

May 22, 1928.

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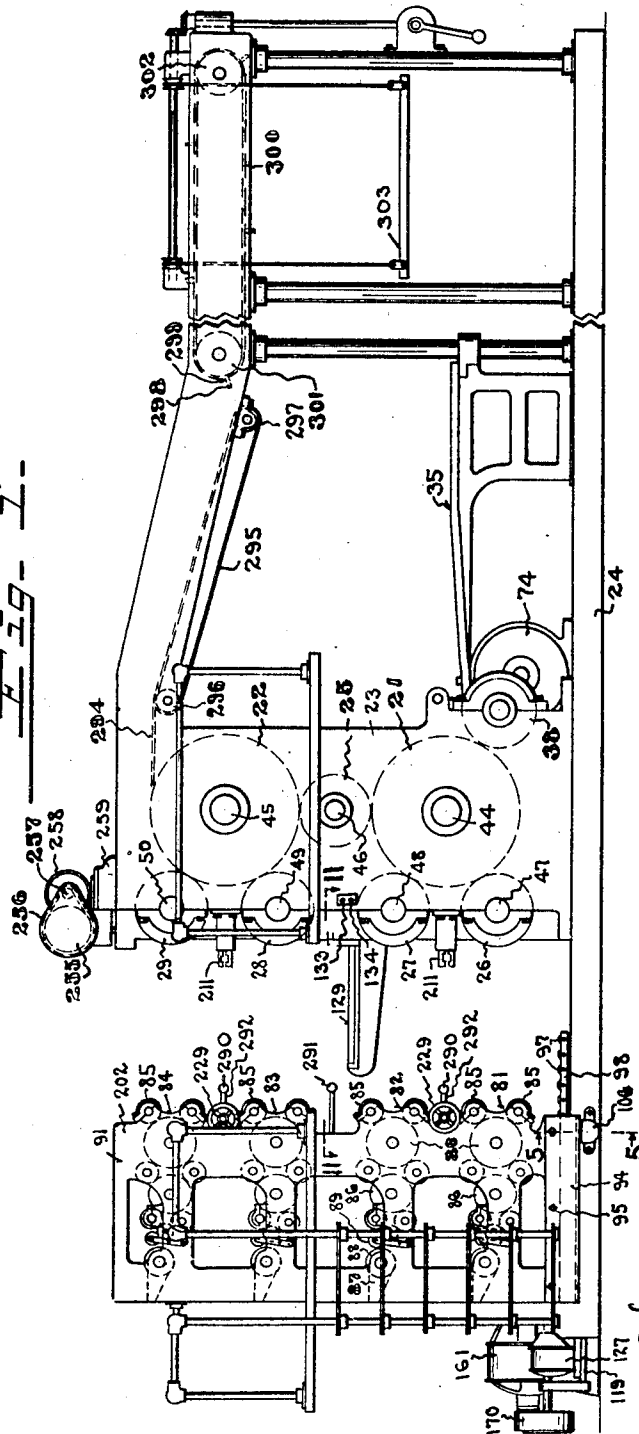
L. W. CLAYBOURN

ROTARY PRINTING MACHINERY

Filed May 25, 1925

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Fig. 1-



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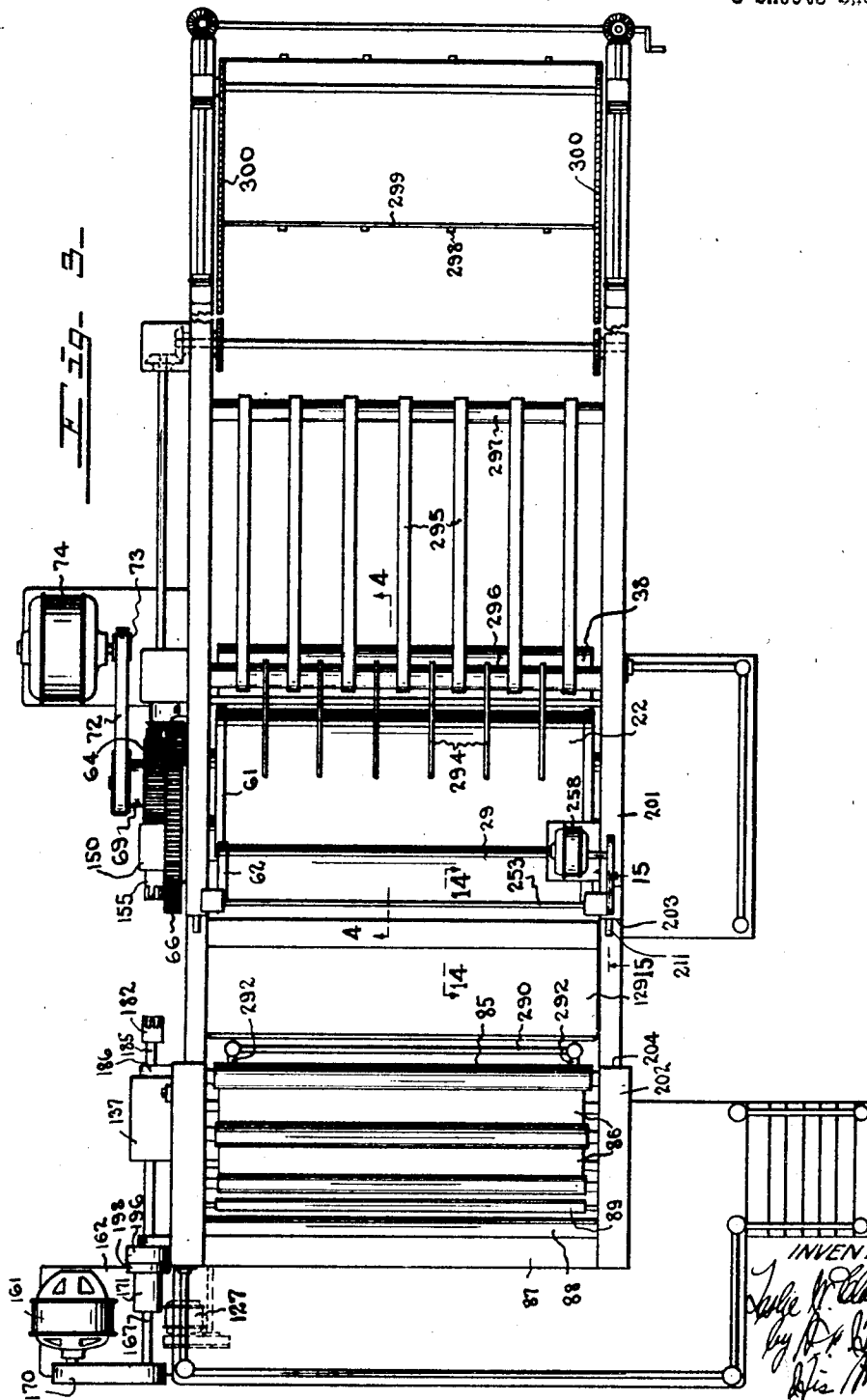
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L. W. CLAYBOURN
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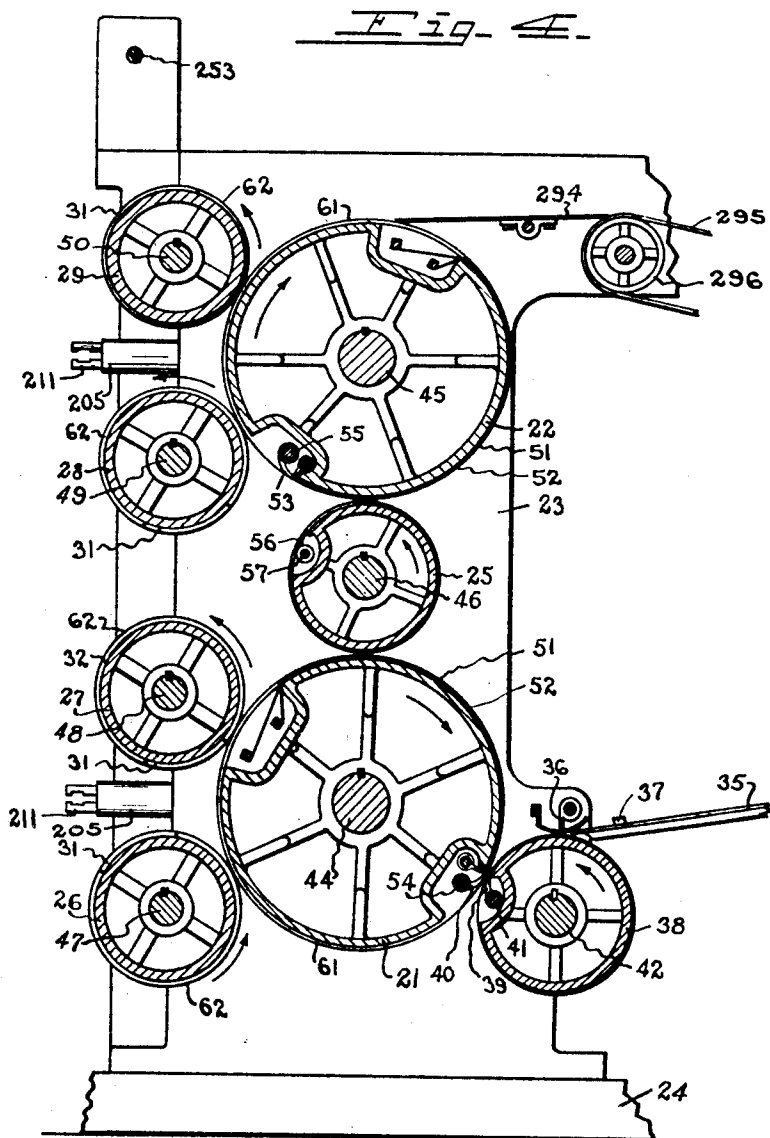
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ROTARY PRINTING MACHINERY

