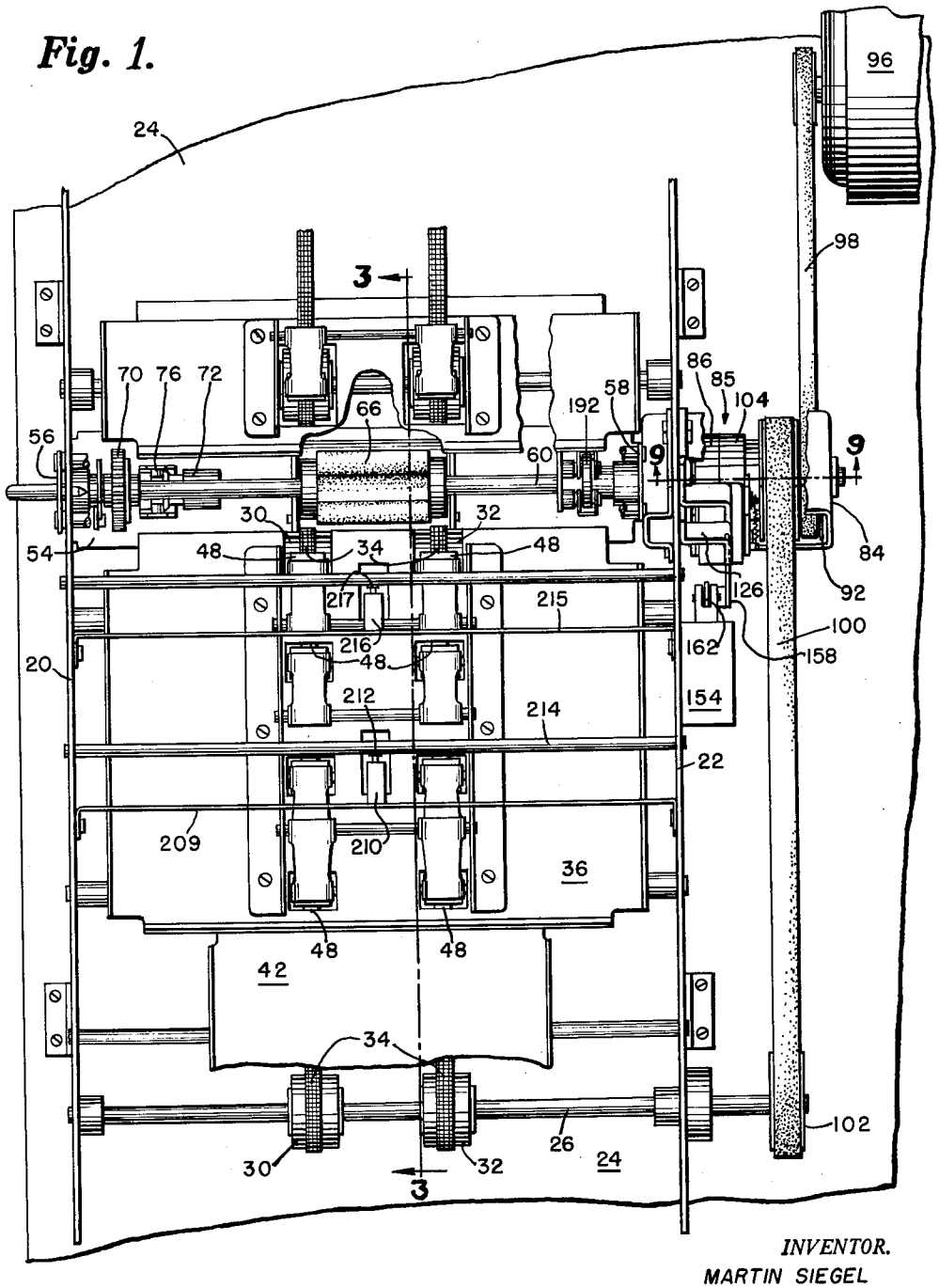
June 19, 1962 M. SIEGEL 3,039,385

PRINTING APPARATUS

Filed Jan. 10, 1961 6 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

