

Dec. 13, 1938.

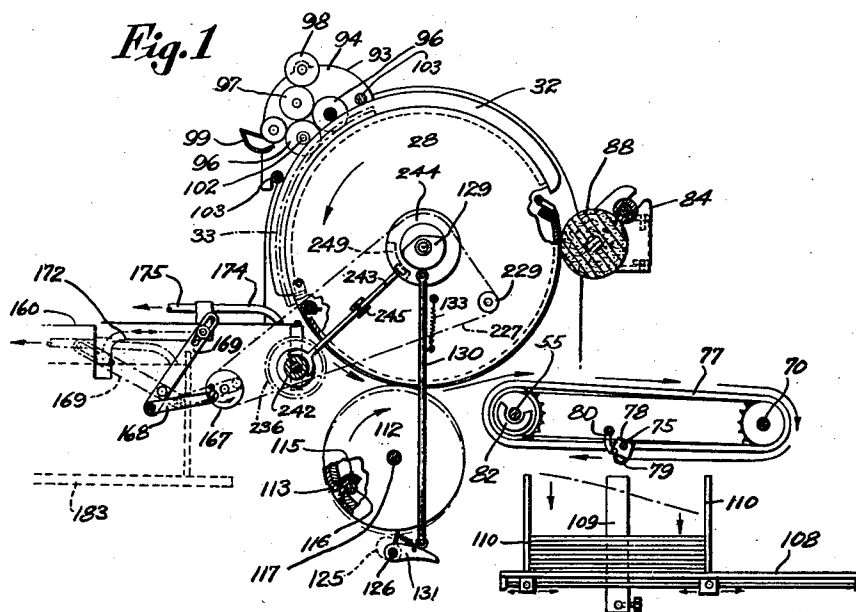
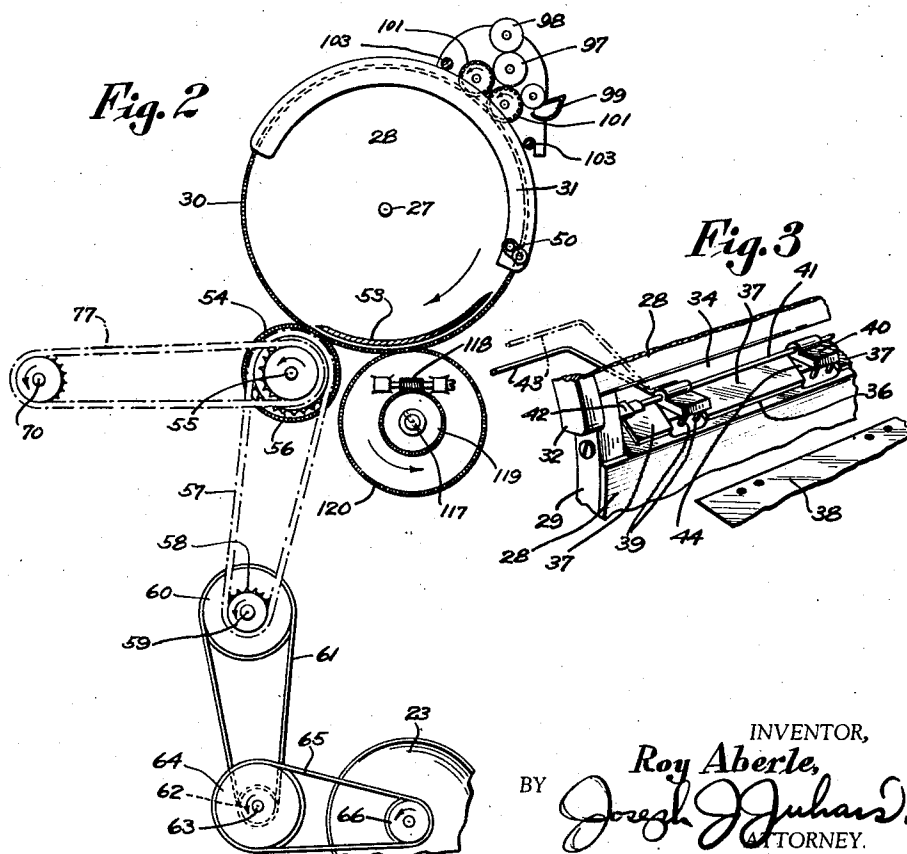
R. ABERLE

2,140,256

OFFSET LITHOGRAPHIC MACHINE

Filed Aug. 29, 1935

6 Sheets-Sheet 1



INVENTOR,
BY *Roy Aberle,*
Joseph J. Juhan,
ATTORNEY.