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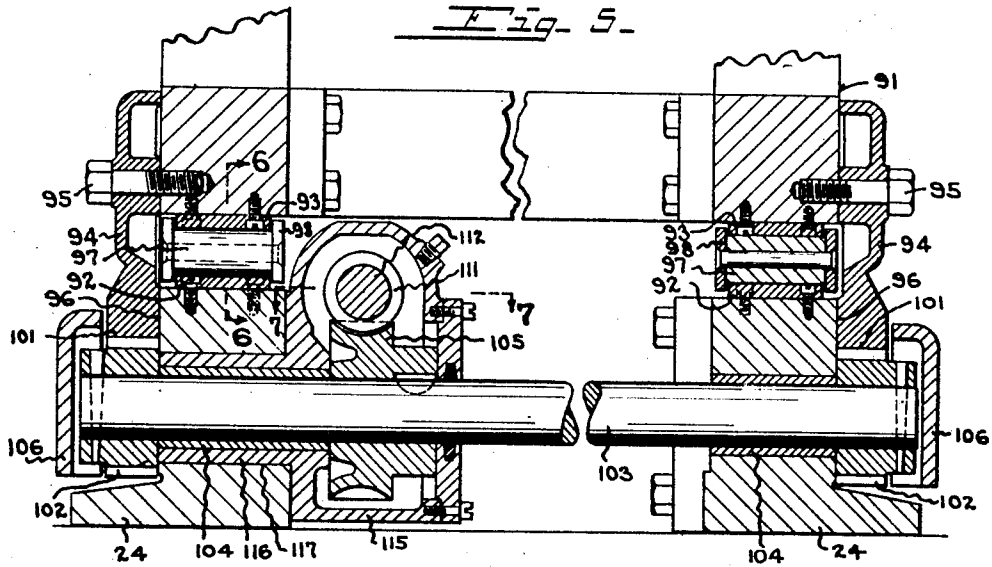
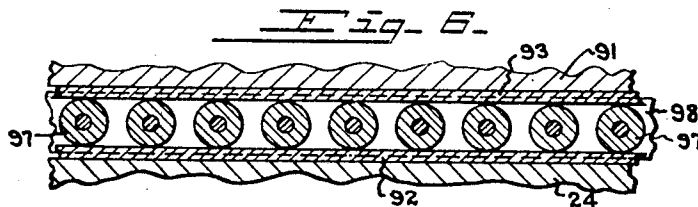
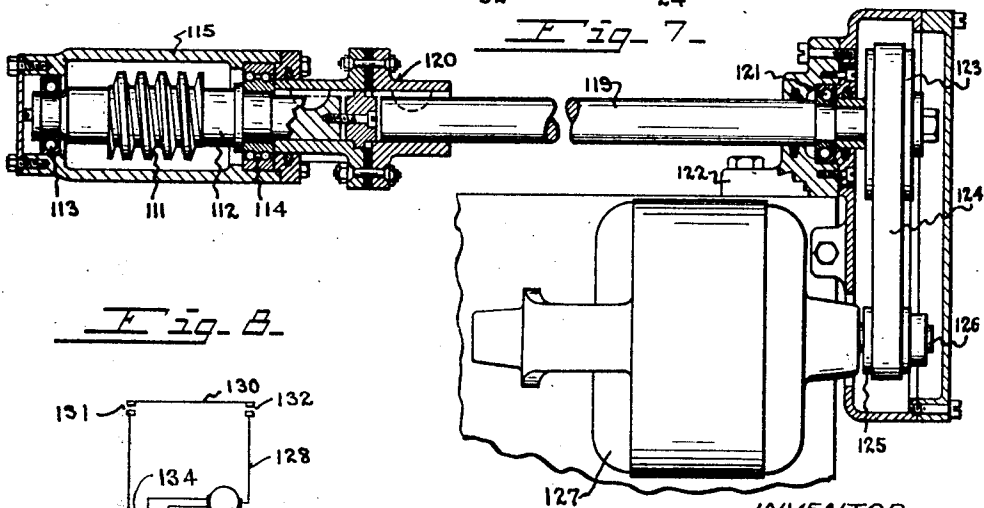
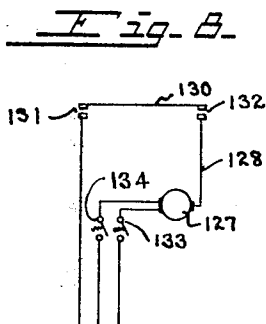
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ROTARY PRINTING MACHINERY