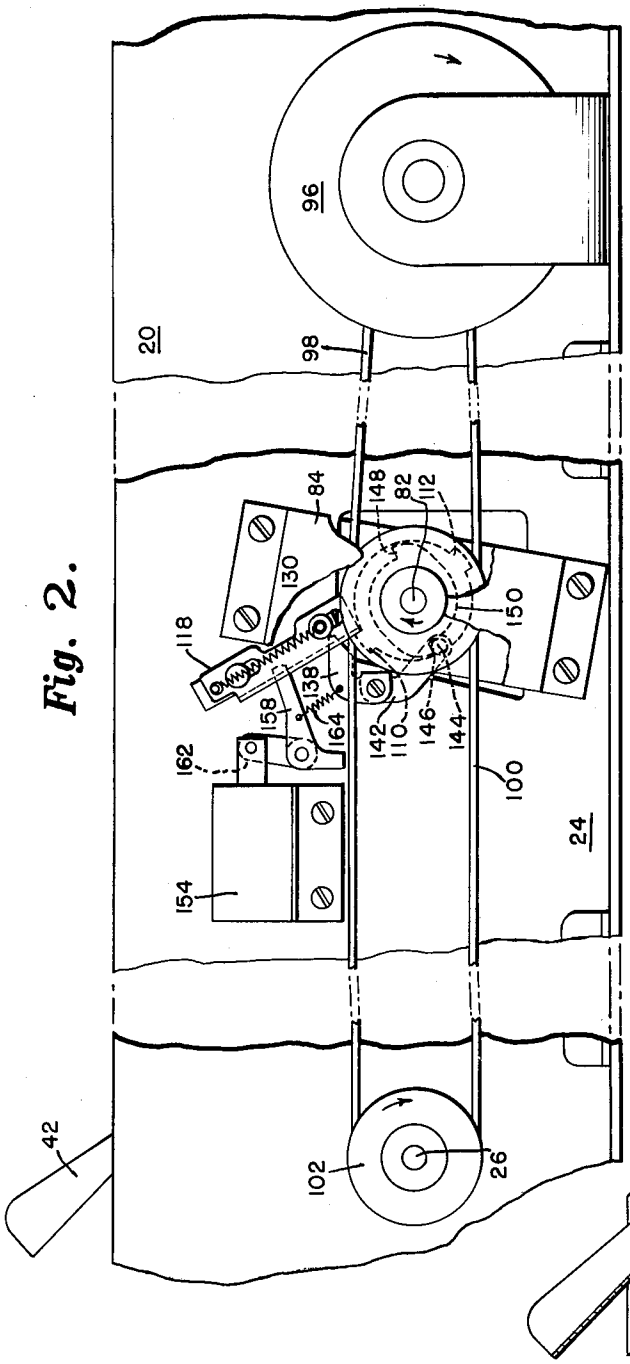
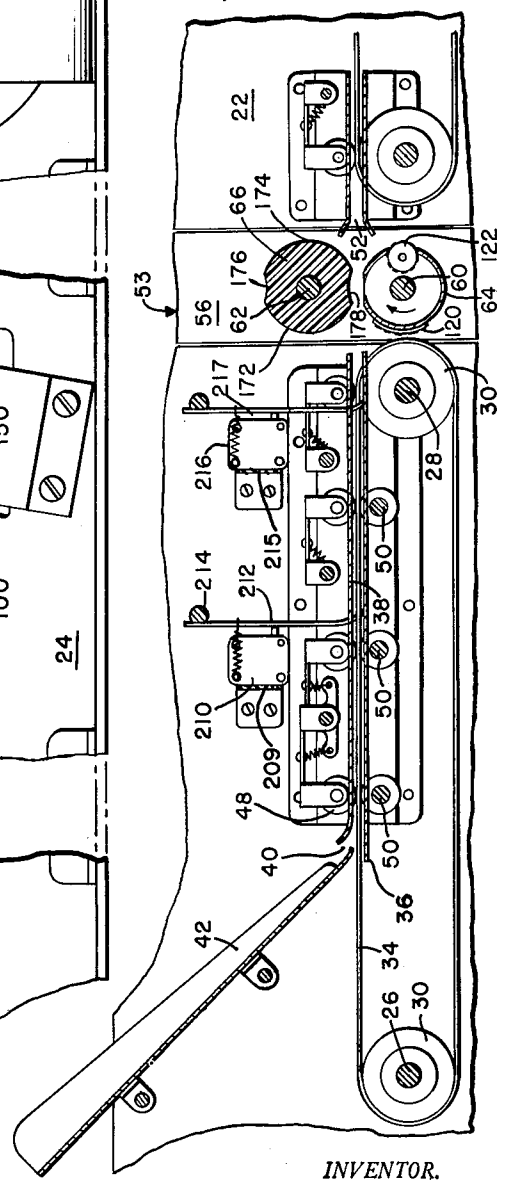


Fig. 3.



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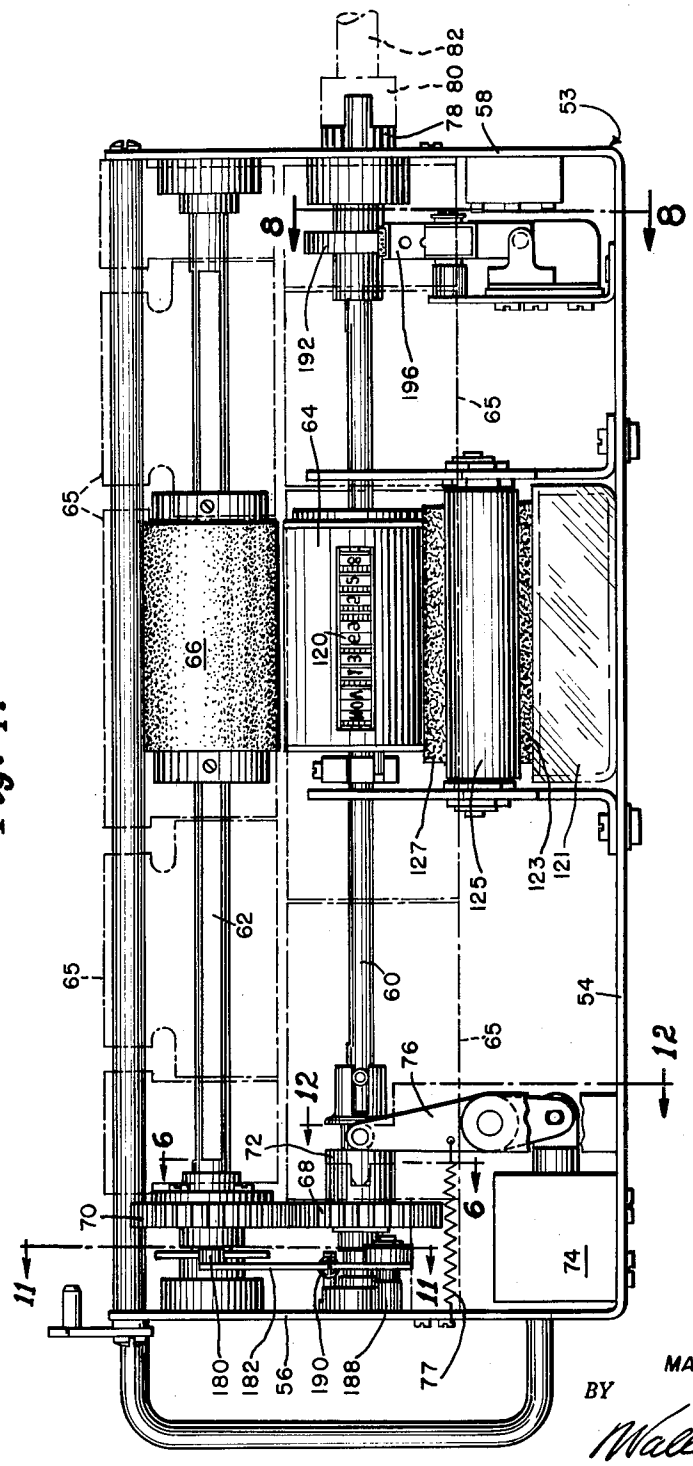


Fig. 4.