Dec. 13, 1938.

R. ABERLE

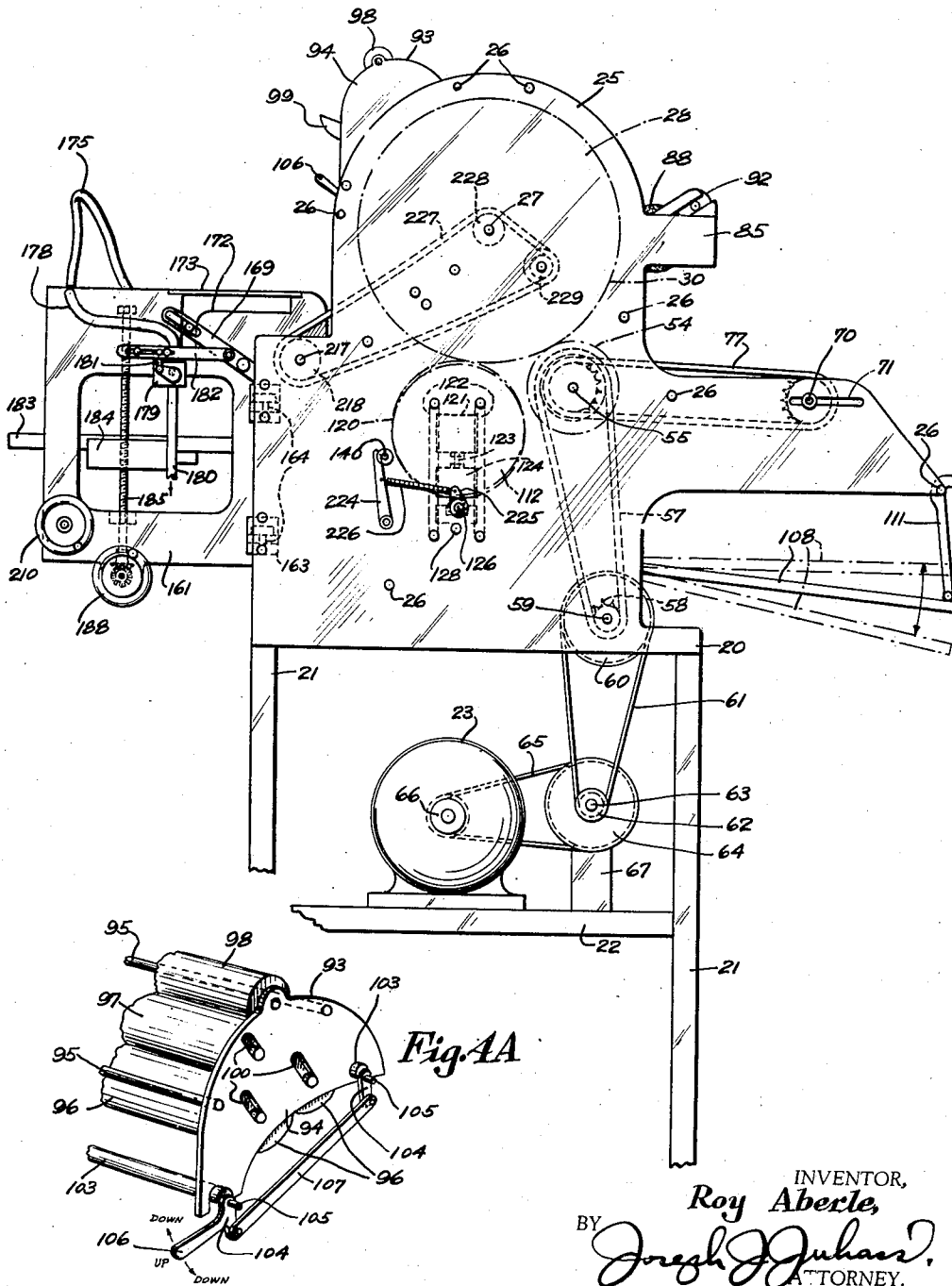
2,140,256

OFFSET LITHOGRAPHIC MACHINE

Filed Aug. 29, 1935

6 Sheets-Sheet 2

Fig. 4



INVENTOR,
Roy Aberle,
BY *Joseph J. Johnson,*
ATTORNEY.

Dec. 13, 1938.

