Aug. 19, 1952 C. A. HARLESS ET AL 2,607,292

ROTOGRAVURE IMPRESSION MECHANISM

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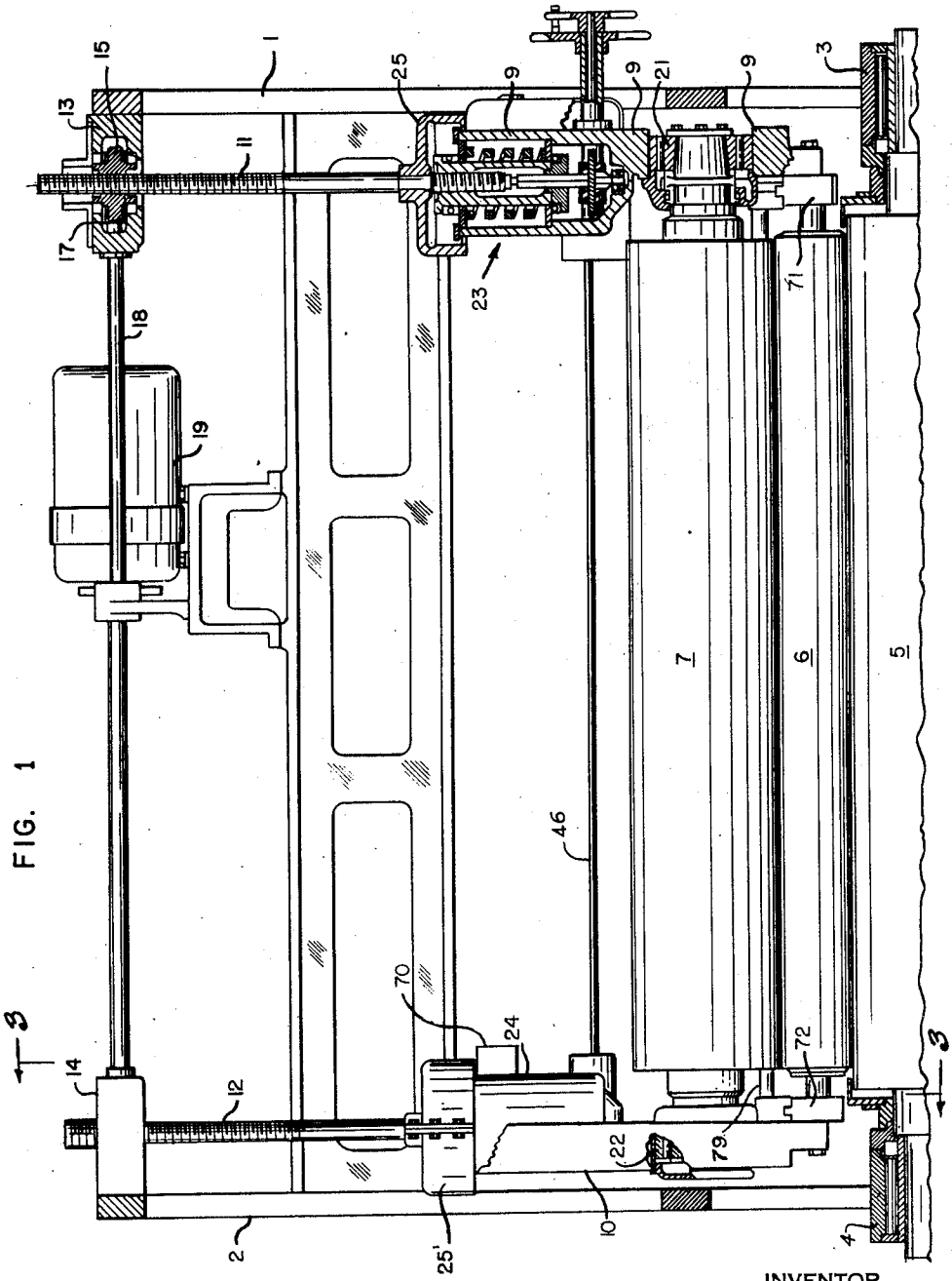


FIG. 1

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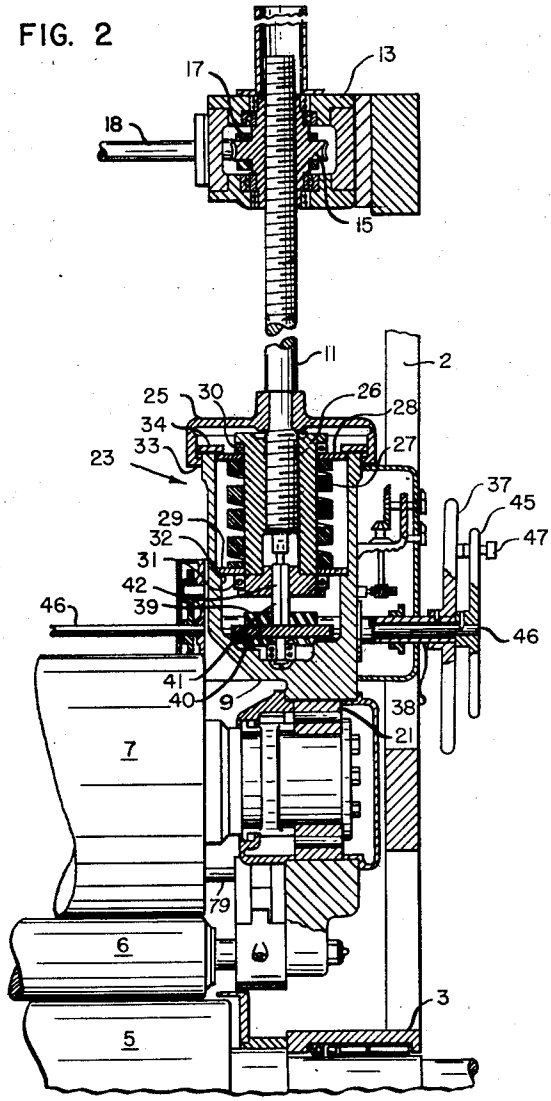
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ROTOGRAVURE IMPRESSION MECHANISM