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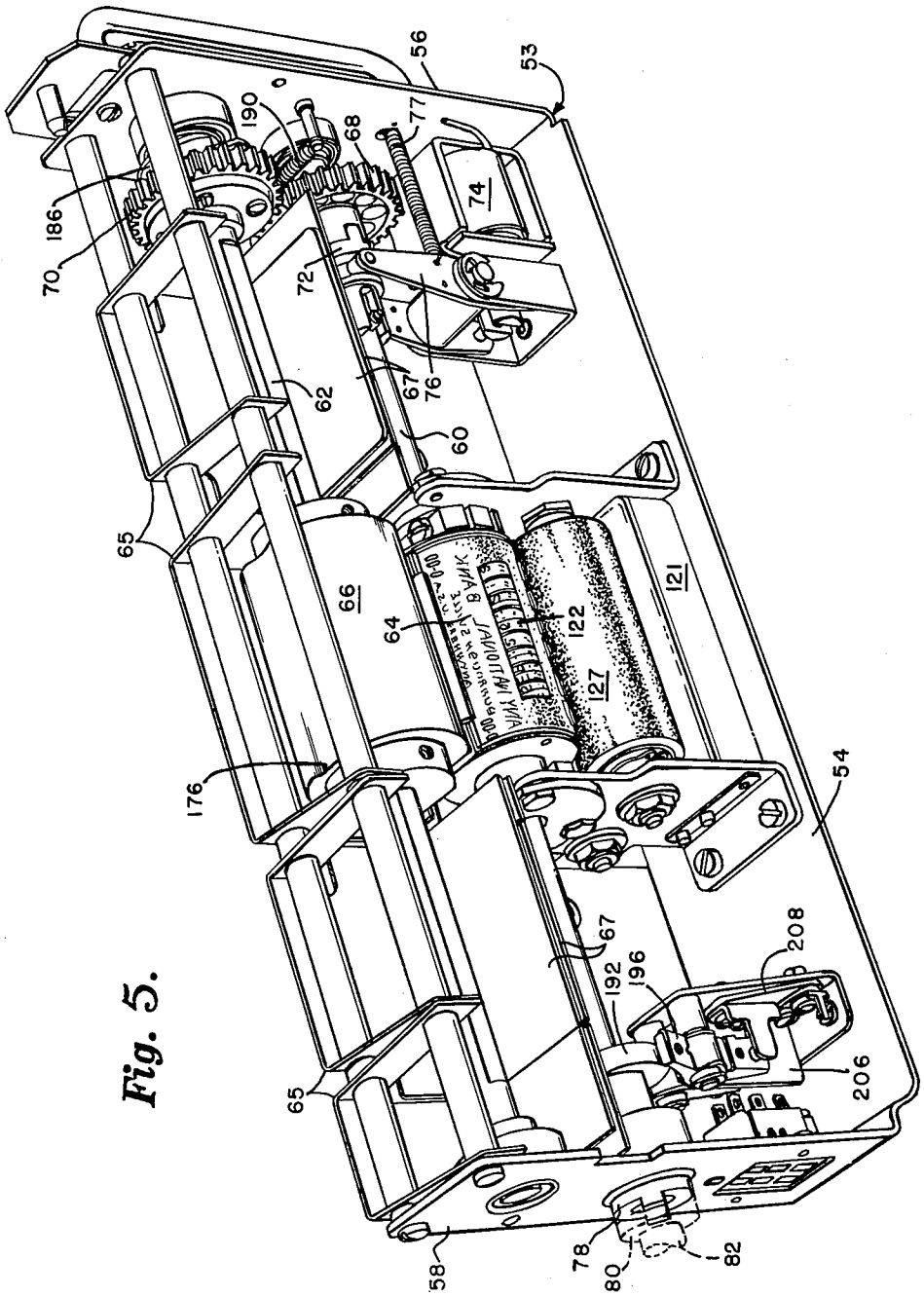


Fig. 5.

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Fig. 6.

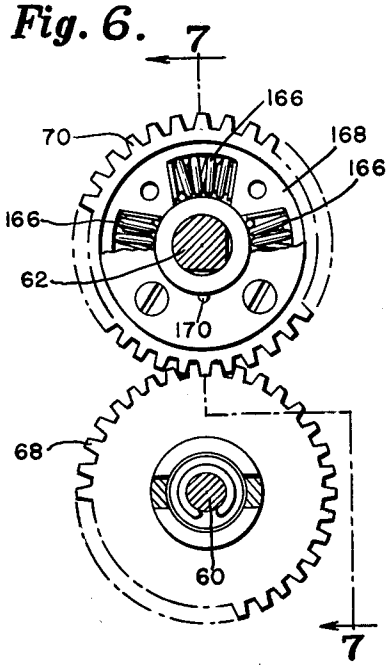


Fig. 7.

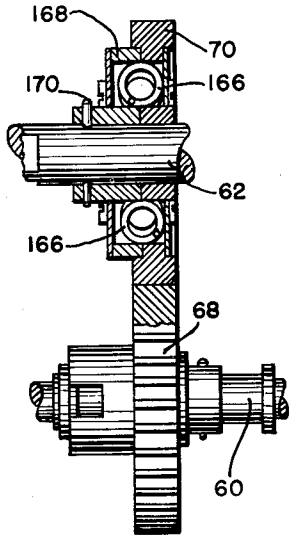


Fig. 9.

