May 23, 1950 W. F. HUCK 2,508,608

SHEET REGISTERING MECHANISM

Filed Nov. 23, 1945 2 Sheets-Sheet 1

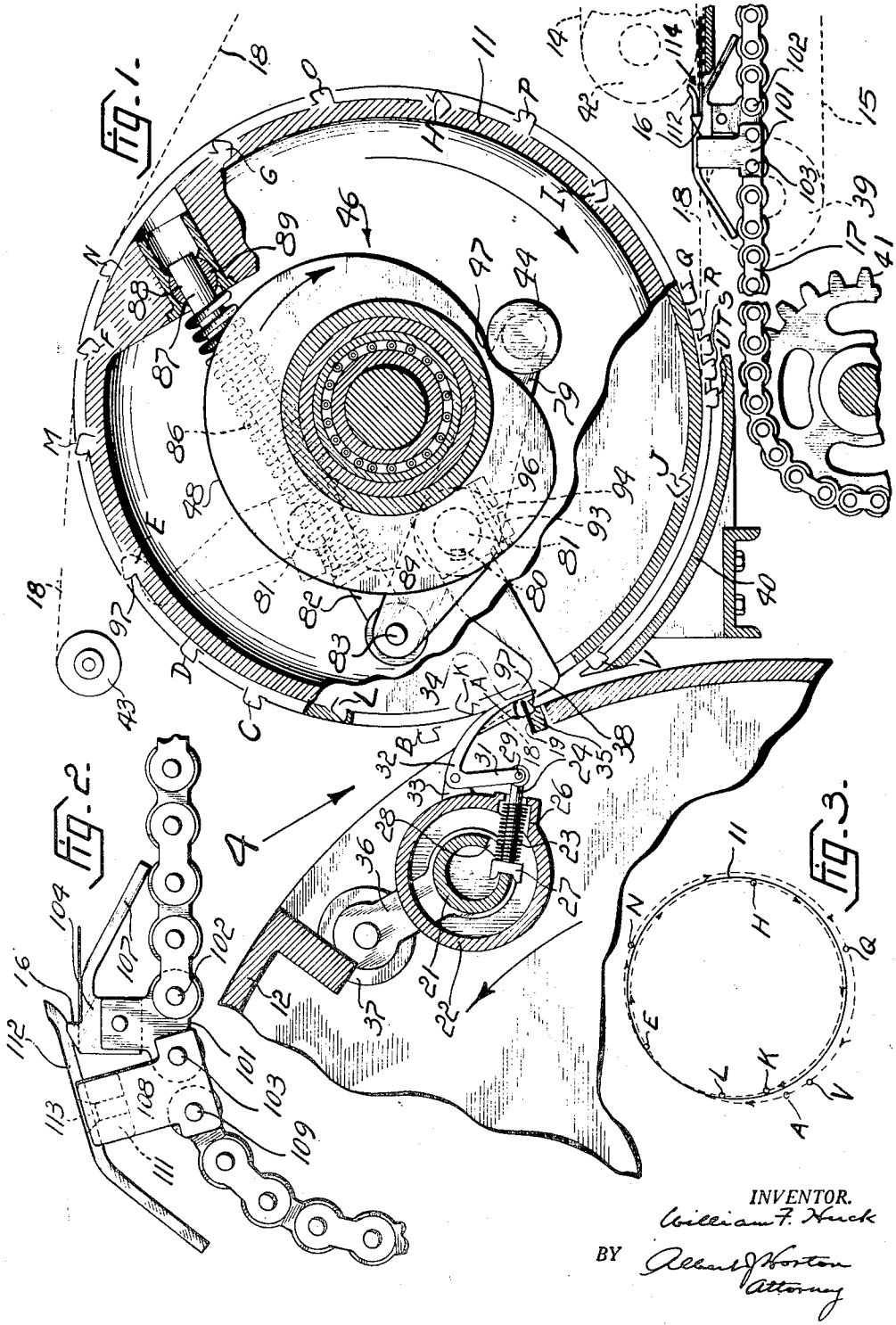


Fig. 1.