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FIG. 2



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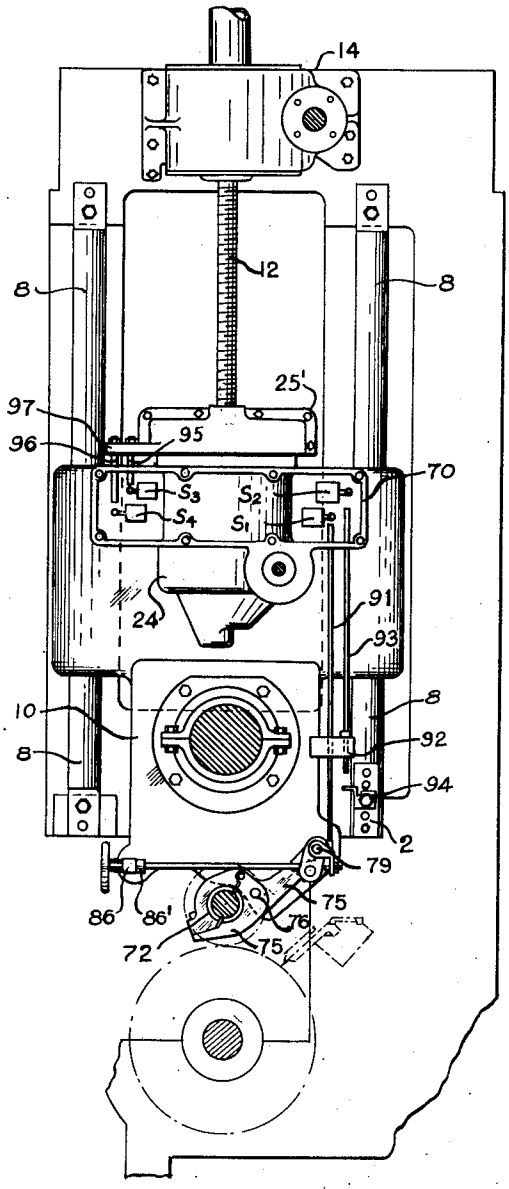
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ROTOGRAVURE IMPRESSION MECHANISM

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FIG. 3



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ROTOGRAVURE IMPRESSION MECHANISM

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FIG. 4

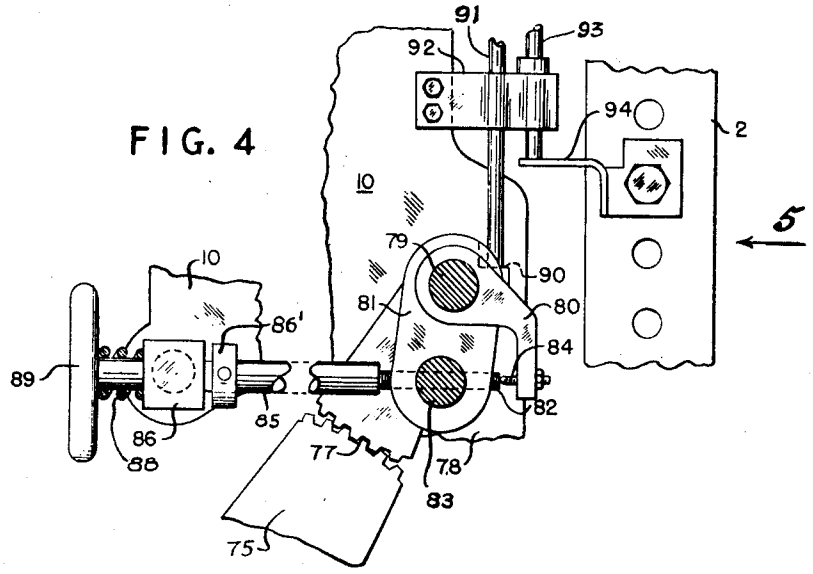
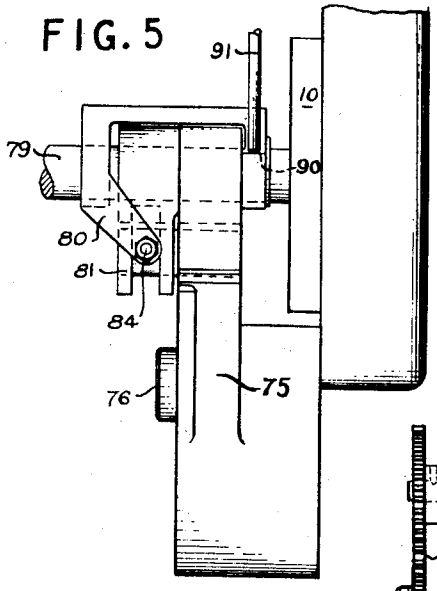


FIG. 5



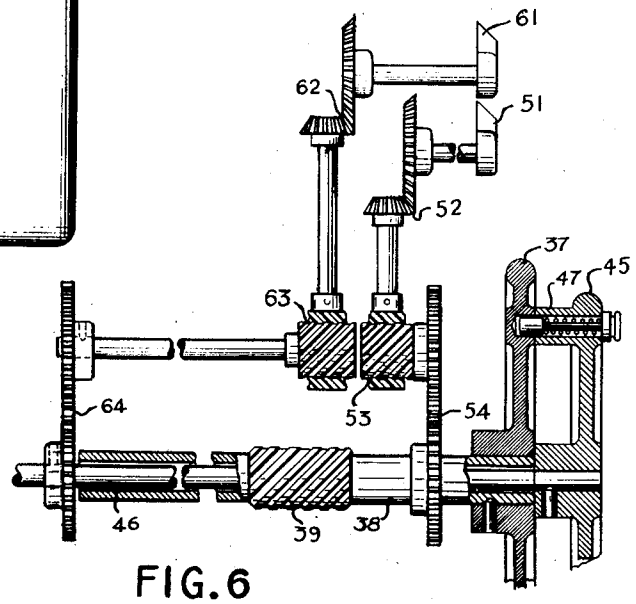


FIG. 6

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ROTOGRAVURE IMPRESSION MECHANISM

