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A. S. MacLAREN

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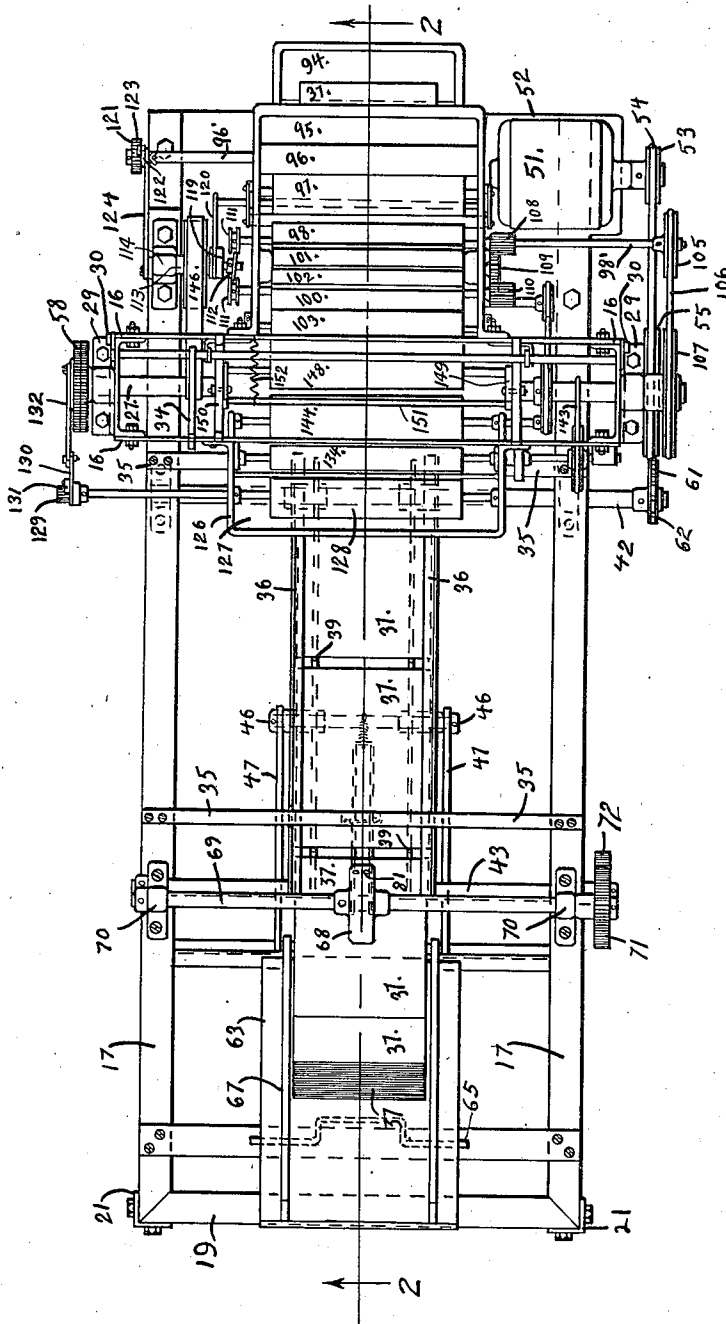


Fig. 1.