Fig. 2.

Fig. 3.

INVENTOR.
William F. Huck
BY Albert J. Horton
Attorney

May 23, 1950 W. F. HUCK 2,508,608

SHEET REGISTERING MECHANISM

Filed Nov. 23, 1945 2 Sheets-Sheet 2

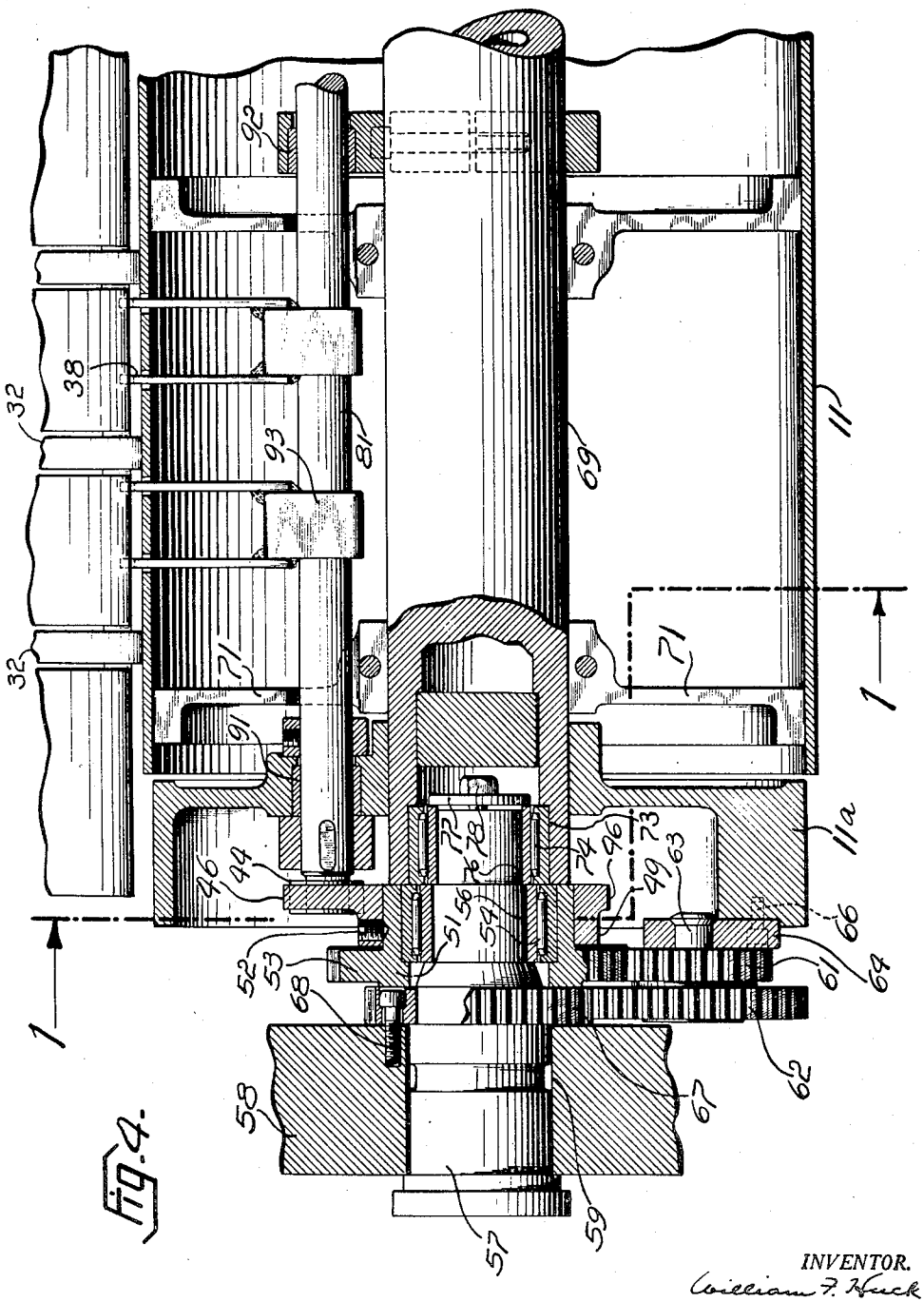


Fig. 4.