Filed May 25, 1925

8 Sheets-Sheet 5



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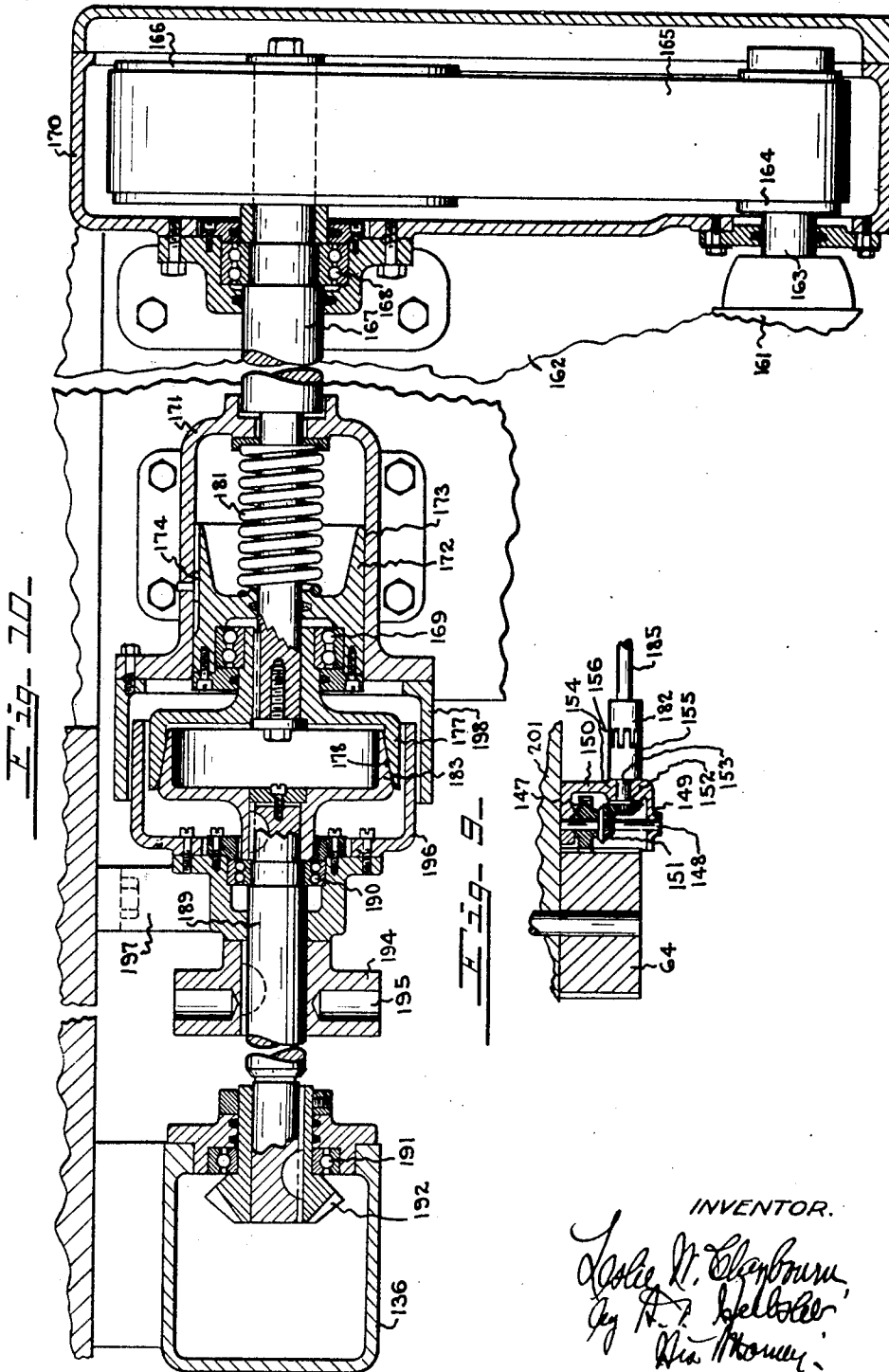
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8 Sheets-Sheet 6



May 22, 1928.

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L. W. CLAYBOURN
ROTARY PRINTING MACHINERY