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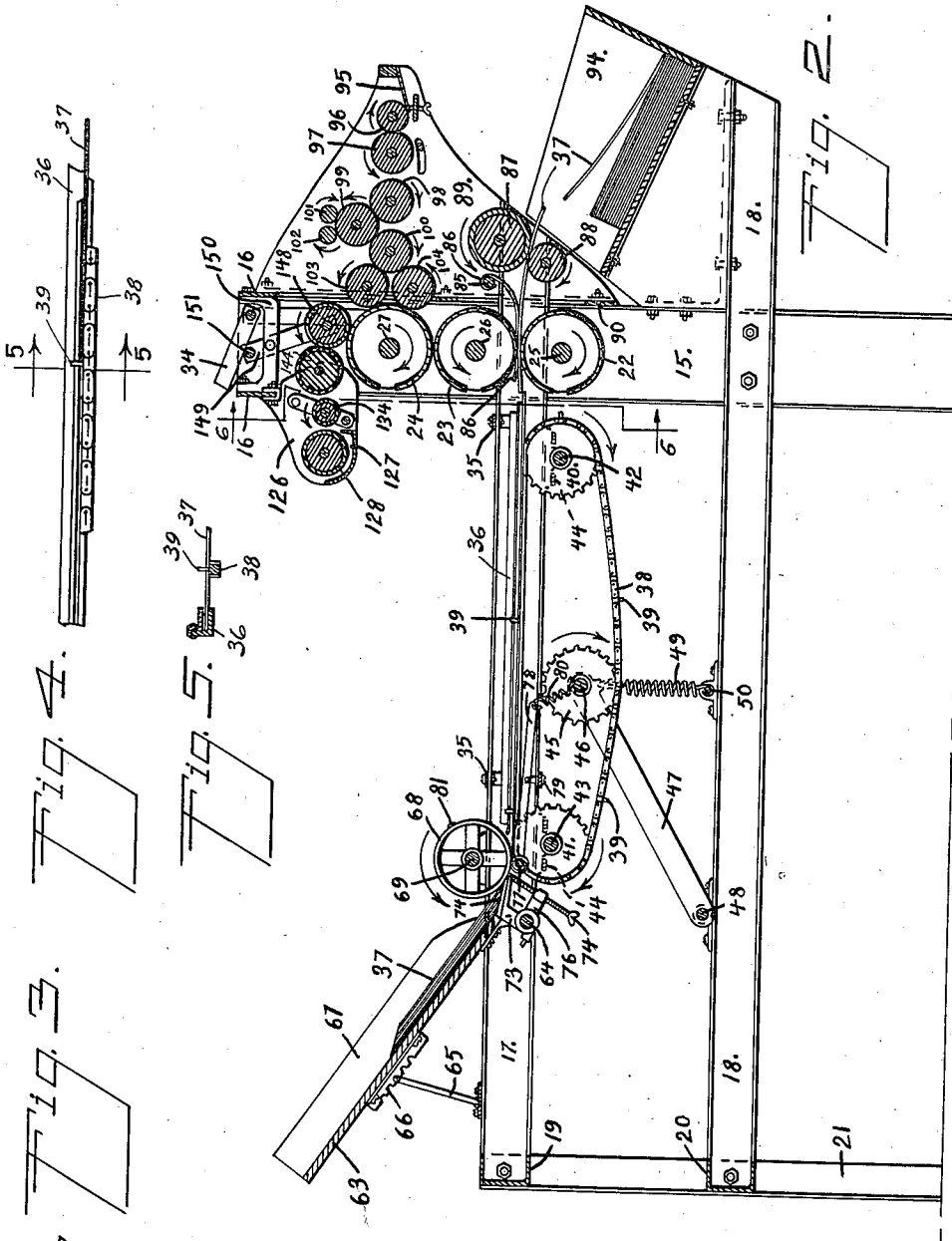
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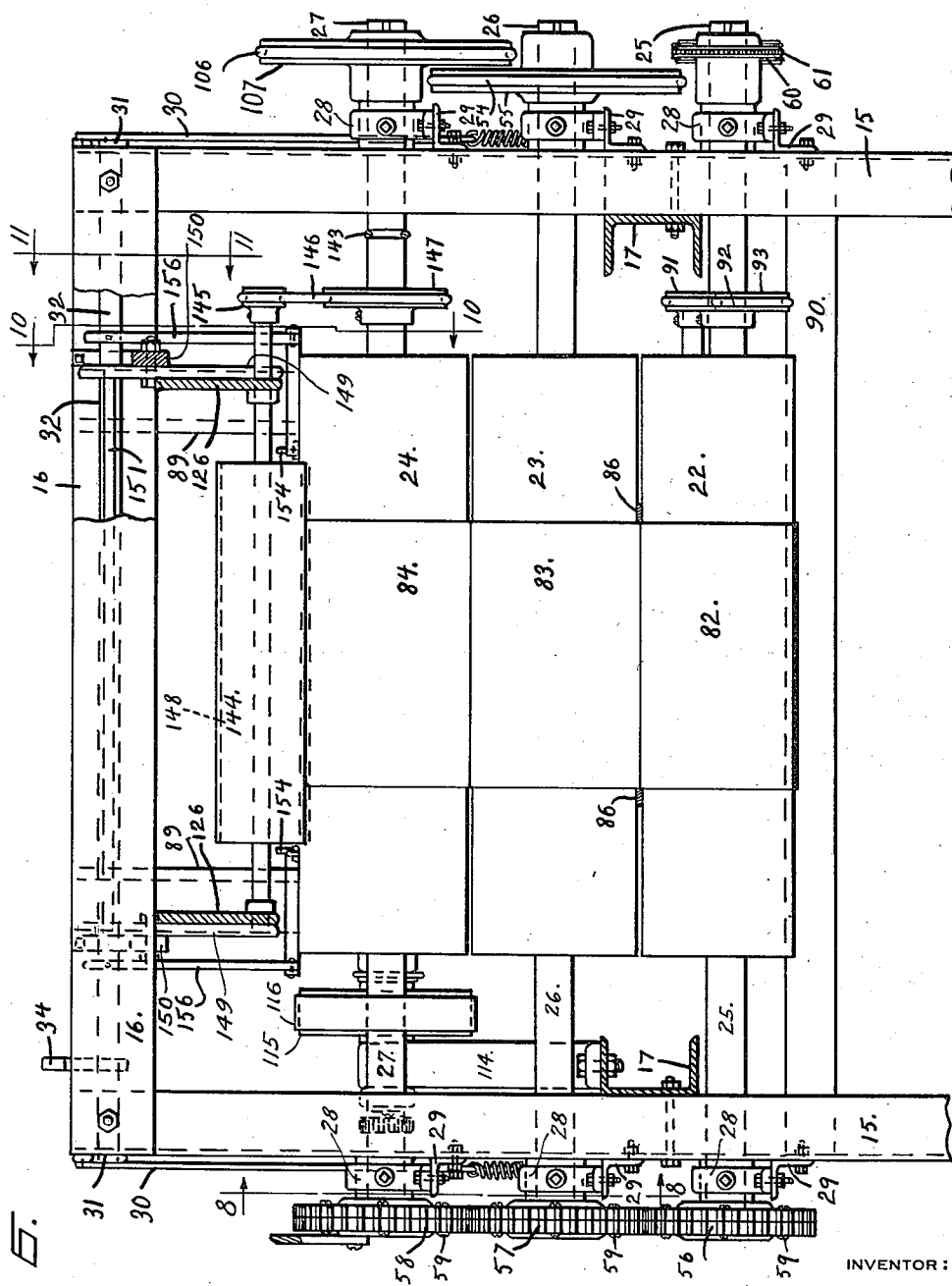
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