INVENTOR.
William F. Huck
BY Albert J. Horton
Attorney

Patented May 23, 1950

2,508,608

UNITED STATES PATENT OFFICE

2,508,608

SHEET REGISTERING MECHANISM

William F. Huck, Forest Hills, N. Y., assignor to R. Hoe & Co., Inc., New York, N. Y., a corporation of New York

Application November 23, 1945, Serial No. 630,337

10 Claims. (Cl. 271—53)

1

This invention relates to sheet registering mechanisms for rotary printing machines and especially for machines of the type described in Patent 2,231,914, in which sheets are fed to a rotating cylinder that registers them without stopping their movement into the printing machine, and more specifically the present invention includes an improvement on a timing cylinder fully disclosed in Patent 2,406,006, which cylinder is used with a machine of the kind shown in the first mentioned patent.

An object of the invention is to provide an improved sheet timing cylinder of relatively small diameter and having retractable sheet stops that engage the leading end of each sheet as it is fed to a rotating cylinder.

Another object of the invention is to provide a sheet timing cylinder for use with a printing machine of the kind shown in the hereinbefore mentioned patent, of generally improved construction and arrangement, whereby the device will be simple, durable, and relatively inexpensive in construction as well as convenient, practical, and serviceable in its use.

A further object of the invention is to provide an improved sheet conveyor having means for controlling the motion of a sheet being fed, and means for removing the controlling means to facilitate transfer of the sheet to a printing machine.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention resides in the combinations and arrangements of parts, and in the details of construction hereinafter described and claimed.

A preferred embodiment of the invention is illustrated in the accompanying drawings, wherein:

Figure 1 is a vertical sectional view on the line 1—1 of Figure 4, with certain parts broken away, and showing a portion of a sheet timing cylinder in which the invention is incorporated;

Figure 2 is an enlargement of a portion of the mechanism of Figure 1, showing the parts in another phase of its operation;

Figure 3 is a diagrammatic sketch showing the path of the sheet stop of Figure 1; and

Figure 4 is a sectional view of the sheet timing cylinder and adjacent parts, as seen in the direction of arrow 4 of Figure 1.

Referring to the drawings, a portion of a sheet feeding and registering mechanism is shown which includes a sheet timing cylinder 11 and a sheet receiving cylinder 12. Sheets are forwarded to the timing cylinder by sheet carrying

2

belts 15, and over-sheet belts 14 acting in cooperation with sheet stops 16 that are carried by a chain 17. From the sheet timing cylinder 11, the sheets are transferred to the sheet receiving cylinder 12 of a printing machine by sheet transfer belts 18. The sheet receiving cylinder herein shown embodies the principals of the sheet receiving cylinder 13 of Patent 2,231,914, which supports endless chains that carry gripper mechanisms for gripping and holding the sheet, although the gripper mechanism as herein shown is somewhat modified. Preferably the sheet receiving cylinder 12 is provided with endless chain supports and side registering mechanism, all of which are fully disclosed in the drawings and specification of Patent 2,231,914.