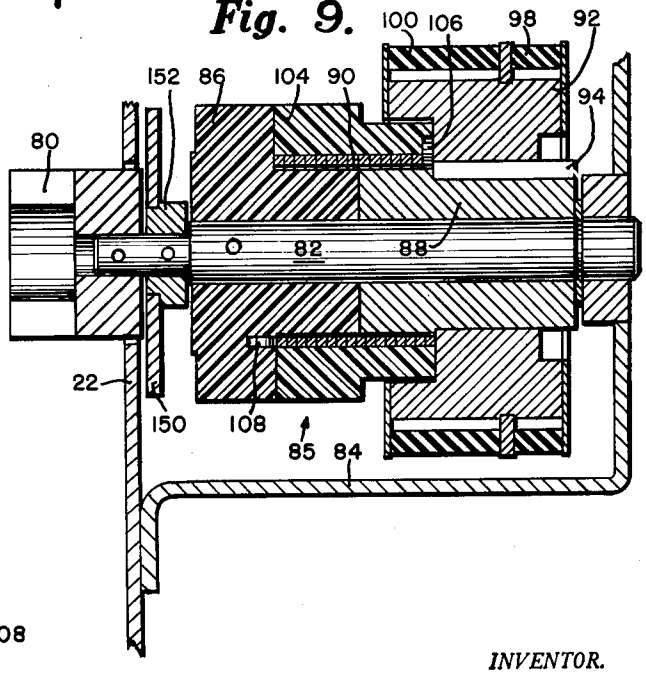
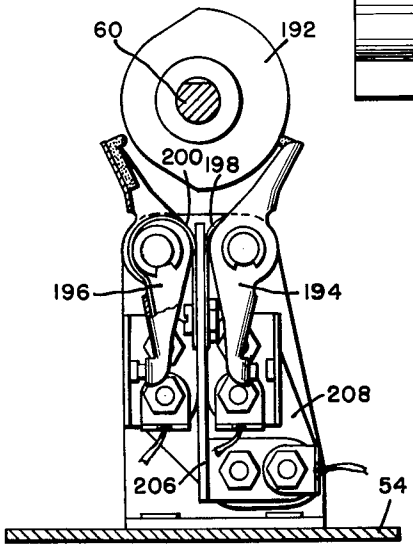


Fig. 8.



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Fig. 12.

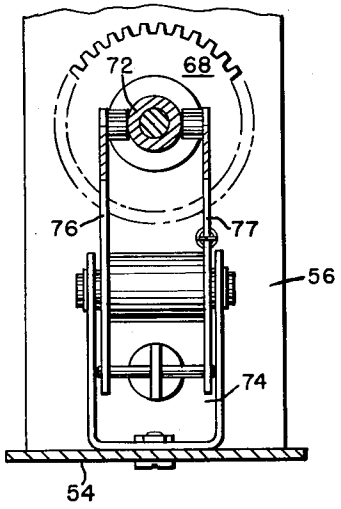


Fig. 13.

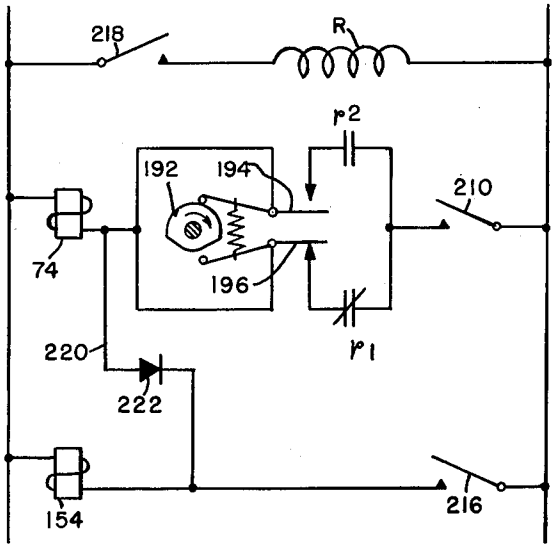


Fig. 10.

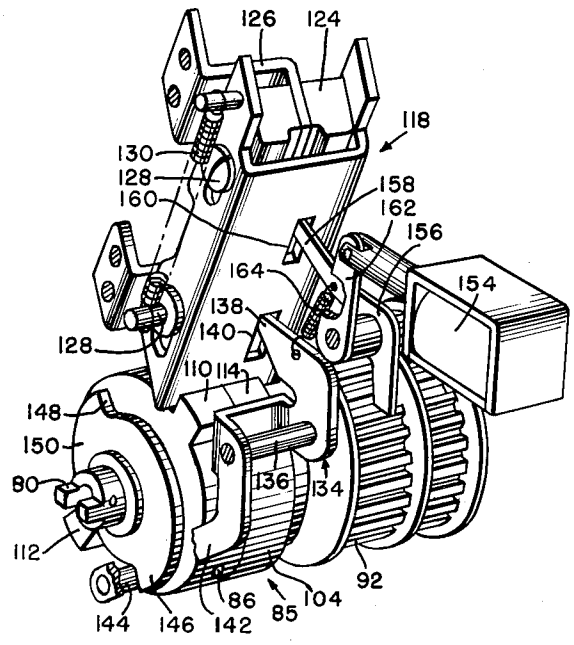
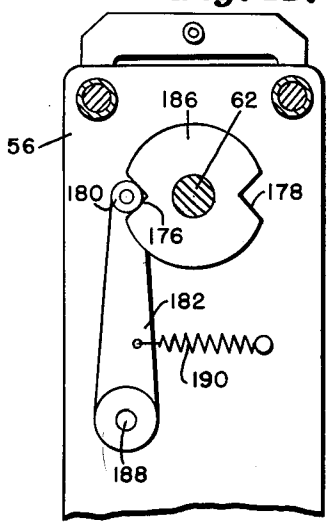


Fig. 11.



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United States Patent Office 3,039,385 Patented June 19, 1962

3,039,385

PRINTING APPARATUS

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Filed Jan. 10, 1961, Ser. No. 81,817
6 Claims. (Cl. 101—91)

This invention relates generally to printing apparatus and particularly to a document endorsing apparatus and control system therefor.