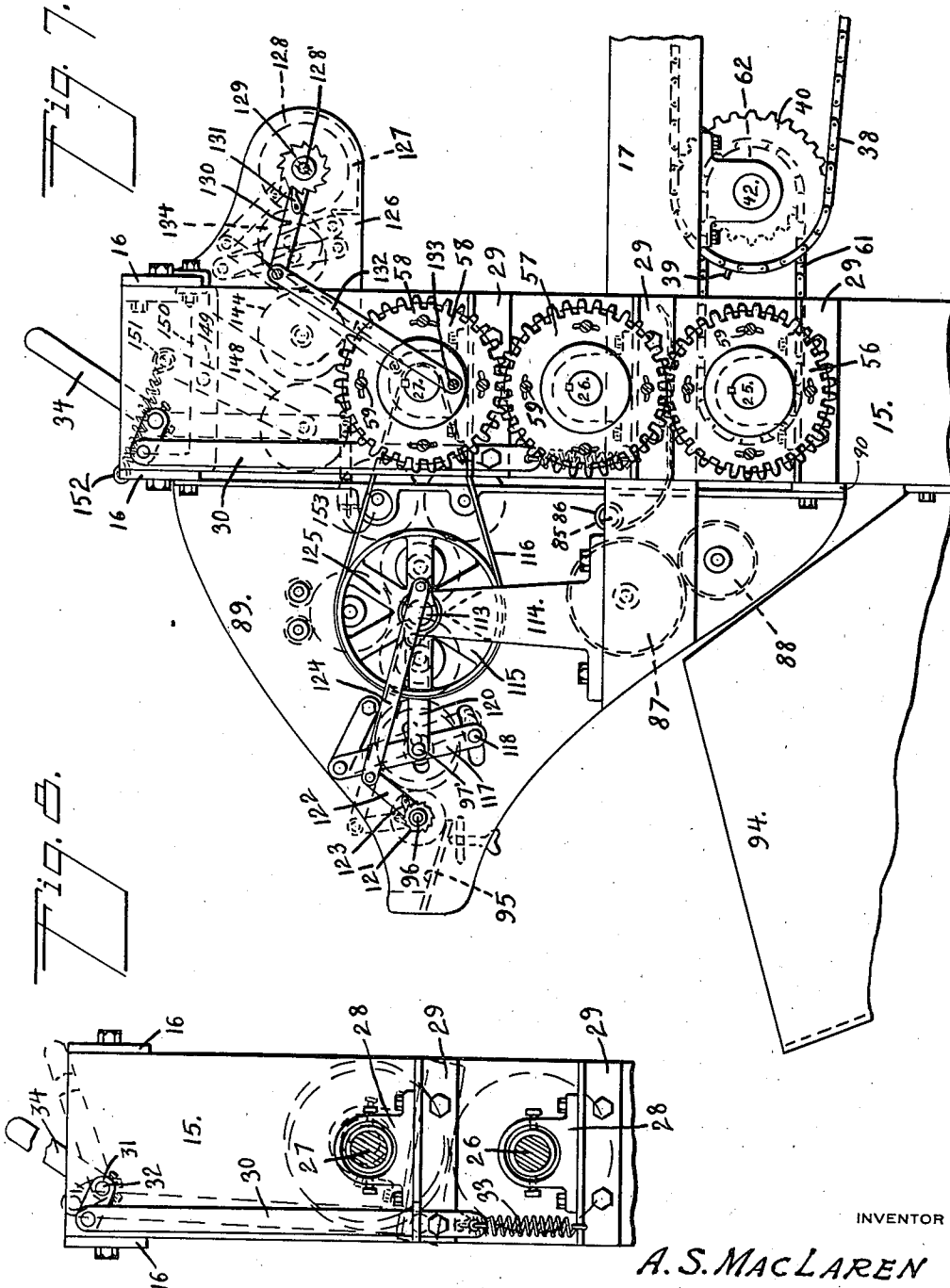
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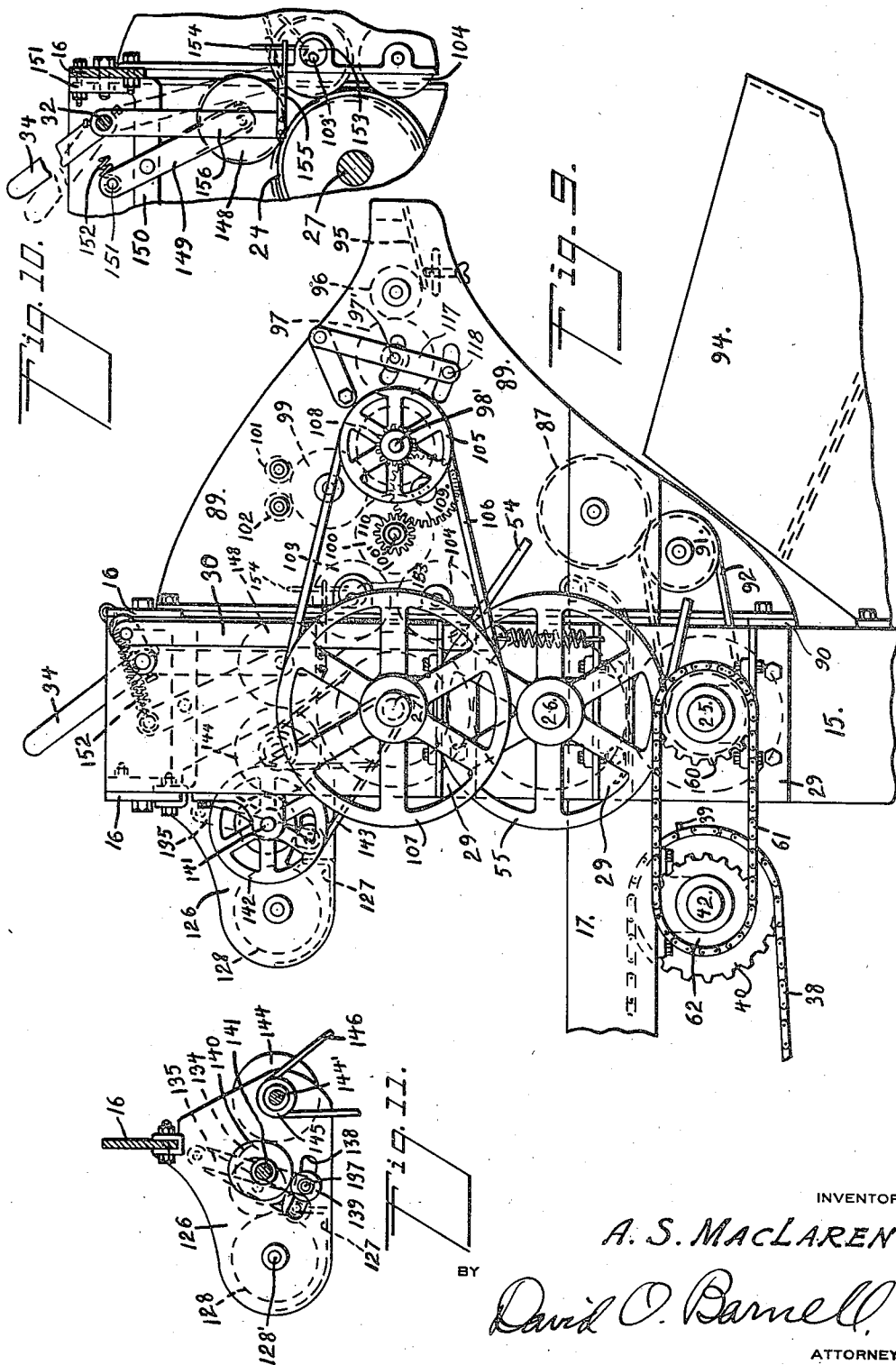
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4 Claims. (Cl. 101—142)

