stationary. At this time cam 61 on the form bed of the printing press has actuated the lever device 60, which in turn has shifted the rod 56 to move the end guide 5 to effect the proper lateral adjustment of the sheet, bringing it, as it were, to the position shown in Fig. 11, just ready to be taken by the printing cylinder gripping means, clearly illustrated in my copending application No. 747,375 before referred to, and the cross shaft 4 has been rocked, thereby lifting the front guides 40 and freeing the sheet upon which the cylinder grippers are closing. Continuous movement of the shaft 14, with the cam 19, to the position shown in Fig. 12 now brings the friction roll into contact with the said roll 11, and the gravity roll 27 to coact with the said roll 11, to advance the tapes 28 and the sheet thereon one step or interval, and to simultaneously receive a new sheet from a separating mechanism with which my conveyer may be combined, or from my separating mechanism shown in my complete printing machine shown in my copending application No. 747,375 mentioned. At this position, the cylinder grippers, owing to their greater velocity over that of the sheet carrying tapes, have advanced the sheet shown in Fig. 11 sufficiently to clear it from under the front guides 40, which are about to drop; and the end guide 5 has been restored to its normal position out of the line of travel of the sheet about to be advanced by the tapes 28. The advancing of the successive sheets on the tapes 28 continues uninterruptedly during the time of movement of the shaft 14 and the cam 19 to the position shown in Fig. 13. At this time, it should be mentioned, the tapes 28, which move intermittently, have been advanced practically a distance equal to the maximum width of sheet for which the conveyer is adjusted, and this brings the sheet that followed the sheet shown in Figs. 11 and 12 up to the front guides 40, but, as shown, in Fig. 13 out of proper longitudinal alinement with the conveyer tapes, a position frequently assumed by the sheets as they are conveyed to the said front guides. At this time the "little more" movement hereinbefore mentioned of the conveyer, which occurs as the cam 19 passes from the position shown in Fig. 13 to that shown in Fig. 14, straightens the front edge of the sheet shown in Fig. 13, and at the moment of the pausing of the tapes when the cam drops, as shown in Fig. 14, admits of the sheet being registered or positioned by the end guide 5. The end guide 5 is held in contact with the sheet until after it has been gripped by the grippers on the cylinder, and such holding of the said guide is provided for by the flat surface on cam 61 on the form bed, see Fig. 11.

Referring to the coaction of the main driving means of the printing machine with my conveyer mechanism, as is generally disclosed in Figs. 1 and 2, it is proper to state that when it is desired to suspend the printing operation a lever 62 is shifted, and in order to suspend the sheet feeding functions simultaneously with the suspension of the printing, I have provided for utilizing the shifting movement of the said lever 62 for throwing out of running gear the sprocket wheel 20, and for such purpose the devices shown in detail in Fig. 10 are used, the construction of which and the operation thereof are best explained as follows: Lever 62, when swung in the direction of the arrow 63 engages a beveled disk 64 on the outer end of a transversely disposed rod 65 that is normally thrust outwardly by a spring 66 that encircles the said rod. The inner end of the rod 65 carries a yoke 67 having long clutch 68, one member of which is normally held in engagement with a clutch lug 69 integrally with the gear 48. The clutch pin 68 slidably engages an opening 70 in

a second sprocket 71 from which takes a chain 22 that transmits the motion to the sprocket 20 of the conveyer shaft 14. When the lever 62 is swung over as stated, the rod 65 is forced back in the direction of the arrow 72 and the clutch yoke and its pin 68 are moved from over the opposing clutch gear, and when thus positioned further rotation of the sprocket 50 has no effect on the driving chain 22, thereby leaving, as it were, the shaft 14 for being freely rotated by hand to bring the paper sheets into proper position before again starting the machine.

What I claim is:

1. In a sheet conveyer, the combination of the following elements; an endless carrier for conveying the sheets, the said carrier including a driving roll, a continuously rotating driving shaft and gear, a cam on the shaft, a sheet retarder against which the conveyed sheets are fed, a friction roll constantly in mesh with the driving gear, a swinging support for the said friction roll, said swinging support being controlled by the cam on the driving shaft whereby to move the friction roll into contact with the carrier roll at times, the said cam being arranged for holding the driving roll to impart advance movement to the endless carrier a distance in excess of the length of the sheet being conveyed, and means for freeing the front edge of the advanced sheet after the carrier has completed its intermittent movements forward.

2. In a sheet conveyer, an endless carrier, means for intermittently advancing the carrier by single steps or movements, other means that is brought into action during the final part of each step of movement of the carrier for engaging the front edge of the sheet as it is still being advanced, and a further means actuated from the machine for edgewise engaging and straightening the sheet when said endless carrier is at rest.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."