One of the objects of my invention is to provide an improved document endorsing apparatus of the type in which a print wheel and pressure roller cooperate in rolling an endorsing imprint onto a document.

Another object of the invention is to provide for a document endorsing apparatus of the type having a print wheel and a cooperating pressure roller adapted to effect alternate half cycle indexing and printing operations, an improved control system for rendering the pressure roller ineffective during the indexing operation.

Another object of the invention is to provide an improved document endorsing apparatus of the type in which a print wheel is rotatable through one-half cycles of rotation for respectively indexing the wheel to position one of two printing plates in a preprinting position, and for printing the endorsement, and to provide for the selecting of one or the other of the printing plates for the printing operation.

Other objects of the invention will become apparent from the following detail description, taken in connection with the accompanying drawings, in which—

FIG. 1 is a fragmentary plan view of a document endorsing apparatus, embodying features of my invention;

FIG. 2 is a fragmentary side view;

FIG. 3 is a vertical sectional view, taken along the line 3—3 of FIG. 1;

FIG. 4 is a front view of a printing unit, shown removed from the apparatus;

FIG. 5 is a perspective view of the printing unit of FIG. 4;

FIG. 6 is a vertical sectional view, partly in elevation, and taken along the line 6—6 of FIG. 4;

FIG. 7 is another vertical sectional view, taken along the line 7—7 of FIG. 6;

FIG. 8 is a vertical sectional view, partly in elevation and taken along the line 8—8 of FIG. 4;

FIG. 9 is a vertical sectional view partly in elevation of a drive clutch and associated structure, taken along the line 9—9 of FIG. 1;

FIG. 10 is a perspective view of the drive clutch and controls therefor;

FIG. 11 is a vertical sectional view partly in elevation, taken along the line 11—11 of FIG. 4;

FIG. 12 is a vertical sectional view partly in elevation, taken along the line 12—12 of FIG. 4, and

FIG. 13 is a diagrammatical illustration of the control system of the document endorsing apparatus.

Referring to the drawings by characters of reference, the document endorsing apparatus has a supporting structure, which may comprise, in general, a pair of oppositely spaced apart side plates 20 and 22 supported on a bed plate 24. Mounted on the side plates 20 and 22 there is a pair of horizontally spaced driven shafts 26 and 28 to each of which is affixed a pair of axially spaced pulleys 30 and 32 around the corresponding ones of which travel a pair of endless document feed belts 34. The upper or feed sides of the belts 34 pass between upper and lower horizontal guide plates 36 and 38 respectively which extend transversely of the belts and are mounted at their opposite ends on the side plates 20 and 22. The

vertically spaced apart plates 36 and 38 form a guideway having an inlet 40 at one end thereof in communication with the lower end of a document chute 42.

Spaced along the upper sides of the document feed belts 34 are pairs of pressure rollers including upper rollers 48 and lower rollers 50. These pairs of rollers project through clearance holes in the upper and lower guide plates 36, 38 to engage opposite sides of the belts 34 and provide the necessary pressure to effect feeding of the documents by the belts.

An interruption, as at 52, in the guide plates 36, 38 is provided adjacent the discharge ends of the feed belts 34 to receive a printing mechanism and associated components which have a common support 53 and are removable from the apparatus as a unitary structure. The printing mechanism support 53 is preferably a frame having a horizontal base 54 and upright opposite end plates 56 and 58. Mounted in suitable journals, affixed to the end plates 56, 58, there is a pair of vertically spaced apart horizontal shafts, including a lower driving shaft 60 and an upper driven shaft 62. Mounted on and fixed to the driving shaft 60 there is an endorsing print wheel 64 and mounted on the driven shaft 62 there is a platen or pressure roller 66, directly above and in cooperative relation with the print wheel 64. Brackets 65 support horizontally spaced guide plates 67 which provide a continuation of the document guideway to the bight formed by print wheel 64 and pressure roller 66.

The driving shaft 60 and the driven shaft 62 are connected together adjacent the end plate 56 by a driving gear 68 on shaft 60, in mesh with a driven gear 70 on shaft 62. A normally engaged clutch 72 connects the driving gear 68 to the driving shaft 60 and is activated by a solenoid 74, which is operatively connected to the clutch 72 by a shifter fork 76. A coil spring 77, yieldingly opposing the solenoid 74, acts to pivot the fork 76 in a direction to effect engagement of the clutch 72.

One end of the driving shaft 60 of the printing unit is connected by cooperating coupling members 78 and 80 to a clutch shaft 82, as shown in FIGS. 4 and 9, the coupling members being aligned to couple when the unit is slid into place. A bracket 84 supports the outer end of the clutch shaft 82 and is mounted on the outer side of the side plate 22 as shown in FIG. 9. On the clutch shaft 82 there is a normally disengaged clutch 85 including a pair of end to end sleeves 86 and 88 and a coil spring clutch member 90 that surrounds adjacent end portions of the sleeves. The sleeve 86 is pinned to the shaft 82 whereas the sleeve 88 is freely mounted on the shaft 82. Surrounding the sleeve 88 there is a driven pulley 92 which is connected to sleeve 88 by a key 94, and the pulley 92 is continuously driven from the drive pulley of an electric motor 96 through a suitable driving belt 98. The electric motor 96 also drives the conveyor belts 34 through a belt drive 100, which connects the pulley 92 to a pulley 102 on one end of the conveyor shaft 26.

Surrounding the spring 90 there is a rotatable sleeve 104 having a recess to receive one end, as at 106, of the spring which has its other end, as at 108, received in a recess in the sleeve 86 as shown in FIG. 9. A pair of diametrically opposite abutment or stop members 110 and 112 are provided on the periphery of sleeve 86 and similar abutments or stop members 114 and 116 are provided on the periphery of sleeve 104 for abutting a retractable stop member 118 to disengage the clutch spring 90 and also to stop the print wheel 64.