My invention relates to printing mechanism, and particularly to printing by rolling contact, and wherein the impression from the primary printing member or plate is received on an intermediate member from which it is transferred or offset onto the paper or other material to be printed. It is the object of my invention to provide a rotary offset printing press adapted for high-speed operation on separate sheets of paper or the like, and wherein the material printed may move in a plane tangent to the rolling impression-members, without bending to conform with the curvature of such members. A further object of my invention is to provide a rotary offset printing mechanism adapted for the printing of stiff sheets of material such that the same would be injured by bending to conformity with the curvature of a small cylinder. A further object of my invention is to provide printing mechanism of the described class, wherein feeding and register of the printing stock is effected without the use of grippers or other reciprocating operating elements which limit the speed of operation of the mechanism. A further object of my invention is to provide a press of the described class adapted for use with photo-engraved plates as the primary printing member, and with which ordinary wet plates or deep-etched dry plates may be used optionally. Further and more particular objects of my invention will be set forth hereinafter.

In the accompanying drawings Fig. 1 is a plan view of a mechanism embodying my invention, Fig. 2 is a longitudinal vertical section on the line 2—2 of Fig. 1, Fig. 3 is a detail partial side view of one of the drive-gears for the cylinders, Fig. 4 is a detail side view of a portion of the sheet-feeding means, Fig. 5 is a detail section on the line 5—5 of Fig. 4, Fig. 6 is a transverse vertical section, substantially on line 6—6 of Fig. 2, Fig. 7 is a partial left side elevation, showing details of the drive-gearing, Fig. 8 is a detail vertical section on the line 8—8 of Fig. 6, Fig. 9 is a partial right side elevation, Fig. 10 is a detail section on the line 10—10 of Fig. 6, and Fig. 11 is a detail vertical section on the line 11—11 of Fig. 6.