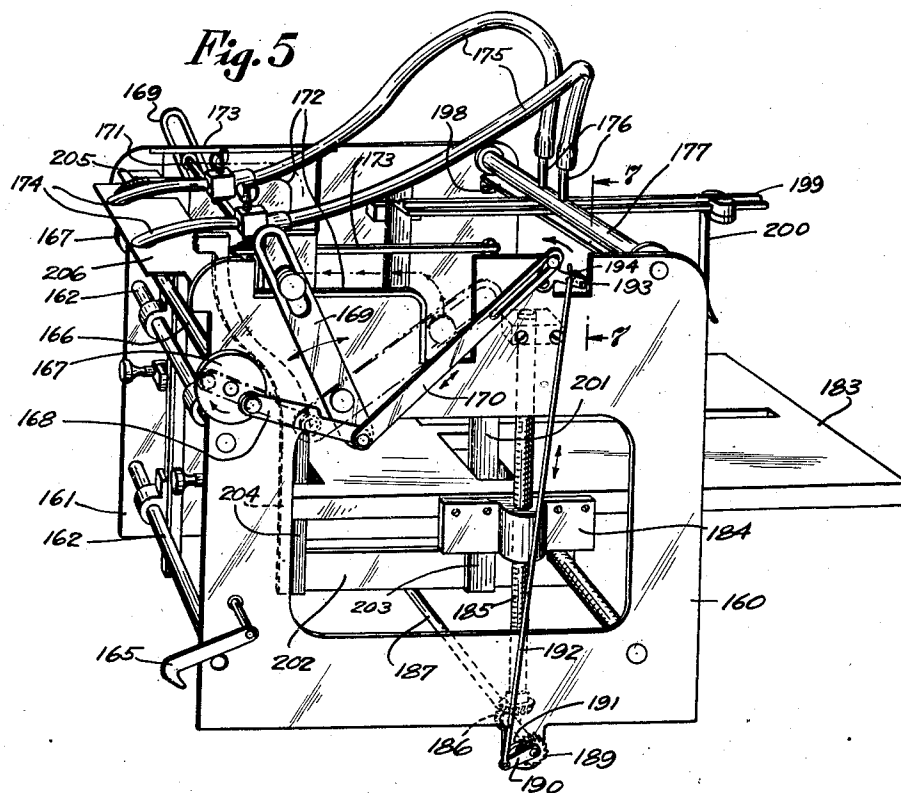
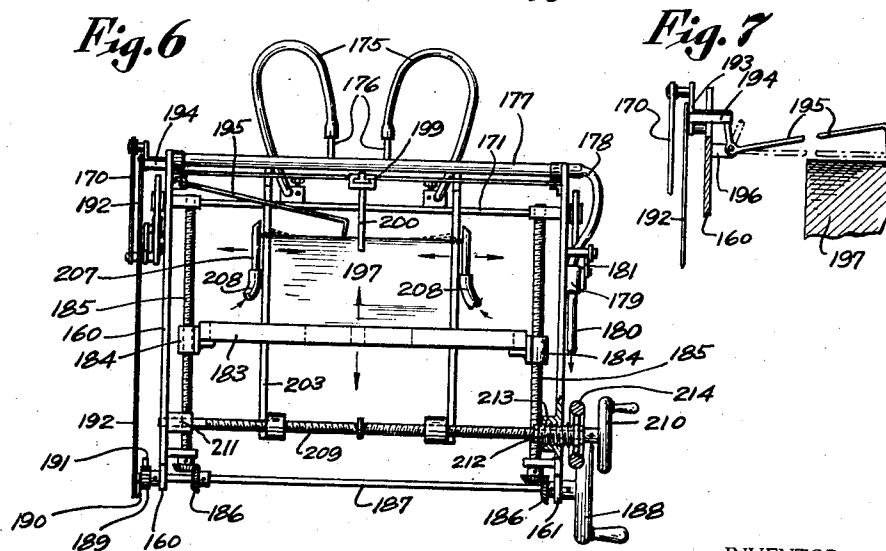
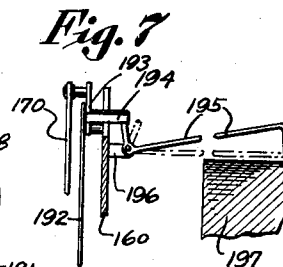
R. ABERLE

2,140,256

OFFSET LITHOGRAPHIC MACHINE

Filed Aug. 29, 1935

6 Sheets-Sheet 3



INVENTOR,
Roy Aberle,
BY *Joseph Dubars*
ATTORNEY.

Dec. 13, 1938.