Sheet stops 19 are supported by the receiving cylinder 12, and cooperate with the gripper mechanism which includes a pair of concentric tubular shafts 21 and 22. The outer shaft 22 is mounted on chains (not herein shown), which are carried about sprockets at each end of the sheet receiving cylinder 12. The inner shaft 21 is rotatably supported and is biased in one direction by longitudinally spaced springs 23, each of which surrounds a spring rod 24, retained in a recess 26, formed in the outer shaft 22. One end of each spring 23 presses a forked head 27 of the rod 24 against one edge of an opening 28 formed in the inner shaft 21. The other end of each spring rod 24 is pivoted by means of a pin 29 to an arm 31 of a sheet gripper 32. Each sheet gripper is pivotally supported from a lug 33 that is formed integral with the outer shaft, and each gripper has a finger end 34 for pressing and holding the leading end of the sheet against a gripper pad 35, that is supported in position to be engaged by the gripper finger. The inner shaft 21 is rotated and the gripper is raised from the sheet by an arm 36, secured to the shaft 21 and having a roller 37 that is operated at the proper time by a cam (not shown). Sheet guides 40 (Figure 1) are suitably secured to a cross member of the machine frame.

The belts 14, 15, and 18, and the stops 16 carried by the chain 17 function to forward sheets to the timing and receiving cylinders and to press the leading end of these sheets first against sheet stops 38 carried by the timing cylinder 11 and later against the sheet stops 19, that are positioned on the receiving cylinder 12 in proper relation to the grippers 32. The sheet carrying belts 15 are led about pulleys 39 and other pulleys not shown. Each chain 17 is carried by a sprocket 41 and another sprocket not

shown. The over-sheet belts 14 are led about pulleys 42 and additional pulleys not shown. The sheet transfer belts 18 are led under pulleys 42, part way around the sheet timing cylinder 11, thence to and part way around the sheet receiving cylinder 12. After leaving the sheet receiving cylinder the sheets pass about a driving pulley not shown which directs the belts 18 toward a tightener pulley 43, from which they are led over the cylinder 11 and about a pulley not shown, which directs them to the under side of the timing cylinder 11 as shown.

In order that the leading edges of advancing sheets may be pressed against the various sheet stops and registered, the belts are driven at speeds greater than the speed of the sheet stops. To this end, the sheet transfer belts 18 travel faster than the sheet stops 19 carried on the receiving cylinder 12, the chain 17 is driven at a speed somewhat greater than the speed of the timing cylinder 11, and the over-sheet belts 14 and the sheet carrying belts 15 are driven at a speed greater than the chain 17.

In order to provide a timing cylinder of reduced size and weight, the cylinder 11 is made with a diameter that is one half that of the receiving cylinder 12, and it is driven by suitable gearing, at twice the angular velocity, with a peripheral speed that is approximately that of the receiving cylinder. Hence the timing cylinder makes two revolutions during the feeding of each sheet to the printing machine.

In order that the sheet stops 38 will not puncture the intermediate portion of the sheet during the second revolution of the cylinder 11, the stops are retracted into the cylinder during each non-registering revolution. The mechanism for retracting and projecting the sheet stops 38 includes a cam roller 44 (Figures 1 and 4) that cooperates with a rotating cam 46. This cam (Figure 1) has a short low portion 47 and a relatively long high portion 48, and is formed integral with a sleeve 49 (Figure 4), the bore of which is fitted to the outer surface of a sleeve 51 and secured thereto by a set screw 52. The sleeve 51 is preferably formed integral with a gear 53, and the whole is carried by the outer race of a roller bearing 54. The inner race of the roller bearing 54 is held on a step 56 of a stud 57 that is secured in a hole 59 in a main frame member 58 of the printing machine. The gear 53 is in mesh with a gear 61 that is formed integral with a planetary gear 62, and the two gears 61 and 62 are rotatably supported on a stud 63, held in a bracket 64, that is secured to an end cap 11a of the timing cylinder 11 by screws 66. The planetary gear 62 is in mesh with a fixed gear 67 supported on the stud 57 and held against rotation by a screw 68. Thus when the timing cylinder 11 is rotated by a suitable means, the planetary gear 62 revolves around the fixed gear 67 and also rotates on the stud 63. The gear 61 also revolves around the stud 57 and rotates with the gear 62 about the stud 63. This motion rotates the gear 53 and the cam 46 in the same direction as the cylinder 11, but due to the ratio of the gears, the cam is rotated at one half the speed of the cylinder. Thus the cam roller 44, which is hereinafter shown to be carried by the cylinder 11, drops into the low portion 47 of the cam 46 during alternate revolutions of the cylinder 11.