In carrying out my invention according to the illustrated embodiment thereof, I provide a supporting frame having a main vertical portion comprising transversely spaced, inwardly flanged standards 15 of which the upper ends are rigidly connected by cross-bars 16. Secured at the inner sides of said standards 15 are upper and lower horizontal longitudinal frame-members 17 and 18 which extend rearwardly to the legs 21, the rear ends of said members 17 and 18 being rigidly con-

nected, respectively, by transverse members 19 and 20. The impression-cylinder 22, the transfer or offset-cylinder 23, and the plate-cylinder 24, carried respectively by shafts 25, 26 and 27, are arranged in superposed relation between the standards 15 of the main frame-portion, the cylinder-shafts extending through openings in the standards and being journaled in boxes 28 mounted on angle-brackets 29 on the flat outer sides of the standards, as best shown in Fig. 6. The rear portions of the brackets supporting the boxes for the upper shaft 27, are connected pivotally with the standards 15, and the front portions of said brackets are connected by links 30 with short crank-arms 31 on the ends of a rocking-shaft 32 mounted in the upper portions of the standards 15. Springs 33, connected with the lower ends of the links 30 as best shown in Figs. 7, 8 and 9, normally hold the cylinder 24 down into contact with the cylinder 23. A handle 34 on the rocking-shaft 32 is movable to the position indicated by dotted lines in Fig. 8, to raise the links 30 and lift the cylinder 24 out of engagement with the cylinder 23.

Extending transversely between the upper longitudinal frame-members 17 are cross-bars 35, beneath which are arranged the longitudinally extending guides 36 having channelled adjoining sides adapted to receive the longitudinal edges of flat sheets 37 lying in a horizontal plane, and to direct said sheets between the cylinders 22 and 23, of which the contacting sides are in line with the guide-channels. The guides 36 are adjustable transversely, along the cross-bars 35 by which they are supported, to accommodate sheets of different widths. For actuating the sheets 37 along the guides 36, there are provided a pair of endless chains 38 having thereon lugs 39 adapted to engage the rear edges of the sheets and push the same forwardly. Said chains 38 extend about sprocket-wheels 40 and 41 carried respectively by front and rear transverse shafts 42 and 43 journaled in suitable boxes 44 on the frame-members 17. The upper sides of said chains, extending between the upper parts of the sprocket-wheels, are in horizontal register with the guides 36 and serve to support the intermediate portions of the sheets 37 while impelling the same along the guides. Said upper portions of the chains are kept taut by idler-sprockets 45 engaged with the lower portions of the chains and carried by a floating-shaft 46. Said shaft 46 is carried by swinging arms 47 pivoted on a cross-shaft 48 on the frame-members 18, and the floating-shaft 46 is pulled yieldingly downward by a spring 49 con-