Filed May 25, 1925

8 Sheets-Sheet 7

Fig. 11

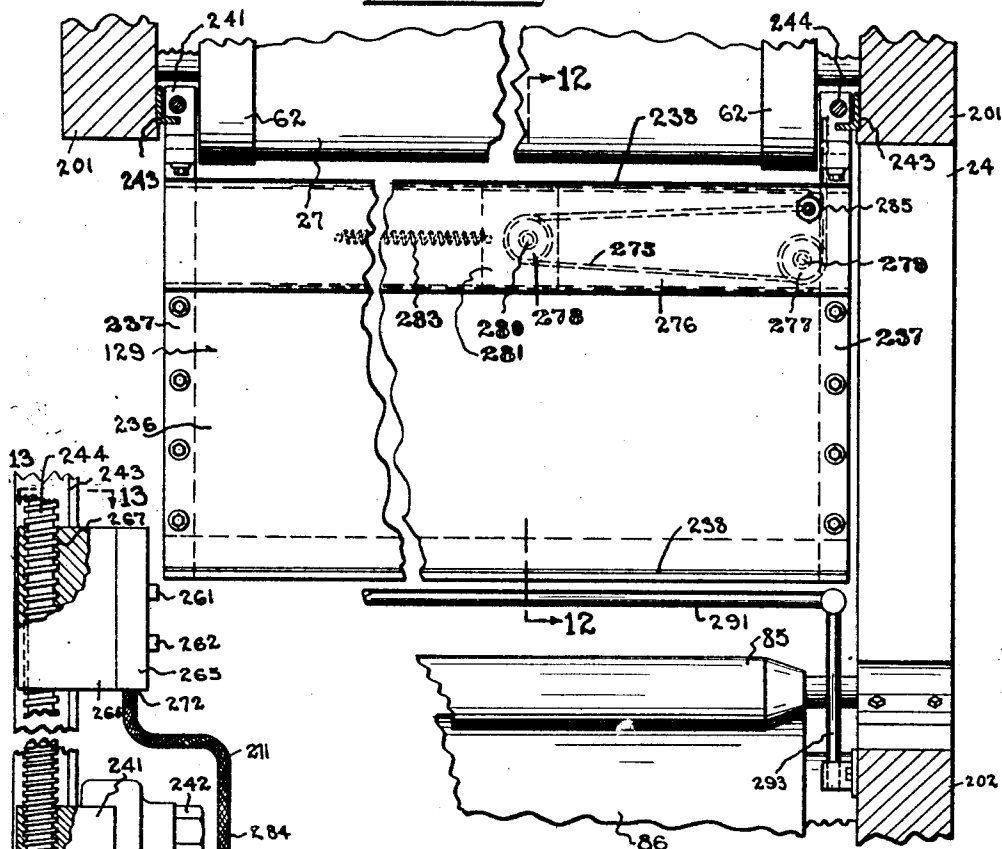


Fig. 12

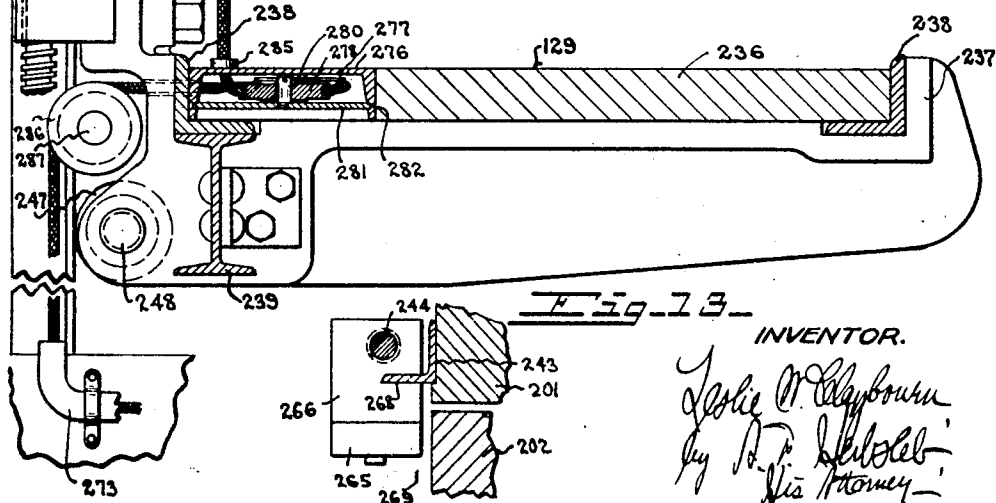


Fig. 13

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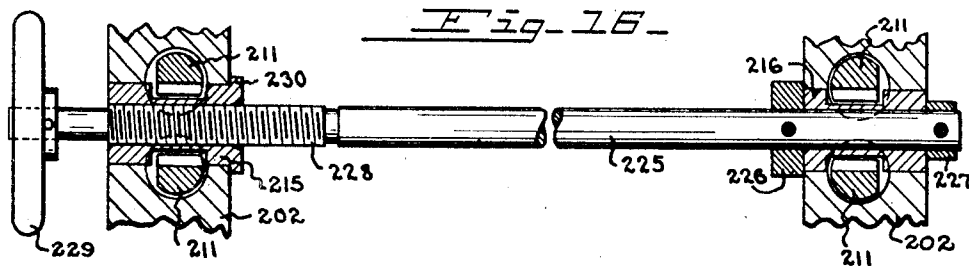
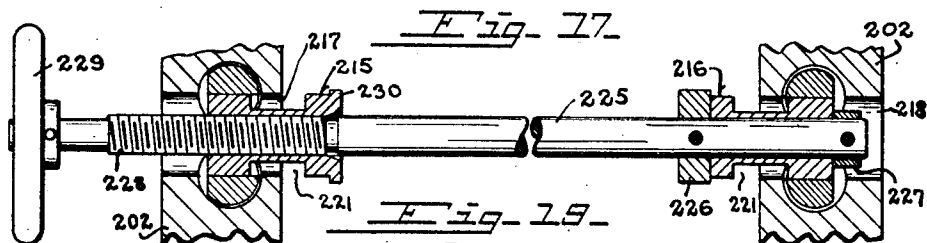
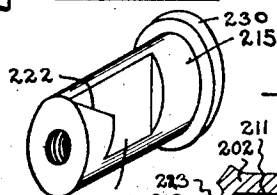
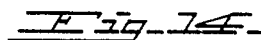
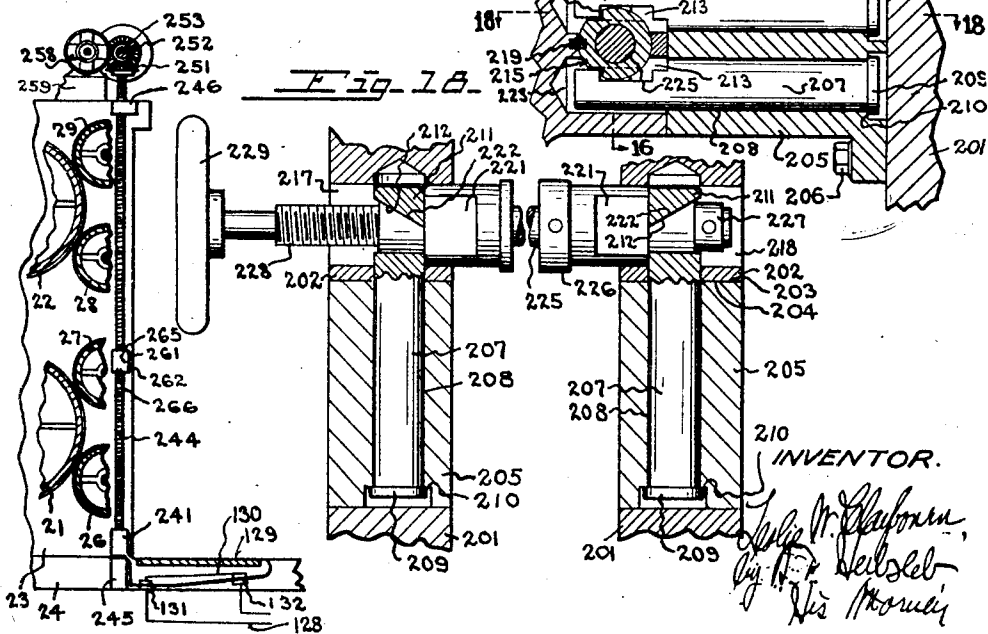
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ROTARY PRINTING MACHINERY

Filed May 25, 1925

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UNITED STATES PATENT OFFICE.

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ROTARY PRINTING MACHINERY.

Application filed May 25, 1925. Serial No. 32,609.

My invention relates to rotary printing machinery, especially of the character of that employing a number of plate cylinders for printing with a plurality of colors at one passage of the paper through the machine.

It is the object of my invention to provide a rotary printing machine with novel means whereby ready access to the plate cylinders and the means for inking the same may be had; further, to provide novel means whereby separation and approach between the inking mechanism and the printing mechanism is obtained; further, to provide novel means for driving the inking mechanism when associated with the printing mechanism as well as when separated therefrom; further, to provide novel arrangement of the printing mechanism with relation to the delivery mechanism in order that the printed paper may arrive at delivery position substantially dry to prevent offset of the same; further, to provide novel elevating mechanism for an operator, the elevator being arranged to be moved up and down between the inking mechanism and the printing mechanism when the latter are in separated relation; further, to provide novel control means for controlling the approach between the inking mechanism and the printing mechanism when the elevating mechanism is in obstructing relation; further, to provide novel control means for the elevating mechanism whereby to maintain the elevating mechanism out of action during its obstructed relation thereof; and, further, to provide novel means for arranging the inking mechanism and the printing mechanism in operative relation and holding the same in such operative relation.

The invention will be further readily understood from the following description and claims, and from the drawings, in which latter:

Fig. 1 is a side elevation of my improved device, showing the inker stand separated from the printing stand and the elevator in partly raised position.

Fig. 2 is a side elevation showing the gear side of the machine, and the inker stand and printing stand in connected relation.

Fig. 3 is a plan view of my improved de-

vice, showing the inker stand and the printing stand in separated relation.

Fig. 4 is a vertical cross-section of the printing mechanism, taken on the line 4—4 of Fig. 3.

Fig. 5 is a vertical section, taken on the line 5—5 of Fig. 1, partly broken away, and showing the operating means for moving the inker stand.

Fig. 6 is a sectional detail of the supporting means for the inker stand, taken in the plane of the line 6—6 of Fig. 5.

Fig. 7 is a horizontal sectional view of the moving means for the inker stand, taken in the plane of the line 7—7 of Fig. 5.

Fig. 8 is a diagrammatic view of the automatic electric switching means in the electric circuit for the electric motor for moving the inker stand.

Fig. 9 is a horizontal section, taken on the line 9—9 of Fig. 2, showing a detail of the inker driving means.

Fig. 10 is a horizontal axial section, taken in the plane of the line 10—10 of Fig. 2, and partly broken away, showing the auxiliary driving means for the inking mechanism in connected relation.

Fig. 11 is a horizontal sectional view, taken on the line 11—11 of Fig. 1, partly broken away, showing the elevator mechanism.

Fig. 12 is a vertical section of the same taken in the plane of the line 12—12 of Fig. 11.

Fig. 13 is a detail of the same in horizontal section, taken in the plane of the line 13—13 of Fig. 12.

Fig. 14 is a side elevation of the elevating mechanism, partly broken away, and partly in vertical section on the line 14—14 of Fig. 3.

Fig. 15 is a vertical section, taken in the plane of the line 15—15 of Fig. 3, showing a detail of the connecting means between the inker stand and the printing stand in connected relation.

Fig. 16 is a vertical section of the same in unlocked relation, taken in the plane of the line 16—16 of Fig. 15.

Fig. 17 is a similar section of the same in locked relation.

Fig. 18 is a horizontal section of the same,

taken in the plane of the line 18—18 of Fig. 15; and,

Fig. 19 is a perspective detail view of one of the locking fingers.