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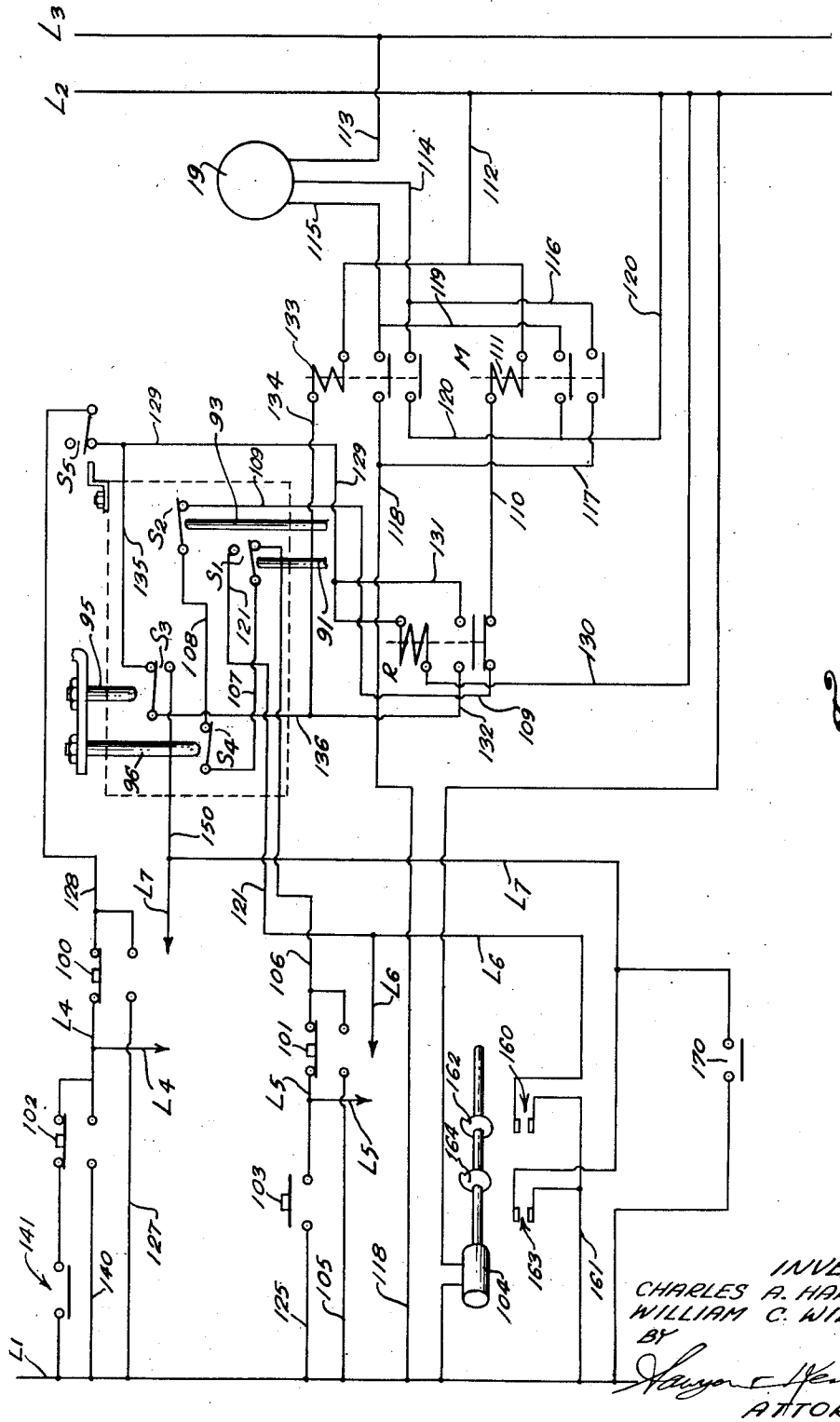


Fig. 1

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Patented Aug. 19, 1952

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UNITED STATES PATENT OFFICE

2,607,292

ROTOGRAVURE IMPRESSION MECHANISM

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Application May 29, 1948, Serial No. 30,114

24 Claims. (Cl. 101—153)

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This invention relates to rotary intaglio printing machines and more particularly to impression cylinder raising and lowering mechanism and pressure adjusting mechanism therefor.

The general object of the invention is to provide an improved automatic mechanism of the type indicated.

A more specific object is to provide an improved means for adjusting the impression pressure and automatically maintaining any desired pressure during operation of the machine.

Another object is to provide improved means for quickly removing the impression pressure without any considerable movement of the pressure producing parts.

With the foregoing and other objects in view, that will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the mechanical and electrical details of construction hereinafter described and claimed.

In the drawings:

Figure 1 is a side view of part of a printing unit embodying the invention in a preferred form of embodiment, frame structure and other parts being broken away to show details of construction;

Figure 2 is an enlarged view of a portion of Figure 1, showing further details of construction at the front or operating end of the unit;

Figure 3 is an enlarged section on the line 3—3 of Figure 1;

Figure 4 is an enlarged detail view showing part of the impression cylinder equalizing arrangement;

Figure 5 is a view looking in the direction of the arrow 5 of Figure 4;

Figure 6 is a detail view showing dial operating mechanism and associated parts; and

Figure 7 is a circuit diagram.

The usual rotary intaglio printing press comprises a number of units, each of which has a frame structure, a printing cylinder, an impression cylinder and a pressure cylinder. Such a structure is shown, for example, in Zuckerman Patent No. 1,695,793. The conventional and known elements of the press will not be repeated herein, the present disclosure being confined to a description of the new elements and so much of the old elements as is necessary to an understanding of the present invention.