The print wheel 64 has a pair of diametrically oppositely disposed printing plates 120 and 122 on the periphery thereof, adapted to imprint different endorsements. For example, banks and other institutions that handle large numbers of checks may provide printing

plate 120 with printing elements for imprinting on checks an endorsement indicating that the check was drawn on the home bank, and may provide plate 122 with printing elements for imprinting an endorsement for use on all other checks. As shown in FIG. 4, an ink well 121 is provided below the print wheel 64 having an upwardly projecting wick 123 for transfer of ink to an ink distribution roller 125, which in turn applies the ink to an inking roller 127 in contact with print wheel 64.

The stop member 118 is preferably a channel member slidably guided on a mounting member 124, which may be mounted by a suitable bracket 126 on the side plate 22. In the opposite sides of the channel-shaped stop member 118, slots are provided to receive guide pins 128 which are secured to and project laterally from the mounting member 24. A coil spring 130 has its upper end attached by a stud 132 to the stop member 118, and its lower end attached to the lower one of the guide pins 128, the spring 130 urging the stop member downwardly to its effective stop position, shown in FIGS. 2 and 10.

A bail 134 is pivoted on a stub shaft 136, which is mounted on the side plate 22, the bail having an upper arm 138 engaging in an aperture 140 in the web of stop member 118 and a lower arm 142 which carries a stud 144 for abutment against one or the other of a pair of diametrically oppositely disposed shoulders 146 and 148 on a disc 150, which has a hub 152 pinned to the clutch shaft 82. In the released position of the stop member 118, the spring urged stud 143 holds the clutch member 86 against rotation in the reverse direction and resultant reclutching action.

A solenoid 154 is provided to retract the stop member 118 and thus effect engagement of the clutch spring 90. The solenoid 154 is operatively connected to the stop member 118 by a bail type lever 156 having one arm 158 engaging in an aperture 160 in the web of stop member 118 and a second arm 162 pivotally connected to the armature of the solenoid 154. A tensioned coil spring 164 has its opposite ends respectively connected to the arm 158 of lever 156 and the arm 138 of the bail 134. In operation, release or activation of the clutch 85 is initiated by pulsing the solenoid 154 which retracts the stop member 118, and the clutch spring 90, which has been held radially expanded or disengaged by the stop member, is now free to contract and grip the end portions of sleeves 86, 88 to couple the printing mechanism driving shaft 60 to the continuously rotating clutch sleeve 88. The stop member 118 is retracted for an interval sufficient to allow the lugs 110 and 114 to clear the lower end of the stop member and then returns to intercept the lugs 112, 116 to disengage the clutch and limit rotation of the driving shaft 60 and thus the print wheel 64 and pressure roller 66 to a one-half cycle of rotation.

In order to avoid damage to the gears 68 and 70 when the clutch lugs engage the stop member 118, the gear 70 is preferably coupled to the driven shaft 62 by a resilient connection, such as a plurality of equally and angularly spaced coil springs 166, as shown in FIGS. 6 and 7. The springs 166 are interposed between the gear 70 and a coupling member 168, which is fixed to the shaft 62 by a pin 170. Thus, the resilient connection or springs 166 allow the driven shaft 62 to overtravel when gear 68 is stopped, the overtravel being limited by the compression of the springs, which then reverse the direction of rotation of the shaft 62 to return the pressure roller 66 to the position shown in FIG. 3. The pressure roller 66 has oppositely disposed pressure portions 172 and 174 separated by oppositely disposed print wheel clearance portions 176 and 178. The clearance portions are preferably arcuate recesses provided in the periphery of the roller 66 and of a depth to clear the printing elements of either of the printing plates 120 and 122. As shown in FIG. 3, in the home positions of the print wheel 64 and the pressure roller 66, the pressure roller recesses 176 and 178 are vertically disposed. In order to stop the roller in its proper home position, a spring pressed detent 180 is provided to engage in one or the other of a pair of diametrically oppositely disposed recesses 178 and 176 in the periphery of a disc 186, which is fixed onto the driven shaft 62, adjacent gear 70. The detent 180 is carried on the free end of an arm 182 which is pivoted on a stub shaft 188, mounted on the end plate 56. A coil spring 190 attached at one end thereof to the arm 182 and anchored at the other to end plate 56, yieldingly holds the detent 180 in engagement with the periphery of the disc 186.

Adjacent the end plate 58, a cam 192 is fixed onto the driving shaft 60 to actuate a pair of pivotal switch members 194 and 196. The switch members 194 and 196 are synchronized with the print wheel 64 and control both of the clutch solenoids 74 and 154 in accordance with the positions of the printing plates 120, 122 relative to the preprinting position. That is, in the present arrangement when the printing plate 120 is in the preprinting position, as shown in FIG. 3, switch member 194 is open and switch member 196 is closed; and when the other printing plate 122 is in the printing position, the switch members 194 and 196 are reversed. Each of the switch members 194, 196 is provided with a leaf spring 198, 200 which yieldingly hold cam follower members 202 and 204 of the switch members in contact with the cam 192, the leaf springs having lower ends anchored to an upright leg 206 of a bracket 208.

Mounted above and between the conveyor belts 34 on a cross member 209 there is a normally open document actuated switch 210 for controlling the clutch solenoid 154 and thus clutch 85. An operating arm 212 for the switch 210 depends therefrom having a lower free end in the path of travel of the documents enroute to the print wheel. In the present construction, the switch operating arm 212 is mounted on a cross rod 214, which is journalled for rotation on and between the side plates 20 and 22. Similarly, a second normally open document actuated switch 216 is mounted on a cross member 215 and is operated by an arm 217, the lower free end of which is in the path of travel of the documents enroute to the print wheel 64, posterior to arm 212 with respect to the direction of travel of the documents.