The cylinder 11 is provided with a tubular core 69 which supports a plurality of pairs of semi-circular collar members 71 that are suitably clamped on the core, and each end of the core 69 is provided with a recess 73 that is bored to receive the outer race of a roller bearing 74. The inner race of this roller bearing is supported on a second step 76 of the stud 57, and is held on the end of the stud by a disc 77 and a bolt 78.

The cam roller 44 (Figure 1) is carried at one end of a rocker arm 79, the center of which is secured to a rocker shaft 81 by a key 80, and the opposite end of the arm 79 is pivotally connected to one end of a spring rod 82 by a pin 83. The rod 82 is provided with a collar 84 that forms an abutment for a spring 86 that biases the arm 79 counter-clockwise as seen in Figure 1 and thus holds the cam roller 44 in contact with the cam 46. An end 87 of the rod 82 passes through a hole 88 in a block 89 that is swingably mounted in the timing cylinder 11. The rocker shaft 81 is rotatably supported in bearings 91 and 92 (Figure 4), and carries a plurality of spaced collars 93 each having a slot 94 (Figure 1) and a bolt 96 by which they are secured to the rocker shaft 81. A pair of sheet stops 38 are suitably secured to opposite faces of each collar 93 (Figure 4) and the outer end of each sheet stop 38 is provided with a sheet engaging surface 97 (Figure 1) against which the sheets are registered when the stops are projected from the timing cylinder 11, as shown in Figure 1. It will be seen that the rotation of the cam roller 44 about the cam 46 will result in rocking the shaft 81 with the sheet stops 38 which are thus alternately swung forward and backward and respectively into and out of the timing cylinder 11 as will be more particularly described hereinafter.

Each sheet stop 16 carried by the chain 17 (Figures 1 and 2), includes an inside link member 101 pivotally connected to the other links of the chain by pins 102 and 103. The link member 101 supports a bracket 104 that includes the sheet stop 16 and an inclined guide bar 107. Outside link members 108 located on opposite sides of the chain 17 attach the inside link member 101 to other links of the chain by pins 103 and 109. A spacer block 111, formed integral with the two outside link members, supports a central portion of a sheet guide finger 112 that is secured on the block 111 by a screw 113. When the members 101 and 108 are in a straight portion of the chain 17 as seen in Figure 1, the trailing end of the guide finger 112 is positioned adjacent the leading portion of the inclined bar 107 and thus forms a pocket 114 into which a sheet may be registered against the sheet stop 16. As the two link members 101 and 108 pass around the sprocket 41, they assume the positions shown in Figure 2, in which the pocket 114 is open and the trailing end of the finger 112 moved forward to permit transfer of the sheet to the timing cylinder 11.

The sheet stops 38 are shown at position A in Figure 1, and the cam 47 and the cam roller 44 are then in the relative positions there shown. Forward rotation of the cylinder advances the cam roller 44 out of the low portion of the cam 46 and moves the stop 38 forward out of engagement with the leading edge of the sheet and retracts them into the cylinder. Various positions of the outer extremities of the sheet stops 38 as indicated in Figure 1, show the positions of the sheet stops relative to the periphery of the timing cylinder 11 at successive points in a cycle of operation. Positions B, C and D show the sheet stop being accelerated and retracted within the