Figure 1 indicates part of the frames 1 and 2 of a rotogravure printing press unit, in which there is journaled by means of bearings 3 and 4 the printing cylinder 5. Only the upper part of

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the printing cylinder is shown, it being understood that the subjacent frame, ink fountain and other structure may be of any desired form. The rubber covered impression cylinder 6 presses the web to be printed firmly against the printing cylinder 5 and the desired pressure is supplied and regulated by means of a pressure cylinder 7 surmounting the impression cylinder 6. The pressure cylinder 7 and impression cylinder 6 are carried by vertically movable slide members 9 and 10, which slide up and down on guide rods 8 (Figure 3) carried by the frames 1 and 2. The members 9 and 10 are moved up and down by means of rods 11 and 12. Gear housings 13 and 14 contain operating mechanism for raising and lowering the rods 11 and 12. This mechanism, being the same in both cases, is shown only in connection with the rod 11 and comprises a worm wheel nut 15 (Figures 1 and 2) cooperating with the threaded upper end of the rod 11 and driven by a worm 17 fixed on a worm shaft 18, which extends across the press from frame to frame. The shaft 18, is, in turn, driven by an electric motor 19 having a speed reducing gear. Rotation of the shaft 18 by the motor 19, in one direction, will raise both the rods 11 and 12 equally, while rotation in the other direction lowers both rods equally.

The pressure cylinder 7 is carried in bearings 21 and 22 fixed in the slidable members 9 and 10, while the impression cylinder 6 may be suspended from the members 9 and 10, during raising and lowering of the impression mechanism, by an arrangement of parts which is later described in detail. The printing pressure is provided by the weight of the impression cylinder 6, pressure cylinder 7 and associated parts, and if additional pressure is required it is supplied by a spring mechanism which will now be described.

The upper parts of the members 9 and 10 form the inner or lower halves of telescoping spring housings 23 and 24. The internal structure of the housing 24, associated with the rod 12, is the same as that of the housing 23, and, hence, only the latter is shown in detail in the drawing. Referring to Figure 2, the cap or outer portion 25 of the telescoping housing 23 consists of two semicircular parts which are bolted together and keyed on a reduced portion of rod 11 and move up and down therewith. The rod 11 and housing cap 25 are held against rotation by means hereinafter described. The lower threaded end of rod 11, within the housing 23, carries a correspondingly threaded sleeve 26 around which is positioned a spring 27 and upper and lower thrust

washers 28 and 29. Upper and lower antifriction thrust bearings 30 and 31 are provided for communicating pressure from flanges at either end of the sleeve 26 to the thrust washers 28 and 29. A ring 34 secured to the upper edge of the spring housing 23 engages the washer 28 and also an internal shoulder or lip 33 formed in the cap 25, and the washer 29 engages a shoulder 32 formed within the spring housing 23. The spring 27 may thus impose either a downward or an upward force on the member 9 and the pressure cylinder 7, to an extent depending upon the position of the sleeve 26 on the rod 11.

The mechanism for adjusting the position of the sleeve 26 comprises a hand wheel 37 which turns a hollow shaft 38 and by means of a worm 39 carried thereon rotates a worm wheel 40 secured to a square shaft 41. Shaft 41 passes through a square opening 42 in the lower end of the sleeve 26 for rotating the same while permitting unobstructed upward and downward movement of the sleeve. As will be apparent, turning the wheel 37 in one direction will lower the sleeve 26 within the housing 23, and with the parts as shown in Figure 2 will increase the impression pressure adjacent the front of the machine, while turning it in the other direction will raise the sleeve 26 and tend to lift the member 9 and the parts carried thereby and so reduce the impression pressure. The operating mechanism within the back housing 24 is the same as that just described in the case of the front housing 23, and is operated by hand wheel 45 and a shaft 46 which passes through the hollow shaft 38 to regulate the impression pressure adjacent the rear of the machine. Hand wheels 37 and 45 may be coupled together or uncoupled by means of a catch 47 of familiar type. With the sleeve 26 so positioned that the spring 27 is fully expanded, the ring 34 will engage with the lip 33 and the washer 28, and the shoulder 32 will engage with the washer 29. The parts are then set to produce an impression pressure equal to the combined weights of the sliding members 9 and 10 and the cylinders and other parts which they carry. Under these conditions, when the rod 11 is lowered, the weight of the impression cylinder 6 will first be transferred to the printing cylinder 5 as the rods 10 and 11 move downward and thereafter the weight of the pressure cylinder 7 will gradually be added and produce a combined impression pressure equal to the weight of the parts as hereinbefore indicated. A very small further motion of the rods 11 and 12 will open a gap between the lip 33 and the washer 34, and this motion will be utilized to operate a switch S4 and stop the further movement of the rods 11 and 12 by means of electrical control circuits hereinafter described.

If a greater impression pressure is required, this is obtained by manipulation of the hand wheels 37 and 45, for turning the sleeves 26 to move them downward on the rods 11 and 12, which will result in compressing the springs from the top, thereby pressing downward on the shoulder 32 and adding pressure to the cylinder 7. Conversely, for an impression pressure lower than the weight of the impression parts, the sleeves 27 will be turned to move them upward on the rods 11 and 12 and compress the springs 27 from the bottom, thereby pressing upward on the rings 34 and transferring to the spring, some or all of the weight carried by the lip 33.

Dials and pointers for showing the spring sleeve positions in the housings 23 and 24 are provided. As best shown in Figure 6, the pointer 51 for the front end of the cylinder is operated through bevel gears 52; helical gears 53 and a spur gear pair 54 from the shaft 38. This gearing turns the pointer 51 as the sleeve 26 (Figure 2) is turned so that the sleeve setting is shown at all times. The pointer 51 may read in arbitrary units, or in pounds of printing pressure, as desired. A similar pointer 61 is provided for the rear mechanism, being driven by similar gearing 62, 63 and 64 from the shaft 46.

The impression cylinder 6 is carried in bearings 71 and 72 (Figure 1). Each bearing is supported by similar mechanism and only the mechanism at the back end will be described (Figures 3, 4 and 5). This mechanism comprises an arm 75, swung on a stub shaft 76 which is fixed on the sliding member 10 (Figure 3). The arm 75 extends beyond the shaft 76, being formed with a gear section 77 (Figure 4) which cooperates with a gear sector 78 fixed to an equalizer shaft 79, which extends across the machine and is journaled in the members 9 and 10. The mechanism at the other end of the impression cylinder being similar, it will be apparent that the impression cylinder is free to move up and down with respect to the pressure cylinder, while the equalizer shaft 79 serves to maintain parallelism in this movement.