Referring now to FIG. 13, a selector or settable switch 218 is provided for selecting, for use, one or the other of the printing plates 120, 122, and is in series circuit with the coil R of a relay having a pair of contacts *r*1 and *r*2. In another circuit, parallel to the circuit of the settable switch 218 is the document actuated switch 210 and the pressure roller clutch solenoid 74, which are connected in series by the relay contacts *r*1 and *r*2 and the cam actuated switch members 194 and 196. The relay contacts *r*1 and switch member 196 are in parallel circuit with relay contacts *r*2 and switch member 194. The document actuated switch 210 also controls the drive clutch solenoid 154 mutually with the cam actuated switch members 194 and 196, which are connected to the solenoid 154 by a lead 220. The document actuated switch, which controls the drive clutch solenoid 154, is in series therewith and to avoid energization of the pressure roller clutch solenoid 74 when switch 216 is closed, a diode 222 may be provided in lead 220.

Operation

As previously mentioned, the cam 192 is rotatable with the print wheel 64 and therefore the positions of the cam operated switch members 194, 196 correspond to the positions of the printing elements 120, 122 relative to the preprinting position of the print wheel 64. When the cam actuated switches 194 and 196 are in the positions shown in FIG. 13, and the settable switch 218 is open, the non-selected one of the printing plates or printing plate 120 is in the preprinting position, as shown in FIG. 3. When the attendant of the endorsing apparatus deposits

a document in the chute 42, the document is fed therefrom onto the feed belts 34 and proceeding therewith toward the print wheel 64, first pivots arm 212 to close switch 210. Since relay contacts r1 and cam actuated switch 196 are closed, it will be seen that the circuit is completed to the pressure roller clutch solenoid 74 and also through lead 220 to the driving clutch solenoid 154. As a consequence, the clutch 72 is disengaged to disconnnect the pressure roller 66 from driving shaft 60 and, at the same time, the driving clutch 85 is engaged to rotate the print wheel 64 a one-half cycle of operation. This is a print wheel indexing operation to bring the selected printing plate 122 around to the preprinting position during which the pressure roller 66 remains at rest so as to avoid printing by the print plate 120 on the surface of the pressure roller. At completion of the indexing operation of the print wheel 64, the document releases the switch 210, which de- energizes the solenoid, thus allowing the clutch 72 to again become engaged. Proceeding along its path of travel, enroute to the print wheel 64, the document pivots the operating arm 217 of the switch 216, which allows the switch to close and causes the driving clutch solenoid 154 to be pulsed to activate the driving clutch 85 to effect a one-half cycle of operation to endorse the check with the imprint of the print plate 122. Thus, each time that a document is fed to the print wheel 64, the print wheel is rotated a one-half cycle of operation to effect an indexing of the print plate 122 to reprinting position, followed by a second one-half cycle of operation to endorse the document.

When it is desired to use the printing plate 120 for the endorsing operation, the settable switch 218 is closed and effects the reversal of the relay contacts r1 and r2 such that r1 is now open and r2 closed. With the switch 218 now selecting the printing plate 120, the next document placed in the chute 42 and proceeding along the conveyor closes switch 210, but since contacts r1 are now open, the switch 210 is ineffective and solenoids 74 and 154 remain de-energized. This is a change-over non-indexing operation. The consequence of this is that the selected one of the printing plates 120 remains in the preprinting position as shown in FIG. 3. Thus when the document actuates switch 216, the drive clutch solenoid 154 is caused to be pulsed to effect a one-half cycling of the print wheel and imprinting of the printing plate 120 on the document. It will be noted that the non-selected one of the print plates or plate 122 is now in the preprinting position such that closing of the document actuated switch 210 and 216 will effect indexing and printing cycles of operation. As before, the pressure roller 66 is disengaged from the driving or print wheel shaft 64 during the indexing operation to avoid inking of the pressure roller and is re-engaged for the subsequent one-half printing cycle of operation.

While I have shown and described my document endorsing apparatus in considerable detail, it will be understood that many changes and variations may be made therein without departing from the spirit and scope of the invention.

What I claim is:

1. In printing apparatus for endorsing documents, a pressure roller, a print wheel associated with said pressure roller to form a bight to which the documents are fed singly along a path of travel, said print wheel having a pair of different types of printing elements diametrically oppositely disposed on the periphery thereof, a normally disengaged clutch member operatively connected to said print wheel and operable to connect said print wheel to a driving source, an electrically operated retractable stop member normally holding said clutch member disengaged and said print wheel with one of said printing elements in a preprinting position less than 180° from the bight in the direction of rotation of the print wheel, said electrically operated member activatable to effect engagement and disengagement of said clutch member and limit rotation of said print wheel to one-half of a cycle of rotation, a first document actuated switch member operatively connected to activate said electrically operated member and disposed in the path of travel of the documents at a predetermined distance anterior to the bight, a second document actuated switch member operatively connected to activate said electrically operated member, said second switch member disposed in the path of travel of the documents anteriorly to said first switch member, and a third switch member, said first and third switch members operatively connected for mutually controlling said electrically operated member, said third switch member movable with said print wheel and to one or the other of two controlling positions corresponding respectively to the positions of said printing elements relative to said preprinting position.

2. In printing apparatus for endorsing documents, a pressure roller, a print wheel associated with said pressure roller to form a bight to which the documents are fed singly along a path of travel, said print wheel having a pair of different types of print elements diametrically oppositely disposed on the periphery thereof, a normally disengaged clutch member operatively connected to said print wheel and operable to connect said print wheel to a driving source, an electrically operated retractable stop member normally holding said clutch member disengaged and said print wheel with one of said printing elements in a preprinting position less than 180° from the bight in the direction of rotation of the print wheel, said electrically operated member activatable to effect engagement and disengagement of said clutch member and limit rotation of said print wheel to one-half of a cycle of rotation, a first document actuated switch member operatively connected to activate said electrically operated member and disposed in the path of travel of the documents at a predetermined distance anterior to the bight, a second document actuated switch member operatively connected to activate said electrically operated member, said second switch member disposed in the path of travel of the documents anteriorly to said first switch member, a third switch member, said first and third switch members operatively connected for mutually controlling said electrically operated member, said third switch member movable with said print wheel and to one or the other of two controlling positions corresponding respectively to the positions of said printing elements relative to said preprinting position, and a settable switch to render effective either one or the other of the positions of said third switch member.