nected therewith and extending down to a cross-rod 50 carried by said frame-members 18. In the structure shown, the press is driven by an electric motor 51 mounted on a base 52 secured to the front portion of the longitudinal frame-member 17 at the right side of the frame. From the drive-pulley 53 of said motor, a belt 54 extends to a pulley 55 secured on the end of the shaft 26. At the opposite or left side of the frame, intermeshing gears 56, 57 and 58 are secured respectively upon the shafts 25, 26 and 27, whereby the shafts 25 and 27 are driven from the shaft 26. Each of said gears 56, 57 and 58, is preferably formed in two parts which are relatively movable circumferentially to slightly offset the portions of the teeth formed thereon, and thus enable compensating adjustments to be made for taking up any play or back-leash between the gears, whereby to assure rotation of the cylinders 22, 23 and 24 in perfect register with each other. Screws 59, extending loosely through slots in the outer portions of the gears, as shown in Fig. 3, and entering threaded openings therefor in the inner portions, are employed for retaining the parts in adjusted relations. On the end of the shaft 25, at the right side of the frame, is a sprocket-wheel 60 from which a chain 61 extends to a similar sprocket-wheel 62 on the shaft 42, whereby said shaft and the feed-chains 38 are driven, the driving mechanism being so proportioned and related that advance of the feed-chains is synchronized with the peripheral speed of the cylinders 22 and 23, and the lugs 39 being spaced on the feed-chains at distances corresponding to the travel thereof during one revolution of the cylinders.

The sheets 37 may be fed by hand onto the guides 36, in a position to be engaged and actuated by the lugs 39 of the feed-chains, but ordinarily, for sheets which are flexible, it is preferable to employ an automatic sheet-separating feed-mechanism of the type illustrated in Figs. 1 and 2. In said mechanism there is employed a feed-table 63 having its front portion pivotally connected with a fixed shaft 64 extending transversely between the frame-members 17 rearwardly of the shaft 43. Said table 63 is supported at adjusted inclined positions by means of a crank-rod 65 engaged selectively with notches in an angle-plate 66 on the lower side of the table, and the table carries side-pieces 67 between which a pile of the sheets 37 may be disposed. Adjacent to the lower front edge of the table 63 is a feed-wheel 68, carried upon a transverse shaft 69 journaled in boxes 70 on the frame-members 17, said shaft 69 being driven from the shaft 43 by intermeshing gears 71 and 72 secured upon the respective shafts. Adjoining the front edge of the table 63 is a foot-plate 73 which is mounted tiltably on the shaft 64, said plate 73 having a cushioned face 74 which is held in adjusted relations to the feed-wheel 68 by means of a screw 75 carried by a fixed arm 76 on the shaft 64. Directly beneath the feed-wheel 68 is disposed a small pressure-roller 77 which is carried between the rear portions of a pair of flat arms 78 pivoted intermediate their ends on a cross-bar 79 arranged directly beneath the rear cross-bar 35 on which the guides 36 are carried. A spring 80 connects the front ends of the arms 78 with the floating-shaft 46, the tension of said spring causing the roller 77 to press up yieldingly toward the feed-wheel. The arrangement of the foot-plate 73 is such that the cushioned upper face 74 of said plate engages the lower edges of the inclined pile of sheets 37 which are disposed upon the table 63

in a "combed" or "feathered" arrangement, whereby the uppermost sheet of the pile is caused to slide by gravity into contact with the feed-wheel, and to be impelled by the rotation of said wheel, into a position at which the forward edge of the sheet enters the apex of the wedge-shaped space between the wheel and foot-plate. On one part of the periphery of the feed-wheel are slightly projecting pads 81 of rubber or the like which, during their movement past the foot-plate, engage the upper sheet 37 and impel the same forwardly until it is engaged between the wheel and the pressure-roller 77, and the latter then deliver the sheet into the guides 36, the timed relation of the pads and feed-chain lugs 39 being such that as each sheet is delivered into the guides said lugs are in position to engage the rear edge of the sheet and push it forwardly along the guides.