The impression cylinder 6 being carried on supports which swing about the stub shafts 76, it is necessary to provide means to prevent more than a small separation between the impression cylinder and the pressure cylinder 7 when the impression mechanism is raised from the printing cylinder 5. Such means is shown in Figures 3, 4 and 5 and comprises an arm 81 secured to the shaft 79 and a rod 85 having a reduced threaded portion 82 which passes through a threaded bore in a stub shaft 83 rotatably supported in the arm 81. The rod 85 is provided with a hand wheel 89 whereby it may be turned, and a collar 86' is secured to the rod. A spring 88 biases the rod 85 to press the collar 86' against the poppet 86. It will be seen that by turning the hand wheel 89, the arm 81 may be swung about the axis of the shaft 79 and raise or lower the impression cylinder 6, and the impression cylinder may thus be adjusted close to but out of actual contact with the pressure cylinder. However, compressibility of the spring 88 will permit the arms 75 to pivot on the stub shafts 76 sufficiently to allow engagement of the pressure and impression cylinders when they are lowered to the position shown in Figures 1 and 2. It will be understood that the hand wheel 89 also provides means for properly positioning impression rollers that may be of large or small diameter within certain limits.

As the impression mechanism is lowered from a raised position, the impression cylinder 6 will first come into contact with the printing cylinder 5. Thereafter, the slide members 9 and 10 and the pressure cylinder 7 will continue to move downwardly and means is provided for checking this downward movement and finally stopping it at a proper point. This means includes a member 80 (Figures 4 and 5) rotatably mounted on the equalizer shaft 79 and adjustably coupled thereto at the rear side of the machine. The adjustable coupling includes an adjusting pin 84 which engages the extremity of the threaded portion 82 of the rod 85. The member 80 is formed with a step 90 arranged to engage a rod 91 which is slidably supported in a bracket 92 secured to the member 10, and serves as the actuating mem-

ber for a switch S1 that opens the direct circuit to the motor 19 and energizes it through an interrupter, giving a pulsating current which produces a jogging action and decelerates the motor during the later part of the lowering motion of the slide members 9 and 10, as the impression roller engages the printing cylinder.

The switch S1 is mounted within a control housing 70 (Figure 3), which is fixed to and moves with the slide member 10. Another switch S2 mounted in the housing 70 adjacent the switch S1, is operated by a rod 93 slidably carried on the member 10 and arranged to engage a stop 94 fixed on the frame 2 to stop the motor 19 at the low limit of travel of the members 9 and 10. Additional switches S3 and S4 (Figure 3) are likewise arranged within the housing 70 and these are operated respectively by rods 95 and 96, secured to a lug 97 on the cap portion 25' of the spring housing. These rods pass through the upper wall of the housing 70 and operate the switches S3 and S4 on relative motion of the cap 25' with respect to the sliding member 10 during the relative motion of these parts in their telescoping action. The rod 95 also acts to prevent rotation of the cap 25' and the rod 12 to which it is secured, and a similar pin associated with the cap 25 (but not shown), cooperates with a hole drilled in the member 9 and prevents rotation of the rod 11. The switches S3 and S4 control the motor 19 to limitedly raise or lower the rods 11 and 12 as may be necessary to automatically maintain the desired separation of the elements 33 and 34 in the spring housings 23 and 24.

The mechanism operating the rod 91 and the members 95 and 96, which are respectively employed for operating the control switches S1, S3 and S4 are adjusted so that as the slide members 9 and 10 are lowered from a raised position, when the impression roller 6 comes to rest on the printing cylinder 5, the continued downward motion of the pressure cylinder 7 will turn the shaft 79 counter-clockwise (Figure 4) and operate the switch S1. This results in placing an interrupter in the circuit of the motor 19 and greatly reduces the lowering speed of the pressure cylinder. After the pressure cylinder reaches a neutral level where it closes the gap between it and the impression cylinder, further downward movement transfers the weight of the pressure cylinder from the rods 11 and 12 to the impression cylinder. After all weight of the pressure cylinder is taken from the rods 11 and 12, their further movement downward will put downward pressure on the springs 27 and increase the impression pressure proportionately. When the switch S4 is operated the downward motion stops.

Should the impression cylinder be forced up for any reason, the switch S3 will be actuated and will cause the motor 19 to raise the rods 11 and 12 so as to reestablish the desired impression pressure. If, on the other hand, the springs are not compressed to the set degree, the switch S4 will operate the motor 19 to force the rods 11 and 12 downwardly, thus establishing or reestablishing the desired pressure. Normally, the automatic control switches S3 and S4 will be set for a very small dead zone so that the mechanism will not be caused to operate by the passage of a double thickness of paper resulting from a web splice, but the switches will be set so that the mechanism will operate if a torn web becomes wrapped about the impression cylinder. The pressure is maintained substantially constant under normal operating conditions, because the compression of the springs 27 will not vary materially due to small changes in their compressed lengths.

Under full width web operation, and with printing pressure within the normal operating ranges, both springs 27 will be set to produce equal pressure on the pressure cylinder, and the set compression will be obtained and maintained at both ends by operation of motor 19 under control of switches S3 and S4.

Where part width webs are used, and the impression cylinder is cut down to a smaller diameter over the portion of the printing cylinder which is not printing, the pressures required at the two ends of the pressure cylinder may be different and in some cases, the spring 27 at one end of the cylinder may be required to press downwardly while the corresponding spring 27 at the other end of the cylinder presses upwardly. The upward pressing action is provided for by turning the sleeve 26 at one end of the cylinder so that an upward thrust will be exerted through washer 28 against the ring 34 fixed to the members 9 or 10, as the case may be. The pressure at one end of the impression cylinder will now be composed of a portion of the weight of the pressure cylinder plus an added spring pressure, while the pressure at the other end will be composed of a portion of the weight of the pressure cylinder, reduced by an upward spring pressure. In both cases, however, the net pressure exerted is a resilient and yieldable pressure, which tends to maintain its balance automatically under all conditions. For example, if the impression cylinder is raised slightly, by a double thickness of paper or for some other cause, the spring 27 at the end where downward spring pressure is being applied will be compressed slightly, thus slightly increasing the pressure applied. The spring 27 at the other end of the cylinder where pressure is being subtracted, will be expanded to some extent, thus increasing the pressure on this end of the cylinder also, since the spring pressure is acting in the upward direction.