- 5 The printing mechanism of my improved device is exemplified as comprising impression cylinders 21, 22, which are shown superposed in the printing stand 23, fixedly mounted on a suitable base 24. A transfer
10 cylinder 25 is located between the impression cylinders. Plate cylinders 26, 27, 28, 29, are shown coacting with the impression cylinders, a pair of each of the plate cylinders coacting with each of the impression cylinders for forming the printing couples. The
15 plate cylinders are shown in superposed arrangement. (See Fig. 4.)

- For convenience and clarity the material being printed will be herein referred to as paper, and the printing surfaces being
20 printed as located on printing plates 31, although such printing surfaces may be located on other suitable forms, sheets or parts, the term printing plate including all
25 such agencies, and the term plate cylinder including the rotating bodies on which the printing surfaces are located. The printing plates are suitably secured in usual manner to the plate supporting peripheries 32 of the
30 plate cylinders.

- The paper is instanced as printed in sheets, and as fed from a feed board 35, on which the respective sheets are respectively positioned in usual manner against usual guides
35 36, 37, operated in usual manner, to a feed cylinder 38, the grippers 39 of which are arranged to take the sheets from the feed board and feed the same to the grippers 40 of the lower impression cylinder 21. The
40 grippers 39 are mounted on a gripper shaft 41 suitably journaled in the feed cylinder and operated in suitable manner. The feed cylinder is fixed to a shaft 42 journaled in suitable bearings in the printing stand.

- 45 The impression cylinders are respectively fixed to shafts 44, 45, rotatable in suitable bearings in the printing stand, which bearings are suitably adjustable vertically and horizontally in usual manner. The transfer
50 cylinder is fixed to a shaft 46, journaled in suitable bearings in the printing stand. The plate cylinders are respectively fixed to shafts 47, 48, 49, 50, journaled in suitable bearings in the printing stand, which bearings are
55 suitably adjustable vertically and horizontally in usual manner. Suitable tripping mechanism for the printing couples may also be employed.

- The impression cylinders are exemplified
60 as respectively provided with tympan sheets 51 stretched about the impressing sectors 52 thereof in usual manner. The impression cylinders are respectively provided with grippers 40, 53, on gripper shafts 54, 55,
65 suitably mounted in the respective impres-

sion cylinders and operated in usual manner. The transfer cylinder is provided with grippers 56 on a gripper shaft 57 suitably mounted therein and operated in usual manner.

The impression cylinders are located one
70 above the other, with the transfer cylinder located between the same, the impression cylinders and the transfer cylinder being instanced as having axes of rotation located
75 in substantially the same vertical plane.

The plate cylinders are exemplified as mounted one above the other, their axes of rotation being in substantially the same vertical plane, with a pair of the plate cylinders coacting with each of the impression
80 cylinders.

The paper being printed, after being received by the grippers of the lower impression cylinder is moved by the latter past
85 the lower pair of rotating plate cylinders, the grippers of the lower impression cylinder delivering the advancing edge of the paper to the grippers of the transfer cylinder, which in turn deliver the advancing
90 edge of the paper to the grippers of the upper rotating impression cylinder, whereupon the paper is printed by the plate cylinders coacting with the latter.

The arrangements of the cylinders is such as to provide close arrangement of the cylinders and easy access to the same, provides a
95 superposed arrangement of the plate cylinders, whereby an operator may readily adjust the same and the printing plates thereon, and whereby inking mechanism,
100 also arranged in superposed manner, may be caused to coact with the plate cylinders, for inking the same, and whereby the plate cylinders and the inking mechanisms may be mounted on stands, and means provided
105 whereby separation and approach between the stands may be effected for ready attention to the plate cylinders and the inking rollers, and whereby elevating mechanism
110 may be provided between the stands for elevating the operator to suitable positions between the stands.

It will be understood that features of my invention relate to printing machinery of large size and comparatively great width
115 and height, and that means are provided in the form of an elevator whereby an operator is enabled to walk lengthwise of the cylinders and inking rollers, and to be also readily
120 elevated to different heights for attention to the various parts in the lengths of the cylinders and inking mechanisms, and also to the various superposed cylinders and inking mechanisms.

The impression cylinders are provided
125 with bearers 61 with which bearers 62 on the plate cylinders coact for forming frictional rolling contact between the same. The printing surfaces on the respective printing plates are in the cylinders of said bearers,
130

and the surfaces of the paper to be printed on the respective tympan sheets are in the cylinders of the bearers on the respective impression cylinders, for forming true rolling contacts between the respective printing surfaces and the surfaces being printed, so that the printed lines will be correct reproductions of the printing lines of the printing surfaces.

10 The shaft 46 of the transfer cylinder 25 has a gear 64 fixed thereto. This gear is a double width gear. Gears 65, 66, respectively fast on the shafts 44, 45, of the impression cylinders 21, 22, mesh with the inner
15 end of the gear 64 for rotating the impression cylinders. A gear 67 meshes with the outer end of the double gear 64 and is fixed to a shaft 68, journaled in a bearing 69, of a bearing stand 70, fixed to an extension of
20 the base of the machine. (See Figs. 2 and 3.)

A pulley 71 is fixed to said shaft, a chain belt 72 passing thereabout and about a pulley 73 fixed to the armature shaft of an electric motor 74.

25 Gears 76, 77, 78, 79, are fixed respectively to the shafts 47, 48, 49 and 50 of the respective plate cylinders. The gears 76, 77, mesh with the gear 65 of the lower impression cylinder, and the gears 78, 79, mesh with the
30 gear 66 of the upper impression cylinder.

The shaft 42 of the feed cylinder 38 has a gear 80 fixed thereto which meshes with the gear 65 of the lower impression cylinder.

Suitable locating means or gear segments
35 may be provided in the meshing gears on the cylinders at the gripper positions for causing registry between the cylinders at the moments of sheet taking and sheet transfer, and at the moments of initiation of
40 printing by the plate cylinders, for causing proper printing with relation to the paper and proper registry between the printing lines printed by the different plate cylinders.

There is an inking mechanism for each
45 of the plate cylinders these inking mechanisms being shown generally at 81, 82, 83, 84. Each of the inking mechanisms comprises suitable form rollers 85, a suitable series of distributing rollers 86 which may
50 include endwise vibrating rollers. (See Figs. 1 and 2.) There is further a suitable ink fountain 87 having a fountain roller 88 and suitable means for regulating the supply of ink therefor, and a ductor roll 89 arranged
55 to reciprocate between the fountain roller and the adjacent inking roller. Suitable means are provided for vibrating the rollers and reciprocating the ductor roller not more particularly shown because these
60 may be of usual construction and are well known.

The inking roller mechanisms are superposed on an inker stand 91. The form rollers of the respective sets of inking rollers
65 are shown in superposed relation, being

shown in vertical planes, for coaction with the similarly superposed plate cylinders, for supplying the printing surfaces on said plate cylinders with the proper ink of various colors for proper printing the paper thereby. 70

Means are provided for causing separation and approach between the inker stand and the printing stand comprising in the present instance guideways 92 on the base 24 and
75 guideways 93 on the inker stand. The inker stand is provided with depending aprons 94, fixed thereto as by bolts 95, and having coaction with the sides of the base, as along guideways 96. For ease of operation, rollers
80 97 are interposed between the base and the inker stand, the said rollers being mounted in roller cages 98. (See Figs. 1, 5 and 6.)