Each of the cylinders 22, 23, and 24, has a longitudinal slot in which are arranged suitable clamping and tensioning means (not shown) for holding the ends of the packing 82 on the cylinder 22, the offset blanket 83 on the cylinder 23, and the photo-engraved plate 84 on the cylinder 24. Adjacent to the front side of the cylinder 23 is a transverse rod 85 to which are slidably connected the front ends of thin flat guide-bars 86, which extend back beneath the cylinder 23 adjoining the edges of the blanket 83, as shown in Fig. 6. The width of said blanket is preferably no greater than the width of the form or design to be offset, so that the longitudinal edges or margins of the sheets 37, while passing between the cylinders, may extend beyond the edges of the blanket for engagement with the guide-bars 86, and the sheets be thereby stripped from, or prevented from adhering to the blanket. As the impressed sheets emerge from the cylinders, the stripper or guide-bars 86 direct the same between the delivery-rollers 87 and 88. Said rollers are journaled in brackets 89 secured to and extending forwardly from one of the upper cross-bars 16 and a lower cross-bar 90, extending transversely between the standards 15 of the main frame. The upper roller 87 is driven frictionally from the lower roller 88, and the latter is driven by a pulley 91 secured upon one end of its shaft, which is extended through the bracket 89, said pulley 91 being connected by a belt 92 with a pulley 93 on the shaft 25, between the standard 15 and end of the cylinder 22. From the delivery-rollers the sheets are discharged into a suitable receiver 94 carried upon the forwardly extending portions of the lower longitudinal frame-members 18.

The brackets 89 support an inking mechanism, comprising an ink-fountain 95, fountain-roller 96, transfer-roller 97, distributing-rollers 98, 99, 100, 101 and 102, and form-rollers 103 and 104. The shaft 98' of the roller 98 is extended through the right-hand bracket 89 and carries a pulley 105 which is driven by a belt 106 from a pulley 107 on the cylinder-shaft 27. An elongated pinion 108 on said shaft 98' meshes with an intermediate gear 109 mounted revolvably on the side of the bracket 89, and said gear meshes with and drives a pinion 110 on the shaft 100' of the roller 100. At the opposite ends, said shafts 98' and 100' are extended through the brackets 89 and carry grooved wheels 111 which are operatively engaged by an inclined cam-disk 112 arranged between them. Said cam-disk is carried by a shaft 113 journaled in a standard 114 mounted on the adjacent forwardly extending portion of the longitudinal frame-member 17. The shaft 113 carries a pulley

115 and is driven by a belt 116 connecting said pulley and the shaft 27. Rotation of the shaft and cam-disk 112 causes longitudinal oscillation of the rollers 98 and 100 in opposite directions, to effect longitudinal distribution of the ink received upon the roller 98 from the transfer-roller 97. The shaft 97' of said transfer-roller extends through arcuate slots in the brackets 89 and is journaled in swingable links 117 of which the lower ends are connected to each other by a cross-rod 118, also extending through arcuate slots in the brackets 89. A cam 119 on the shaft 113 actuates a bar 120, connected with the shaft 97', to swing the links 117 and engage the roller 97 alternately with the fountain-roller 96 and distributing-roller 98. The shaft 96' of the fountain-roller is extended to carry a ratchet-wheel 121 and a swinging pawl-arm 122 having a pawl 123 for engaging said wheel. The pawl-arm is actuated by a link 124 which connects the arm with a crank 125 on the outer end of the shaft 113.

To the upper cross-bar 16 at the rear side of the standards 15 are secured brackets 126, between which is carried a water-pan 127 having a roller 128 arranged to dip therein. The shaft 128' of said roller is extended to carry a ratchet-wheel 129 and a swinging pawl-arm 130 having a pawl 131 for engaging said wheel. The pawl-arm is connected by a bar 132 with a crank-pin 133 on the hub of the gear 58, whereby the arm is oscillated to intermittently actuate the roller 128. A transfer-roller 134 is carried by swinging arms 135 pivoted on the brackets 126 and connected to each other by a rod 137 parallel with the roller. One end of the rod 137 is extended through an arcuate slot 138 in the adjoining bracket, as best shown in Fig. 11, and on said end of the rod is a cam-roller 139. A cam 140 is carried on a shaft 141 having a pulley 142 which is driven by belt 143 from the cylinder-shaft 27, and said cam 140 engages the roller 139 to swing the transfer-roller 134 into alternate engagement with the pan-roller 128 and a water-distributing roller 144. The shaft 144' of the latter roller is journaled in the brackets 126, and one end of the shaft is extended to carry a pulley 145 which is driven by a belt 146 from a pulley 147 on the shaft 27, as best shown in Fig. 6. A plate-moistening roller 148 is mounted on swinging arms 149 pivoted on tie-bars 150 extending between the frame cross-bars 16. The upper ends of the arms 149 are connected to each other by a rod 151, to which is connected a spring 152, the tension of said spring tending to swing the arms 149 about their pivotal axis and press the roller 148 into yielding engagement with the roller 144 and the plate-cylinder 24. The arrangement is such that moisture is conveyed successively from the pan 127 to the roller 128, to the transfer-roller 134, to the distributing-roller 144, to the roller 148, and to the plate 84 on the cylinder 24.