During printing the impression cylinder is supported entirely by the printing cylinder but is maintained in parallelism by the equalizer shaft 79, while permitting the impression cylinder to adjust itself to printing conditions as required.

When the cylinders are in printing position, the lip 33 of the cap 25 may be separated about $\frac{1}{16}$" from the ring 34, as illustrated in an exaggerated way in Figure 2. The spring 27 will then act to provide resilient pressure either upward or downward, depending on the position of the sleeves 26 on the rods 11 and 12. If hand wheels 37 and 45 are turned to set the pointers 51 and 61 for a pressure greater than the weight carried by the slide members, the sleeves 26 will be moved downward on the rods, opening gaps above the spring 27, between the washers 28 and the rings 34, but if the pointers are set for a pressure less than the weight carried by the slide members, the sleeves 26 will be moved upward on the rods, opening gaps below the springs, between the rings 29 and the shoulders 32, and produce a resilient upward pressure that will counter-balance a portion of the weight of the pressure and impression cylinders.

Figure 7 of the drawing shows suitable circuits for the impression mechanism above described. The equipment at the unit includes: switches S1, S2, S3, S4, previously referred to, as well as the

usual up limit switch S5 for stopping the impression mechanism in its fully raised position; the motor 19 previously referred to; a motor relay M for starting, stopping and reversing the motor; a control relay R; pushbutton switch 100 for raising the impression; and a pushbutton switch 101 for lowering the impression. The power for the unit is taken from power lines L–1, L–2 and L–3. Control lines L–4 and L–5 which run to the master raising and lowering pushbuttons at the folder are also connected to the unit, as well as the lines L–6 and L–7 for jogging ond operating the motor 19 intermittently for positioning and maintaining the pressure mechanism in the desired position.

In the circuit diagram, switch S5 is, as indicated, a normally closed switch which opens only when the impression mechanism is in its fully raised position. Switch S1 is a two-way switch, making contact in the lower position for the preliminary full speed lowering movement of the mechanism and making contact in the upper position only when the impression mechanism has been lowered nearly to the printing position and the impression cylinder is resting on the printing cylinder. With switch S1 in the upper position, further movement of the mechanism will be controlled by the jogging line L–6 and will be intermittent. Switch S2 is normally closed and operates only as an emergency stop, opening, for example, if the impression mechanism is lowered with no impression cylinder in the unit. The switch S4 is closed at all times except when the cylinders are in printing position. It is opened by a slight telescoping of the spring housing 24, and stops the downward movement of the impression mechanism when the predetermined printing pressure is reached. The switch S3 is the up correcting switch, operating to jog the mechanism upwardly if for any reason the desired impression pressure is exceeded. This switch is a two-way switch, making connection in its upper or normal position, as shown in the figure, with a pushbutton controlled line and making connection in its lower position, with the up jogging line L–7.

Lowering of the impression mechanism under control of the unit pushbutton 101 occurs in the following way. Pushing this button establishes a circuit from line L–1 through line 105, pushbutton 101, line 106, switch S1, line 107, switch S4, line 108, switch S2, line 109, normally closed contacts in the control relay R, and line 110 to the down winding 111 of the motor relay M. The other side of this winding is connected through line 112 to power line L–2. Winding 111 of the relay M being thus energized, will close the down contacts of the relay M. Motor 19 is connected through a line 113 with the power line L–3. Motor connections 114 and 115 are respectively connected to power lines L–1 and L–2 (or the reverse) for operating the motor to lower (or raise) the impression mechanism. With the down contacts of the relay M closed, a circuit is established from line 114 through a line 116, contacts of the relay M and lines 117 and 118 to the power line L–1. Similarly, connection for the line 115 is established through lines 119 and 120 to the power line L–2, thus energizing the motor to lower the impression. So long as the pushbutton 101 is held down, the motor will continue to operate until the switch S1 is operated by the rod 91, as previously described. At this point the connection between lines 106 and 107 is broken and a connection from line 107 through switch S1 and line 121 to the down jogging line L–6 is established. Line L–6 being supplied with interrupted current by mechanism later described, the further downward movement of the impression mechanism will proceed at a reduced rate by means of successive small jogging movements. The downward jogging movement will continue until the shoulder 34 of the spring housing has been unseated from the supporting lip 33 to the desired extent, at which point the switch S4 will open, thus stopping the downward movement of the impression mechanism. If for any reason the mechanism should overshoot in this downward movement, an upward movement will be applied, as later described.

The same cycle of movements as just described may also be initiated under control of the master pushbutton 103 at the folder. Pressing this button connects line L–5 to line L–1 through line 125 and in turn makes a connection to line 106 through normally closed contacts of the pushbutton 101 previously referred to. The operating cycle from this point forward is the same as previously described.

Assuming the impression mechanism to have been lowered as before described, and assuming further that the lowering movement has not been carried too far, the impression mechanism will remain in the position at which the down jogging circuit connection is broken. The impression may, however, be lifted under control of the up pushbutton 100 in the following way: pressing this pushbutton establishes a connection from line L–1 through a line 127, contacts of the pushbutton 100, line 128, switch S5 and line 129 to the winding of the control relay R. The other side of this winding being connected to line L–2 through a line 130, the relay R will be energized, thus breaking the connection between lines 109 and 110, before described, and establishing connection from line 129 through line 131, contacts of the relay R and lines 132 and 134 to the up winding 133 of the motor relay M. The other side of this winding being connected to power line L–2 through line 112, winding 133 is energized, connecting line 115 to line 118 and thus to power line L–1 and also connecting line 114 through line 120 to power line L–2, for operating the motor 19 in the reverse or raising direction. So long as the pushbutton 100 is held down, this raising movement will continue until the up limit switch is operated at the time when the impression mechanism reaches its upper limit of movement. Assuming that the spring housing is not compressed beyond the desired extent, switch S3 will be in the position shown and it will be apparent that a parallel connection is established from line 129 through line 135, switch S3 and lines 136 and 134 to the up winding 133 of the motor relay M. Since the energizing of relay R disconnected lines 109 and 110, it will be impossible to interfere with the raising of the impression by operating the "down" pushbutton.