The separation and approach between the inker stand and printing stand is exemplified by a movement of the inker stand on the roller supports. Power means may be provided for moving the inker stand, comprising
85 racks 101, on the aprons 94, with which pinions 102 mesh. The pinions are fixed to a cross shaft 103 journaled in bearings 104 in the base, and having a worm wheel 105 fixed thereto. Protecting hoods 106 are received over the ends of the shaft and its pinions. 90

A worm 111 meshes with the worm wheel. This worm is fast on a shaft 112 journaled in bearings 113, 114, of a housing 115 fixed to the base, and provided with a bushing 116 which forms the bearing 104 received in a bore 117 in the base. (See Figs. 5 and 7.) 95

A shaft 119 is secured to the shaft 112 by means of clutch coupling 120, and is journaled in a bearing 121 on a block 122 fixed to the base. The shaft 119 has a pulley 123 fixed thereto, about which a chain belt 124
100 is received, so as to rotate the same from a similar pulley 125 fixed to the armature shaft 126 of an electric motor 127 suitably fixed to an extension of the base. 105

The motor 127 is a reversible electric motor which, when revolving in one direction, will cause the inker stand to move toward the printing stand, and when revolved in the opposite direction, will cause the inker stand to move away from the printing stand. The
110 operation of the motor is controlled by an electric circuit, a part of which is shown at 128, in which there are suitable switches 133, 134 normally spring retracted for normal open relation of the circuit in order that continued manual pressure on the respective
115 switch buttons is necessary for continued movement of the inker stand in either direction. (See Fig. 8.) 120

There is furthermore an automatic switch
125 in this circuit, so arranged that when the elevator 129, hereinafter described, is in obstructing relation, rotation of the electric motor 127 cannot take place. Thus the elevator has a part 130 of the electric circuit 130

for the electric motor mounted thereon, there being electric contacts 131, 132, between said partial circuit and the remaining portion of the electric circuit, so that, upon movement of the elevator, these electric contacts will separate for breaking the circuit and, when the elevator is in unobstructing position, the said contacts will contact each other automatically for completing the circuit.

The driving means for rotating and otherwise operating the inking rollers of the respective sets of inking mechanisms comprise an upright shaft 135 mounted in bearings of suitable gear boxes 136, 137, 138, on the inker stand. This upright shaft has bevel gears 139 fixed thereto which mesh with bevel gears 140 on shafts 141 journaled in the gear boxes 137. The said shafts have bevel gears 142 fixed thereto, which mesh with bevel gears 143 on transverse shafts 144 of one of the distributing rollers 86, for rotating the inker rollers and otherwise operating the same. (See Fig. 2.)

Means are provided for rotating the driving means on the inker frame, for operating the inker rollers when said inker stand is in approach relation to the printing stand, and auxiliary driving means are provided therefor, when the inker stand is distanced from the printing stand. A pinion 147 is fixed to a shaft 148 journaled in a bearing 149 of a bracket 150 extending from the printing frame, and meshes with the gear 64. (See Figs. 2 and 9.) A bevel gear 151 is fixed to the shaft 148, and has a bevel gear 152 meshing therewith. The bevel gear 152 is fixed to a shaft 153 journaled in a bearing 154 of the bracket 150. The shaft 153 has one of the members 155 of a toothed clutch 156 fixed thereto.

An auxiliary electric motor 161 is mounted on and fixed to an extension 162 of the base of the machine. The armature shaft 163 of this motor has a pulley 164 thereon, about which a chain belt 165 is received. This belt is also received about a pulley 166 on a shaft 167 journaled in bearings 168, 169. The pulleys and belt are located in a housing 170 supported by the base, this housing also containing the bearing 168.

A housing 171 is supported by said extension of the base, and has a sleeve 172 slidable lengthwise therein on guideways 173. A spline key and groove connection 174 prevents rotation of said sleeve. The bearing 169 is located in said sleeve.

A clutch member 177 of a friction clutch 178, shown as a cup-clutch, is fixed to rotate with the shaft 167, the boss of said clutch-member extending within the bearing 169.

A spring 181 is located about the shaft 167 between said sleeve and the bottom of said housing 171 for normally urging the sleeve and the clutch member 177 outwardly.

Clutch connecting means are provided on

the inker stand and comprise clutch members 182, 183, which cooperate with the respective clutch members 155, 177. The clutch member 182 is shown as a toothed clutch member, its teeth cooperating with the teeth of the clutch-member 155, the respective teeth being preferably sharp at their ends for ready engagement between the teeth.

The clutch-member 182 is fixed to a shaft 185 journaled in a bearing 186 on the inker stand and in a bearing in the gear casing 138. It has a bevel gear 187 fixed thereto, which meshes with a bevel gear 188 fixed to the shaft 135.

The clutch-member 183 is a friction clutch member complementary to the friction clutch member 177, and is fixed to a shaft 189 journaled in a bearing 190 on the inker stand and in a bearing 191 in the gear casing 136. It has a bevel gear 192 fixed thereto, which meshes with a bevel gear 193 on the upright shaft 135.

The shaft 189 further may have a collar 194 fixed thereto, provided with sockets 195, in which a suitable stem or tool may be inserted for rotating the shaft 189, and thereby manually operating the inking rollers independently of the power means for operating the same in slight steps in either direction.

A cover 196 is fixed against rotation on a bracket 197 fixed to the inker stand. The housing 171 has a cover 198 fixed thereto. These covers are shown of cup form and arranged to be received one within the other. They are rotatively stationary and form protecting means about the rotating members of the clutch 178, and these covers and the clutch members are telescopingly received one within the other when said clutch is in engaged position. The spring 181 insures close operative driving relation between the friction clutch members, and permits the inker stand to be moved away from the printing stand to greater or less extent while maintaining such driving relation.

Means are provided for definitely positioning the inker stand and the printing stand with relation to each other when in approach relation. (See Fig. 1, 3, 15, 16, 17 and 18.) It is desirable for accuracy in proper inking of the printing forms that the form rollers be returned to proper contact relations with the printing surfaces on the plate cylinders, and means are provided for accomplishing this and also for maintaining the inking stand in definite relation to the printing stand when in connected relation, and means are provided whereby such definite relation is maintained throughout the height and width of such stands. The stands are in the present invention of substantial width and height.

The side frames 201 of the printing stand and the side frames 202 of the inker stand

are provided with complemental contact faces 203, 204, at each of the sides of the stands, which are arranged to be in contact when said stands are in proper association.

5 In order to insure such proper association and maintain the same during the printing operations, I provide means for drawing said stands together. Thus the printing stand is provided with brackets 205 secured
10 thereto, as by means of bolts 206, passing through flanges on said brackets and threaded into the side frames of the printing stand. These brackets have stems 207 received in sockets 208 in said brackets, the
15 stems having shoulders 209 resisted by shoulders 210 on said brackets. These stems are arranged in pairs, the outer ends of the stems being provided with jaws 211 having inclined engaging faces 212 in sockets 213
20 therein.

The inker stand is provided with means coacting with said jaws to draw said stands together, instanced as comprising slides 215, 216, shown in the nature of spools and slidable in bores 217, 218 in the side frames of said inker stand. These slides are axially
25 movable in said bores, but prevented from turning therein, as by means of a spline key and groove connection 219 between each of said slides and the side frame member.

Each of said slides is provided with recesses 221, in one portion of its length, and with slanting faces 222 in another portion of its length, the latter faces coacting with the
30 jaws 211 on the complemental members of said clamps. The side frame members of the inker stand are provided with sockets 223 at the respective sides of said slides, for receiving the ends of the complemental jaws.

40 When the recesses 221 in said slides are arranged in line with the jaws, the stands may be moved together, and said stands may be drawn together in clamped relation by axial movements of said slides, causing the
45 inclined faces on said slides to climb lengthwise of the inclined faces of said jaws, for drawing said stands together, the stands being maintained locked in clamped relation during printing operations.