3. In a printing apparatus, a pressure roller, a print wheel associated with said pressure roller to form a bight to which sheets are fed singly along a path of travel, said print wheel having a pair of relatively different print elements substantially equally and radially spaced about the periphery thereof, a clutch member operatively connected to said print wheel and operable to connect said print wheel to a driving source, an electrically operated clutch controlling member normally rendering said clutch member ineffective and said print wheel with one of said print elements in a preprinting position angularly displaced from the intake side of the bight by an angle less than the angle of displacement between said print elements, said clutch controlling member operable when activated to effect rotation of said print wheel and limit rotation thereof to an angular displacement substantially equal to the angular displacement between said print elements, a first normally open sheet actuated switch member operatively conected to said clutch controlling member, said first switch member disposed in the path of travel of the sheets a predetermined distance anteriorly of the bight and operable when closed to activate said clutch controlling member, a second normally open sheet actuated switch member operatively connected to said clutch controlling member, said second switch member disposed in the path of travel of the sheets and anteriorly to said first switch member, a pair of switch members operated by and upon

rotation of said print wheel through the angular displacement between said print elements, one of said pair of switch members normally in closed effective position and the other in open ineffective position corresponding respectively to the positions of said print elements relative to the preprinting position, and selector switch means operatively connected to and for rendering said one switch member ineffective and said other switch member effective.

4. In a printing apparatus, a pressure roller, a print wheel associated with said pressure roller to form a bight to which sheets are fed singly along a path of travel, said print wheel having a pair of relatively different print elements substantially equally spaced apart about the periphery thereof, clutch means operatively connected to said print wheel and operable to connect said print wheel to a drive source, electrically operated clutch controlling means normally holding said first clutch means ineffective and said print wheel in a position with a selected one of said print elements in a preprinting position angularly displaced anteriorly from the bight with respect to the direction of rotation by an angle less than the angular displacement between said print elements, said clutch controlling means operable when activated to effect indexing rotation of said print wheel and limit rotation thereof to an angular displacement substantially equal to the angular displacement between said print elements, a first normally open sheet actuated switch member operatively connected to said clutch controlling means, said first switch member disposed in the path of travel of the sheets a predetermined distance anteriorly of the bight with respect to the direction of sheet travel and operable when closed to activate said clutch controlling member, a second normally open sheet actuated switch member operatively connected to said clutch controlling means, said second switch member disposed in the path of travel of the sheets and anteriorly to said first switch member with respect to the direction of travel of the sheets, and a third and normally closed switch member electrically connecting said clutch controlling means to said second switch member, said third switch member opened and closed by and upon rotation of said print wheel and with said second switch member mutually controlling said clutch controlling means, a fourth and normally open switch member electrically connecting said clutch controlling means to said second switch member, said fourth switch member closed and opened by and upon rotation of said print wheel, and selector switch means operatively connected to said third and fourth switch members.

5. In printing apparatus, a rotatable print wheel having two different types of print elements equally spaced apart on the periphery thereof, a pressure roller engaging said print wheel to form a bight to which sheets to be printed are fed singly along a path of travel, said print wheel normally in a position with one of the print elements in a preprinting position angularly displaced from the intake side of the bight in the direction of rotation of said print wheel by an angle less than the angular displacement between said print elements, said pressure roller having a pair of equally and radially spaced apart pressure portions on the periphery thereof separated by print element clearance recesses and normally at rest with the recesses respectively overlying the spaces between said print elements, first clutch means operatively connecting said print wheel to a driving source, first electrically operated clutch controlling means operable when activated to effect rotation of said print wheel and limit said rotation to an angular displacement equal to the angular displacement between said print elements, second and normally engaged clutch means connecting said pressure roller to and for rotation with said print wheel, second electrically operated clutch controlling means operable when activated to disengage said second clutch means, a sheet actuated switch member disposed in the path of sheet travel and electrically connected to and for activating said first clutch controlling means, and a second sheet actuated switch member disposed in the path of sheet travel anteriorly of said first switch member with respect to the direction of sheet travel and electrically connected to activate said first and second clutch controlling means.

6. In printing apparatus, a rotatable print wheel having two different types of print elements equally spaced apart on the periphery thereof, a pressure roller associated with said print wheel to form a bight to which sheets to be printed are fed singly along a path of travel, said print wheel normally in a position with one of the print elements in a preprinting position angularly displaced from the intake side of the bight in the direction of rotation of said print wheel by an angle less than the angular displacement between said print elements, said pressure roller having a pair of equally and radially spaced apart pressure portions on the periphery thereof separated by print element clearance recesses and normally arranged with the recesses respectively overlying the spaces between said print elements, first clutch means operatively connecting said print wheel to a driving source, first electrically operated clutch controlling means operable when activated to effect rotation of said print wheel and limit said rotation to an angular displacement equal to the angular displacement between said print elements, second and normally engaged clutch means connecting said pressure roller for rotation with said print wheel, second electrically operated clutch controlling means operable when activated to disengage said second clutch means, a sheet actuated switch member disposed in the path of sheet travel and electrically connected to and for activating said first clutch controlling means, a second sheet actuated switch member disposed in the path of sheet travel anteriorly of said first switch member with respect to the direction of sheet travel and electrically connected to activate said first and second clutch controlling means, a pair of switch members individually connecting said first and second clutch controlling members to said second switch member, one of said pair of switch members normally closed and the other normally open in correspondence respectively to the positions of said print elements relative to the preprinting position, said pair of switch members actuated by and upon rotation of said print wheel, and a normally open settable switch means operable to render one or the other of said pair of switch members effective.

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