The same cycle of operations for raising the impression mechanism can also be carried out under control of the pushbutton 102 at the folder. Pressing this button establishes connection to power line L–1 through a line 140, contacts of pushbutton 102, line L–4 and normally closed contacts of the pushbutton 100 at the unit, to the line 128, the operation thereafter being the same as though pushbutton 100 had been closed. Means may also be provided for raising all cylinders automatically under certain con-

ditions of press operation. For example, normally open relay contacts 141 may be provided, as indicated, for establishing a connection to line L–1 through the normally closed contacts of the pushbutton 102. The contacts 141 may be arranged to close if the drive clutches of the web feeding rollers are opened, thus automatically raising the impressions for all units.

The up jogging circuit runs from the line L–7, which is supplied with intermittent current as hereinafter described, through line 150, normally open contacts of switch S3, lines 136 and 134 to the up winding 133 of the motor relay M. Whenever the spring housing is compressed beyond the desired limit, switch S3 will establish connection between lines 150 and 136, thus jogging the impression mechanism upwardly.

As before indicated, a dead zone is provided in which the switch S4 is open and S3 remains in the position shown in the circuit diagram. This zone may be in the neighborhood of 1/100 of an inch or thereabouts, thus insuring that the mechanism will not operate to raise or lower during the normal operation of the press, as for example, when the extra thickness of paper at a splice is passing through the unit.

The down jogging line L–6 is connected through contacts 160 and line 161 to the power line L–1. The contacts 160 are periodically closed by a cam 162 driven by the constantly running jogging motor 104. Similarly, the up-jogging line L–7 is intermittently connected to power line L–1 through contacts 163 which are periodically closed by a cam 164, also driven by the jogging motor 104. Cans 162 and 164 are preferably arranged so that the time during which contacts 160 are closed will exceed that during which the contacts 163 are closed in each rotation of the cams. The speed of the down jogging movement thus being different from that of the up jogging movement, any tendency toward hunting may be eliminated.

The up jogging contacts 164 may be bypassed by relay contacts 170 which provide for connecting the line L–7 directly to power line L–1. Contacts 170 may be incorporated in the so-called "red button stop" relay of the press drive controller. When so connected they will normally be open, but when an emergency stop is made, these contacts will close and cause the impression mechanism of a unit in which there is a paper wrap on the cylinders to rise rapidly but will not affect the impression mechanism of the other units. The way in which this action occurs is as follows. If it is assumed that there is a paper wrap on a given cylinder, switch S3 will make contact in the lower position, connecting line 136 to line 150 and thus connecting the up winding 133 of the motor relay to power line L–1 through a circuit established through lines 134, 136, switch S3, line 150, line L–7 and contacts 170 then closed. The impression mechanism of the unit in question will thus rise rapidly until any undue pressure caused by the winding of the paper on the cylinders has been eliminated. If there is no winding of paper in a unit, the Switch S3 thereof will be in the position of the circuit diagram, so that the closing of contacts 170 will not energize the up winding 133 of the motor relay M for that unit.

As will be apparent the arrangements shown may be reduplicated for any desired number of units in a press, the equipment for each unit being connected to lines L–1, L–2, L–3, L–4, L–5, L–6, and L–7, as shown in the diagram. To avoid complication in the diagrams, the points at which lines L–4, L–5, L–6 and L–7 lead off to other units are indicated by arrows at free ends thereof.

What is claimed is:

1. In an impression mechanism for a rotary intaglio printing unit comprising pressure, impression and printing cylinders, and in combination, a first drive means for rapidly lowering the pressure cylinder toward printing position, a second drive means for slowly lowering the pressure cylinder to obtain a required printing pressure, and control means responsive to decrease in distance between the axes of the impression cylinder and the pressure cylinder for shutting off the said first drive means and cutting in the second drive means at a predetermined point in the downward movement of the pressure cylinder.

2. Impression mechanism according to claim 1, comprising also second control means responsive to further downward movement of the pressure cylinder for shutting off the said second drive means.

3. Impression mechanism according to claim 2, in which the said second control means includes a spring for applying pressure to the pressure cylinder, and means responsive to compression of the spring for shutting off the second drive means upon the spring being compressed to a predetermined extent.

4. Impression mechanism according to claim 2, comprising also a third drive means for raising the pressure cylinder at a reduced average rate different from that of the second drive means and control means responsive to upward movement of the pressure cylinder for cutting in the said third drive means, the difference in average rate between the second and third drive means being sufficient to prevent hunting.

5. Impression mechanism according to claim 4, in which the said second control means is responsive to pressure applied to the pressure cylinder by the said second drive means.

6. In an impression mechanism for a rotary intaglio printing unit comprising pressure, impression and printing cylinders, and in combination, electric motor means for lowering the pressure cylinder toward printing position, a circuit for connecting said motor to a source of power supply, a jogging circuit including an intermittent contact device for connecting the motor to a power supply for driving the same at relatively slow average speed, and a control switch responsive to downward movement of the pressure cylinder for breaking the first said circuit and establishing a connection for said motor to the jogging circuit.

7. Impression mechanism according to claim 6, comprising also a control switch responsive to printing pressure for opening the said jogging circuit to stop further downward movement of the pressure cylinder when a predetermined pressure is obtained.

8. Impression mechanism according to claim 7, comprising also a reverse jogging circuit for raising the pressure cylinder and a third control switch responsive to printing pressure for connecting the motor to the reverse jogging circuit when a predetermined pressure is exceeded.

9. Impression mechanism for a rotogravure printing unit comprising a pressure cylinder, moveable bearings therefor, a spring means for applying printing pressure to each of the said bearings, motor driven means for compressing the said spring means and control mechanism responsive to compression of one of said spring

means for operating said motor means to maintain predetermined compression of the spring means.

10. Impression mechanism according to claim 9, in which at least one of the said spring means comprises a spring, a thrust member for applying pressure to increase printing pressure, a thrust member for applying pressure to reduce printing pressure, and means for selectively adjusting the spring to act against either of the said thrust members.