cylinder. Position E shows it fully retracted, the cam roller 44 then riding on the high portion of the cam 47. The stop 38 remains fully retracted through positions F, G, H, I, J, K, and L, during approximately a complete revolution of the cylinder, and it is then gradually retarded and projected to the positions indicated at M, N, O, P and Q, where the stop 38 is projected sufficiently to be engaged by a sheet. This progressive projecting motion of the stop 38 is effected while the roller 44 is moving downward toward the low portion 47 of the cam. While the stop is moving outward from within the cylinder as described, it is also rotating backward with respect to the cylinder, and with a decreasing speed of forward rotation in space, through the positions marked R, S, T, U and V, until it reaches the position indicated at A, where the roller 44 is at the lowest point on the cam. During the motion between positions U and V, the stops 38 are moving sufficiently slower than the cylinder 11, to be overtaken by a sheet that has been brought forward against the sheet stops 16 on the chain. When the roller 44 moves away from the low point of the cam, the action is reversed and the sheet stops move faster than the timing cylinder and are quickly accelerated and retracted as previously described.

The path of the extremities of the sheet stops 38 during two successive revolutions of the timing cylinder 11 is clearly shown in Figure 3. At position Q, the stop is projecting from the cylinder in a position to receive a sheet. At position V, the stop will have moved rearwardly with respect to the cylinder into contact with the sheet, and at the position A where the sheet is about to be transferred to the cylinder 12, the stop 38 immediately starts to move forward away from the sheet and downward into the cylinder, the stop being flush with the cylinder periphery at E. The stop is then held below the cylinder surface through positions H, K, L and to E, where it starts to rise from the cylinder and is projected at the position N and thereafter through the initial period of the next cycle beginning at Q.

In operation, a sheet is carried to the printing machine on the sheet carrying belts 15, and is pressed thereagainst by the first over-sheet belts 14, the latter preferably being driven slightly faster than the former. The belts 14 and 15 all run faster than the chain 17 and thus they push the leading edge of the sheet against the sheet stop 16 on the link member 101. As the sheet stop 16, travels around the circumference of the sprocket 41, the finger 112, is tilted as shown in Figure 2, and the sheet is guided between the sheet guides 40 and the periphery of the timing cylinder 11, by the sheet transfer belts 18 that are driven at a speed faster than the sheet carrying belts 15 or the over-sheet belts 14, and also faster than the peripheral speed of the timing cylinder 11.

When the leading edge of a sheet reaches the timing cylinder 11, the sheet stops 38 will be positioned with their sheet engaging surfaces 97 somewhat in advance of the sheet. Soon thereafter, the sheet will overtake the stops 38 due to its being urged forward by the transfer belts 18 and also due to a slowing down of the motion of the sheet stops 38 by action of the cam 46 on the roller 44.

As the sheet stops and the leading edge of the sheet approach the gripper fingers 32, the sheet is in proper register. When they reach the position shown in Figure 1, the sheet is about to be pressed against the sheet stops 19 which are moving at a somewhat slower speed than the sheet. The sheet is then urged toward the sheet receiving cylinder 12 by the sheet transfer belts 18 and held in register against the stops 19. Immediately thereafter, the gripper fingers 32 close and carry the sheet to the printing cylinders.

It will be understood that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and it is therefore desired that the present embodiment be considered in all respects as illustrative and not restrictive, reference being made to the claims rather than to the foregoing description for an indication of the scope of the invention.

What I claim is:

1. In a sheet timing mechanism for registering sheets to be fed to a sheet receiving cylinder of a printing machine, a rotating timing cylinder driven at twice the angular velocity of the sheet receiving cylinder, movable sheet stops carried by the sheet timing cylinder, and means to project and to retract the stops relative to its peripheral surface during successive periods in each of which the sheet timing cylinder makes two revolutions.

2. In a sheet timing mechanism for registering sheets to be fed to a sheet receiving cylinder of a printing machine, a rotating timing cylinder driven at twice the angular velocity of the sheet receiving cylinder, movable sheet stops carried by the sheet timing cylinder, and means to project the stops through peripherally extending openings in the timing cylinder and swing them in one direction during one revolution of the timing cylinder and to retract the stops within the cylinder periphery and swing them in the opposite direction during the next revolution of the timing cylinder.