50 The means for axial movements of said slides are shown in the form of shafts 225 which extend crosswise of the machine. The slide at one side of the machine is held lengthwise to said shaft, as between collars
55 226, 227, suitably fixed to said shaft, as by pinning the same thereto. The other end of the shaft is threaded, as shown at 228, having threaded connection with the threaded bore of the other slide. Each of the shafts
60 is provided with a handle 229.

Rotation of the shaft causes approach or separation between said slides. The slide 215 is provided with a shoulder 230, and the collar 226 forms a shoulder for the slide 216, the shoulders being at the proximate ends of

said slides. These shoulders coact with the outer ends of the walls of the bores in which said slides move, for limiting endwise movements of said slides in release directions. When said shaft 225 is rotated in one direction, a separation between said slides will be caused, until said shoulders 226, 230, coact with the ends of said bores, in which relation the recesses 221 in said slides coincide with the positions of the jaws 211, in order
70 that the stands may be moved together. In order to clamp the stands together, the shaft 225 is rotated in the opposite direction, which causes approach between said slides, and movement of the inclined faces thereon
75 lengthwise of the inclined faces on said jaws.

The movements of the respective slides is selectively dependent on the resistances to said respective slides. If there is greater resistance to movement of one slide, the other
80 slide is moved, until its resistance is the greater, when the first slide will again move axially in clamping direction. If the resistances to both sides are equal their movements will be equal.

By means of this arrangement the clamping movements at the respective parts of the complemental faces between the stands may be equalized, so that strains on the respective portions of the stands will be avoided,
85 and so that when said stands are in clamped relation all parts of the stands may be clamped with equal forces.

Two of these clamping arrangements are shown at each side of the machine superposed, and in line with each other crosswise
90 of the machine. The clamps are preferably located between the lower plate cylinders and their respective inking sets, and between the upper plate cylinders and their respective inking sets, being further shown in substantially the horizontal planes of the respective superposed impression cylinders.

Means are provided whereby when the stands are in separated relations, the operator may be elevated to various positions
95 for attention to the different plate cylinders and the different inking mechanisms, as well as the superposed printing cylinders and transfer cylinder therebetween, and whereby the various parts in the lengths of these
100 respective mechanisms may be given attention. (See Figs. 1, 11, 12 and 14.)

Thus an elevator 129 is arranged to be moved up and down between the inker stand and printing stand when said stands are in separated relation. This elevator is shown
105 as comprising a platform 236 mounted on brackets 237. The brackets are connected by suitable cross bars 238, shown as angle irons, and may be additionally connected by a cross-bar 239, shown as an I-beam, such brackets and cross-bars being suitably
110 rigidly secured together.

The brackets are secured to threaded 130

blocks 241, as by bolts 242. The blocks are guided on guideways 243, secured to the respective side frames of the printing stand. Elevating screws 244 are journaled in bearings 245, 246, in said respective side frames, parallel with said guideways, and have threaded connections with the blocks 241. Guide rollers 247 are journaled on studs 248 in said brackets, and are guided on one of the faces of said guideways.

A bevel gear 251 is fixed to the upper end of each of said elevating screws. Each of these bevel gears is meshed by a bevel gear 252 on a cross shaft 253 journaled in bearings 254 on the respective side frames, and having a pulley 255 fixed thereon, suitable for receiving a chain belt 256 received about said pulley and a pulley 257 on the armature shaft of an electric motor 258, fixed to a bracket 259 on the printing stand.

The electric motor 258 is a reversible motor, and is controlled by an electric circuit having switching mechanism therein comprising a pair of push buttons 261, 262, normally spring-pressed for inactive relation of said electric motor, to compel continued manual pressure on said respective push buttons for continued operation of the elevator in either direction.

These switches are mounted in a switch box 265 which is arranged to move with the elevator, so that the switch buttons may be continuously located at equal elevation above the elevator platform, in order that the operator may readily find the same at various elevations of the elevator. For accomplishing this, the switch box is fixed to a block 266, which has a threaded bore 267, in which one of the elevating screws is threaded. The block is threaded to said elevating screw in spaced relation to the threaded block 241 which controls the elevator. The block 266 is prevented from turning by having guide connection 268 with one of the guides 243.

In order to remove danger of operation of the elevator while said stands are in connected relation, the switch box 265 is located in a recess 269 between said stands, obstructed by the side frames of said stands for preventing manipulation when said stands are connected. (See Fig. 13.)

The elevator, when in idle relation, is arranged to be moved downwardly, so that it will be below the operative mechanisms and obstructing parts of the inking stand, in the present exemplification.

The electric connections between the switch box 265 and the electric motor 258 include flexible connections in the form of a cable 271 which includes the necessary electric wires, one end of the cable being fixedly received in the switch box, as exemplified at 272. The other end of the cable passes fixedly into an inclosing piping 273

leading in suitable manner to the electric motor.

The cable or flexible electric wiring includes a slack portion which is present to compensate for the elevations of the elevator and switch box. This slack portion is arranged loopwise, as in the form of a loop 275 in a channel 276 extending crosswise of the elevator in the bottom thereof about sheaves 277, 278. The sheave 277 rotates about a pin 279 in fixed position on the elevator. The sheave 278 rotates about a pin 280 fixed to a slide plate 281 slidable in guideways 282 in the wall of said channel. A spring 283 is arranged to automatically take up the slack in said loop or to yield to the pulling strain on said loop as the elevator descends or ascends. One end of said spring is fixed to said slide and the other end is fixed to the top wall of said channel.

The stretch 284 of said cable is of constant length, the lower end of said stretch being fastened in a spool 285 in the upper wall of said channel, through which said cable passes into said channel. The cable then forms a loop about said sheaves, and continues about a sheave 286 rotating on a pin 287 secured to the elevator, the cable continuing to the pipe 273.

In order to prevent accidental contact to the operator on the platform with the inking rollers, obstructing means are provided between the inking mechanism and the operator's position on the platform. These obstructing means are shown as bars 290, 291 which extend crosswise of the machine and are mounted on brackets 292, 293, extending toward the printing stand, for positioning the cross-bars a distance away from the vertical planes in which the inking rollers are located. (See Figs. 1, and 11.)

When said stands are in connected relations, the bars 290 and their brackets 292 are received in the space between the cylinders of the respective pairs of plate cylinders, in coincident horizontal planes with the impression cylinders, and the cross-bar 291 and its brackets 293 are located between said respective pairs of plate cylinders, and in coincident horizontal plane with the transfer cylinder.

The paper after being printed passes from the upper impression cylinder along take-off bars 294 and along traveling delivery tapes 295 formed loopwise and movable in suitable manner about rolls 296, 297, suitably driven. The advancing edges of the printed sheets are arranged to be taken between the jaws of suitable grippers 298 on gripper bars 299 extending between suitable sprocket chains 300 traveling about sprocket wheels 301, 302, suitably driven, suitable means being provided for causing said grippers to automatically open and close so as to take said sheets, and to release said sheets for

delivery above and upon a delivery platform 303 suitably suspended and operated. The delivery tapes extend above the feeding table or platform, and the sprocket chains

are of substantial length, for causing drying of the ink on the paper prior to delivery on the stack on the delivery platform, so as to prevent off-set between printed sheets. Having thus fully described my invention,

what I claim as new, and desire to secure by Letters Patent, is:

1. In a rotary printing machine, the combination of a printing stand, printing couples including plate cylinders rotatably mounted thereon, an inker stand, a set of inking rollers including form rollers for each of said plate-cylinders rotatably mounted on said inker stand, a drive-shaft extending up and down on said inker stand, driving means on said inker stand between the latter and each of said sets of inking rollers, means causing separation and approach between said stands, and driving means for said drive-shaft at each of the limits of said movements of said inker stand.