11. In an impression mechanism for a rotogravure printing unit, means for applying printing pressure comprising a spring, a thrust member at each end of said spring, an abutment for communicating thrust from one of said thrust members downwardly and an abutment for communicating thrust from the other of said thrust members upwardly, each thrust member being mounted for movement toward and away from its abutment, and means for adjusting said spring to apply printing pressure through one of said thrust members for reducing printing pressure or through the other of said thrust members for increasing printing pressure.

12. In an impression mechanism for a rotary intaglio printing press, a pressure cylinder, bearings for said cylinder and means for applying printing pressure to said bearings, the means for each bearing comprising a vertically moveable member, an upper spring housing section carried thereby, a lower spring housing section connected to the pressure cylinder bearing, a spring compressed between said housing sections and adjustable therein for varying its compression when the said housing sections are in predetermined positions relative to each other, switch means carried by the housing sections and operable by relative movement thereof and a motor controlled by said switch means for moving the said vertically moveable member to maintain the said predetermined relative positions of the housing sections for applying spring printing pressure to the pressure cylinder bearing according to the adjustment of said spring.

13. Impression mechanism according to claim 12 in which the housing sections comprise cooperating parts for limiting the separation of the said housing sections, whereby the pressure cylinder may be raised by the said vertically moveable members and supported independently of the springs.

14. Impression mechanism according to claim 12 in which the lower housing section comprises upper and lower thrust members for respectively reducing and applying printing pressure, and means is provided for adjusting the spring to apply pressure selectively from the said vertically moveable member to either of the said thrust members.

15. Impression mechanism according to claim 14 in which the housing sections comprise cooperating parts for limiting the separation of the said housing sections, whereby the pressure cylinder may be raised by the said vertically moveable members and supported independently of the springs.

16. In an impression mechanism for a rotary intaglio printing press, a vertically moveable member, a member for carrying a pressure cylinder bearing, a sleeve screw threaded on the vertically moveable member and having upper and lower stop flanges, thrust washers slidably carried by the sleeve, a spring on the sleeve between the thrust washers, a housing attached to the second said member and having upper and lower abutments for engaging the respective thrust washers, and means for rotating the sleeve to adjust its position on the vertically moveable member for selectively applying compression to said spring between the upper stop flange of the sleeve and the lower thrust member engaging against the lower abutment or the lower stop flange of the sleeve and the upper thrust member engaging against the upper abutment, when the two said members are in predetermined relative positions, whereby adjustable spring pressure may be applied to a pressure cylinder bearing either to reduce or increase the printing pressure.

17. In an impression mechanism for a rotary intaglio printing unit comprising an impression cylinder and a printing cylinder, and in combination, bearings for the impression cylinder, means mounting said bearings for movement toward and away from the printing cylinder, a separate adjustable spring mechanism for applying pressure to each bearing, and equalizer means connected to said bearings for maintaining parallelism of movement of the impression cylinder axis.

18. In an impression mechanism for a rotary intaglio printing unit comprising an impression cylinder and a printing cylinder, and in combination, bearings for the impression cylinder, means mounting said bearings for movement toward and away from the printing cylinder, a separate adjustable spring mechanism for applying pressure to each bearing, a torsion shaft, and means coupling each bearing to said shaft for rotating the same upon movement of the bearing, whereby parallelism of movement of the impression cylinder axis is maintained.

19. In an impression mechanism for a rotary intaglio unit comprising pressure, impression and printing cylinders, and in combination, vertically moveable members for supporting the pressure cylinder bearings and means for moving the said members toward and away from the printing cylinder to apply and release printing pressure, pivotally mounted arms carried by the said moveable members for holding the impression cylinder bearings, the said arms being swingable for permitting movement of the impression cylinder relative to said pressure cylinder, and a parallel motion connecting said arms for maintaining parallelism of the impression cylinder axis during such movement, whereby one end of the impression cylinder may be supported by reaction through said parallel movement against the other end of said impression cylinder when unequal pressures are applied by the two ends of the impression cylinder.

20. Impression mechanism according to claim 19 in which the said parallel motion comprises a torsion shaft and means coupling the said shaft to the said arms.

21. A rotary intaglio printing press having a plurality of printing units, each comprising pressure, impression and printing cylinders and electric motor means for raising the pressure cylinder, a normally open manually closable circuit for each unit for connecting the motor thereof to a source of power supply to raise the pressure cylinder, a jogging circuit for a plurality of units and including an intermittent contact device for connecting the motors to a power supply for driving the same at relatively slow average rate, a control switch for each unit normally connecting the motor means thereof to the said

normally open manually closable circuit and responsive to upward movement of the pressure cylinder for breaking the said connection and establishing connection for said motor means to the jogging circuit, and a switch for connecting the jogging circuit direct to the power supply for driving the motors at an increased speed, whereby closing of the last said switch will raise the pressure cylinder of the unit in which a paper wrap on the cylinder has lifted the pressure cylinder sufficiently to operate the unit control switch and will cause the raising of the said pressure cylinder faster than jogging speed while not raising the pressure cylinders of other units.

22. In an impression mechanism for a rotary intaglio printing unit comprising pressure, impression and printing cylinders, and in combination, spring means for applying pressure to the pressure cylinder, electric motor means for regulating compression of the spring means, a circuit for supplying power to operate the motor for increasing the compression of the spring means, a circuit for operating the motor to reduce compression of the spring means, and control means for connecting the motor selectively to the said circuits comprising switches operable by said spring means upon change of compression from a predetermined value and comprising also operating members adjustably connected to the spring means and adjustable to operate one of said switches for increasing compression and the other of said switches for reducing compression, at predetermined values separated by a dead zone in which neither of said switches is operated.

23. Impression mechanism according to claim 22 in which means are provided for driving the motor at different average rates when connected to the respective said circuits whereby hunting is prevented.

24. Impression mechanism according to claim 23 in which the said circuits comprise devices for intermittently making connection to a source of power, the time intervals during which connection is so made by the two circuits being different for producing the different average rates of movement of the motor.

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