3. In a sheet feeding mechanism for a printing machine having a sheet receiving cylinder carrying grippers for holding the sheet, a sheet timing cylinder, a sheet stop mechanism that projects from the surface of the timing cylinder during alternate revolutions thereof and is retracted into the timing cylinder during other revolutions, and sheet advancing means arranged to forward sheets to the sheet timing cylinder.

4. In a sheet feeding mechanism for a printing machine having a sheet receiving cylinder carrying grippers for holding the sheet, a sheet timing cylinder rotating at twice the angular velocity of the sheet receiving cylinder, sheet stops that may be projected above and retracted below the surface of the timing cylinder, a cam driven to rotate at one half the angular velocity of the timing cylinder, and a cam roller riding on the said cam and arranged to alternately project and retract the sheet stops during every two successive revolutions of the timing cylinder.

5. In a sheet registering mechanism for a printing machine having a sheet receiving cylinder and a sheet timing cylinder rotating at substantially the same peripheral speed for registering sheets on the sheet receiving cylinder, sheet registering stops on the timing cylinder, means to feed the sheet toward the stops, operating means to move the stops backward on the timing cylinder and into engagement with the leading edge of a sheet, and means to transfer the leading edge of the sheet to the sheet receiving cylinder, the said operating means acting to move the stops forward on the timing cylinder and away from the leading edge of the sheet when it

is transferred to the sheet registering cylinder.

6. In a sheet registering mechanism for a printing machine having a sheet receiving cylinder and a sheet timing cylinder rotating at substantially the same peripheral speed for registering sheets fed to the sheet receiving cylinder, first sheet registering stops on the timing cylinder, means to feed the sheet toward the first stops, second sheet registering stops on the sheet receiving cylinder, means to transfer a sheet from the sheet timing cylinder to the sheet receiving cylinder and push its leading edge against the second stops, and operating means for the first stops arranged to move them backward on the timing cylinder into engagement with a sheet thereon, and then forward on the cylinder and away from the sheet when it is transferred to the sheet receiving cylinder.

7. In a sheet registering mechanism for a printing machine having a sheet receiving cylinder and a sheet timing cylinder rotating at substantially the same peripheral speed for registering sheets on the sheet receiving cylinder, sheet registering stops on the timing cylinder, means to feed the sheet toward the stops, means to transfer the leading edge of the sheet to the sheet receiving cylinder, cam operated means to first move the stops backward on the sheet cylinder and into engagement with the leading edge of the sheet being fed and then to move the stops forward on the timing cylinder to clear the leading edge of the sheet when it is transferred to the sheet receiving cylinder.

8. In a sheet registering mechanism for a printing machine having a sheet receiving cylinder to which a sheet normally is fed during each revolution, a sheet timing cylinder rotating at substantially the same peripheral speed though at a higher angular velocity, movable sheet stops carried by the sheet timing cylinder, and means to move the stops forward and into the cylinder

and then backward and out of the cylinder in timed relation with the rotation of the sheet receiving cylinder.

9. In a sheet registering mechanism for a printing machine, a sheet conveyor including a pair of chains and sprockets about which the chains are led, each chain including a first link member having a sheet carrying surface and a stop, and a second link member having a finger cooperating with the first link member while the said link members are in a straight portion of the chain path, to form a pocket for holding and aligning a sheet being urged against the stops; there being no pocket formed while the said link members are in engagement with the sprockets, and the sheet then being freed for transfer to the printing machine.

10. In a sheet registering mechanism for a printing machine, a sheet conveyor including a pair of chains and sprockets about which the chains are led, each chain including a first link member having a sheet carrying surface and a stop, and a second link member having a finger cooperating with the sheet carrying surface on the first link member to form a pocket while the said link members are in a straight portion of the chain path; and a pivotal connection between the said link members whereby the said pocket is held open while the said link members are in engagement with a sprocket.

WILLIAM F. HUCK.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,128,390	Upham	Feb. 16, 1915
1,991,003	Stevens	Feb. 12, 1935
2,406,006	Eckhard	Aug. 20, 1946