2. In a rotary printing machine, the combination of a printing stand, printing couples including plate cylinders rotatably mounted thereon, an inker stand, inking rollers rotatably mounted thereon, a driving means for said cylinders, a driving means for said inking rollers, driving connections therefor mounted on said inker stand, and means for moving said inker stand toward and from said printing stand, said driving means and driving connections arranged in axial alignment parallel with the movement of said inker frame, said driving connections movable with said inker stand into driving relation with said respective driving means by said movements of said inker stand.

3. In a rotary printing machine, the combination of a printing unit, cylinders rotating therein, an inker unit comprising inking rollers, and means for rotating said inking rollers including oppositely disposed clutch-members, power means for rotating said cylinders, a clutch member mounted on said printing unit having operative connection with said power means and arranged to be engaged by one of the clutch members on said inker unit when said inker unit is in coacting relation with said printing unit, means to move said inker unit toward and from said printing unit, and a power driven clutch member opposed to said first-named clutch-member and arranged to be engaged by the other of said oppositely disposed clutch-members of said inker unit when said inker unit is moved away from said printing unit.

4. In a rotary printing machine, the combination of a printing stand, printing couples including plate cylinders rotatably

mounted thereon, an inker stand, a set of inking rollers including form rollers for each of said plate cylinders rotatably mounted on said inker stand, means for moving said inker stand toward and from said printing stand, a substantially vertical drive shaft on said inker stand, driving means on said inker stand between the latter and each of said sets of inking rollers, driving means on said printing stand for said printing couples, a clutch-member at said printing stand driven thereby, auxiliary driving means including a clutch-member spaced from said printing stand, and clutch members on said inker stand having driving connections with said substantially vertical shaft and arranged respectively for cooperation with said first-named clutch-members at the respective limits of movements of said inker stand.

5. In a rotary printing machine, the combination of a printing stand, printing couples including plate cylinders rotatably mounted thereon, an inker stand, a set of inking rollers including form rollers, for each of said plate cylinders rotatably mounted on said inker stand, means for moving said inker stand toward and from said printing stand, a substantially vertical drive shaft on said inker stand, driving means on said inker stand between the latter and each of said sets of inking rollers, driving means on said printing stand for said printing couples, a clutch-member on said printing stand driven thereby and located at an elevation between said printing couples, auxiliary driving means spaced from said printing stand and including a clutch-member at substantially the level of the lower end of said substantially vertical shaft, and clutch members at different elevations on said inker stand having driving connections with said substantially vertical shaft and arranged respectively for cooperation with said first-named clutch-members at the respective limits of movements of said inker stand.

6. In a rotary printing machine, the combination of a printing stand, printing couples including plate cylinders rotatably mounted thereon, an inker stand, a set of inking rollers including form rollers for each of said plate cylinders rotatably mounted on said inker stand, said plate cylinders superposed in said printing stand and said form rollers superposed in said inker stand, inker driving means on said inker stand for said inking rollers, oppositely disposed clutch members on said inker stand therefor, means for moving said inker stand toward and from said printing stand, driving means at said printing stand for said inker driving means, and driving means for said inker driving means distanced from said printing stand, said respective last two

named driving means comprising oppositely disposed clutch members with which said first-named clutch members coact at the respective limits of movements of said inker stand, said clutch-members including a resiliently retreating clutch member, the retreat whereof is caused during clutch engagement and arranged for rotating said inker driving means throughout a limited range of traveling movement of said inker stand.

7. In a rotary printing machine, the combination of a printing stand, printing couples including plate cylinders rotatably mounted thereon, an inker stand, inking rollers including form rollers rotatably mounted thereon, said plate cylinders superposed on said printing stand and said form rollers superposed on said inker stand, said form rollers and said plate cylinders presented toward each other on said respective stands, inker driving means on said inker stand for said inking rollers, oppositely disposed clutch members on said inker stand therefor, means for moving said inker stand toward and from said printing stand, driving means at said printing stand including a clutch member for said inker driving means, driving means including a clutch member for said inker driving means distanced from said printing stand, a cover for said last-named clutch-member, said respective last two named clutch-members being oppositely disposed for coaction of said first-named clutch members therewith at the respective limits of movements of said inker stand, and a cover for one of said first-named clutch members, one of said covers received within the other during said coaction of said clutch members.

8. In a rotary printing machine, the combination of a printing stand, a pair of superposed impression cylinders thereon, a pair of plate cylinders for each of said impression cylinders, said plate cylinders in superposed arrangement, an inker stand, a set of inking rollers thereon for each of said plate cylinders, means causing separation and approach between said stands, and locking means between said stands located at substantially the levels of said respective impression cylinders, said respective locking means comprising means for drawing said stands together.

9. In a rotary printing machine, the combination of a printing stand, a pair of superposed impression cylinders thereon, a pair of plate cylinders for each of said impression cylinders, said plate cylinders in superposed arrangement, an inker stand, a set of inking rollers thereon for each of said plate cylinders, means causing separation and approach between said stands, and locking means between said stands at substantially the elevations of said impression cylinders,

each of said locking means comprising means at each side of said stands for drawing said stands together, and said last-named means at the respective sides of said stands connected for combined movements.

10. In a printing machine, the combination of a printing stand, an inker stand, means causing separation and approach between said stands, means for locking said stands together comprising a finger on one of said stands, the other of said stands having a recess for receiving said finger, said finger provided with a slanting shoulder, a sleeve on said other of said stands extending at substantially right angles to said finger, said sleeve having a slanting shoulder coacting with said first-named shoulder, and means for axially moving said sleeve whereby to draw said stands toward each other by the coaction between said slanting shoulders.

11. In a printing machine, the combination of a printing stand, an inker stand, means causing separation and approach between said stands, means for locking said stands together comprising a finger on one of said stands, the other of said stands having a recess for receiving said finger, said finger provided with a slanting shoulder, a sleeve on said other of said stands extending at substantially right angles to said finger, said sleeve having a slanting shoulder coacting with said first-named shoulder, means for moving said shoulders into non-registering positions for permitting separation between said stands, and means for axially moving said sleeve whereby to draw said stands toward each other by the coaction between said slanting shoulders.

12. In a printing machine, the combination of a printing stand, an inker stand, means causing approach and separation between said stands, and means to lock said stands together comprising a pair of fingers on one of said stands and a recess in the other of said stands in which said fingers are received, said fingers provided with slanting shoulders, a sleeve slidably mounted in said other of said stands, said sleeve provided with slanting shoulders coacting with said first-named shoulders, and means for moving said sleeve axially whereby to cause sliding movement between said slanting shoulders for drawing said stands together.

13. In a printing machine, the combination of a printing stand, an inker stand, means causing separation and approach between said stands, and means to lock said stands together comprising a finger on one of said stands and a recess in the other of said stands in which said finger is received, said finger provided with a slanting shoulder, a sleeve slidably mounted in said other of said stands, said sleeve provided with a

slanting shoulder coacting with said first-
name shoulder, means for moving said
sleeve axially whereby to cause sliding move-
ment between said slanting shoulders for
5 drawing said stands together, said comple-
mental finger and shoulders located at each
side of said stands, a cross-rod, and con-
necting means between said sleeves and said
cross-rod for compensatingly moving said
sleeves axially for equal clamping forces 10
applied at both sides of said stands.

In testimony whereof, I have hereunto
signed my name.

LESLIE W. CLAYBOURN.