When the rocking-shaft 32 is operated to lift the cylinder 24 out of contact with the cylinder 23, the upward movement of said cylinder 24 swings the roller 148 out of engagement with the roller 144, and prevents the supplying of additional moisture to the plate 84. The upward movement of the cylinder 24 also disengages the same from the lower inking-roller 104. For disengaging the upper inking-roller 103 from the cylinder, the shaft 103' of said roller is journaled eccentrically in bushings 153 which are rotatable to move the roller out of engagement with the cylinder when the latter is in raised position, as

shown by dotted lines in Fig. 10. The bushings 153 have radially extending pins 154 which are engaged and actuated by fingers 155 carried on arms 156 secured on the rocking-shaft 32, the arrangement being such that the eccentric bushings are actuated by the same movement of the rocking-shaft which serves to raise the cylinder.

For use with deep-etched or "dry" photo-engraved plates, the water-supplying and distributing devices may be omitted, or made inoperative by the removal of the plate-moistening roller 148.

The general operation of the press will be obvious from the foregoing, and it will be seen that the mechanism is adapted for high-speed operation in the printing of relatively small sheets of paper or the like, or for printing sheets of stiff material which are incapable of bending, or which would be injured by bending the same to conformity with a small cylinder. By the use of continuously moving pushing means for feeding the sheet to the impression-cylinder, the use of gripper or other reciprocating parts is avoided, and it is also made possible for the sheets to pass through between the cylinders along a rectilinear path, and without bending to conform with the curvature of the cylinders, as would be necessary if grippers were employed.

Now, having described my invention, what I claim and desire to secure by Letters Patent is:

1. In combination, a rotary offset press including an impression-cylinder and an offset-cylinder arranged in superposed relation, a packing on the impression-cylinder, an offset-blanket on the offset-cylinder, said packing and blanket each having a longitudinal slot therein, means for rotating said cylinders in synchronism so that the respective slots substantially register and meet between the cylinders upon rotation thereof, means synchronized with the cylinders for feeding sheets of paper successively between the cylinders into the slots of the packing and blanket as said slots meet upon rotation of said cylinders, said cylinders then gripping said paper between the packing and offset blanket upon further rotation thereof, and means for stripping finished sheets from the cylinders.

2. In combination, a rotary offset press having an offset-cylinder and an impression cylinder arranged in superposed relation, a packing on the impression-cylinder, an offset blanket on the offset-cylinder, said packing and blanket each having a longitudinal slot therein, means for rotating said cylinders in synchronism so that the respective slots substantially register and meet between said cylinders upon rotation thereof, means synchronized with said cylinders for registrably feeding a sheet of paper between said cylinders into the slots of the packing and blanket upon each revolution of said cylinders, and means between the cylinders spaced longitudinally outwardly of the blanket and packing thereof for stripping finished sheets from the offset-cylinder.

3. In combination, a rotary offset press having an impression-cylinder and an offset-cylinder arranged in superposed relation, a packing on the impression-cylinder, an offset blanket on the offset-cylinder, the circumferential ends of the packing and blanket being spaced apart to provide respective longitudinal slots therein, means for rotating the cylinders in synchronism so that the respective slots substantially register and meet between said cylinders upon rotation thereof, continuously forwardly moving means synchronized with the cylinders for feeding a sheet

of paper into the slots of the packing and blanket upon revolution of said cylinders whereby said sheet is gripped between said cylinders upon further rotation thereof, and means for stripping finished sheets from the offset cylinder.

4. In combination, a rotary offset press having an impression-cylinder and an offset-cylinder arranged in superposed relation, a packing on the impression-cylinder, an offset blanket on the offset-cylinder, said packing and blanket each having a longitudinal slot therein, means for rotating said cylinders in synchronism so that the respective slots substantially register with each other and meet between said cylinders upon every

revolution thereof, and continuously forwardly moving means synchronized with the cylinders for registrably feeding sheets of paper into the slots of the packing and blanket each time said slots meet, said means comprising an endless sheet-actuating means having projecting pins thereon longitudinally spaced apart a distance substantially equal to the circumference of the cylinders, continuously forwardly moving means for operatively feeding sheets of paper to the endless sheet-actuating means, and means for stripping finished sheets from the cylinders.

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