R. ABERLE

2,140,256

OFFSET LITHOGRAPHIC MACHINE

Filed Aug. 29, 1935

6 Sheets-Sheet 5

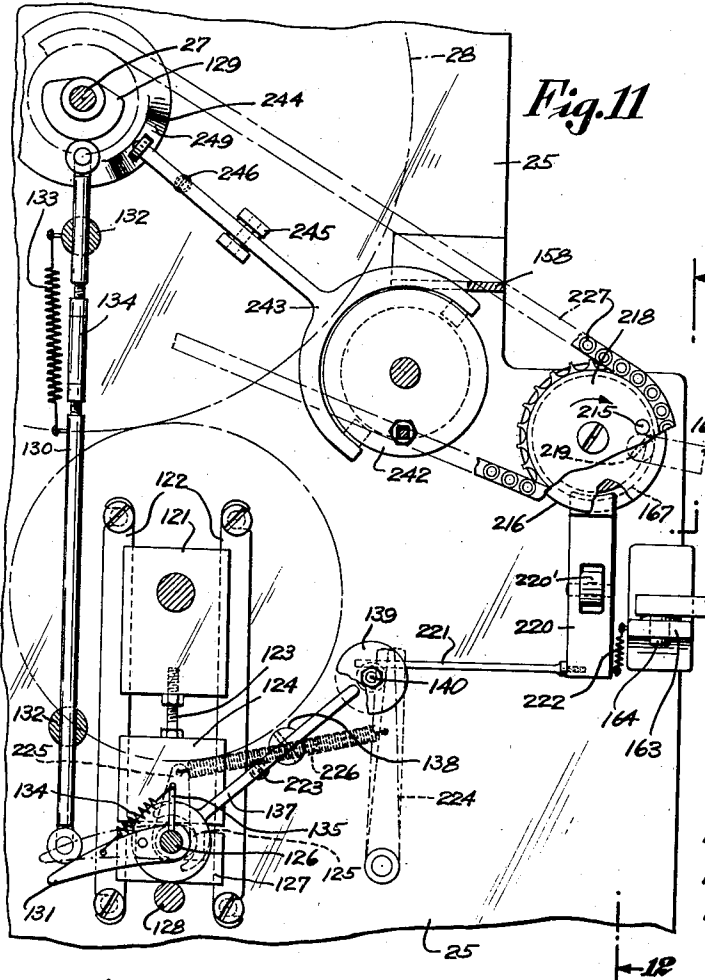


Fig. 11

Fig. 12

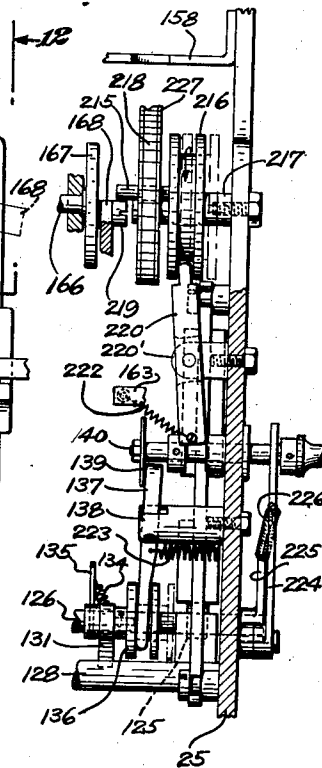
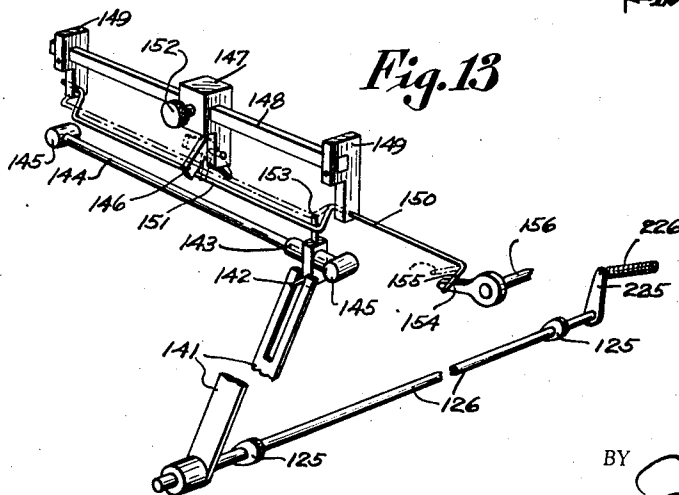


Fig. 13

INVENTOR,
Roy Aberle,
BY *Joseph J. Juhan,*
ATTORNEY.

Dec. 13, 1938.

R. ABERLE

2,140,256

OFFSET LITHOGRAPHIC MACHINE

Filed Aug. 29, 1935

6 Sheets-Sheet 6

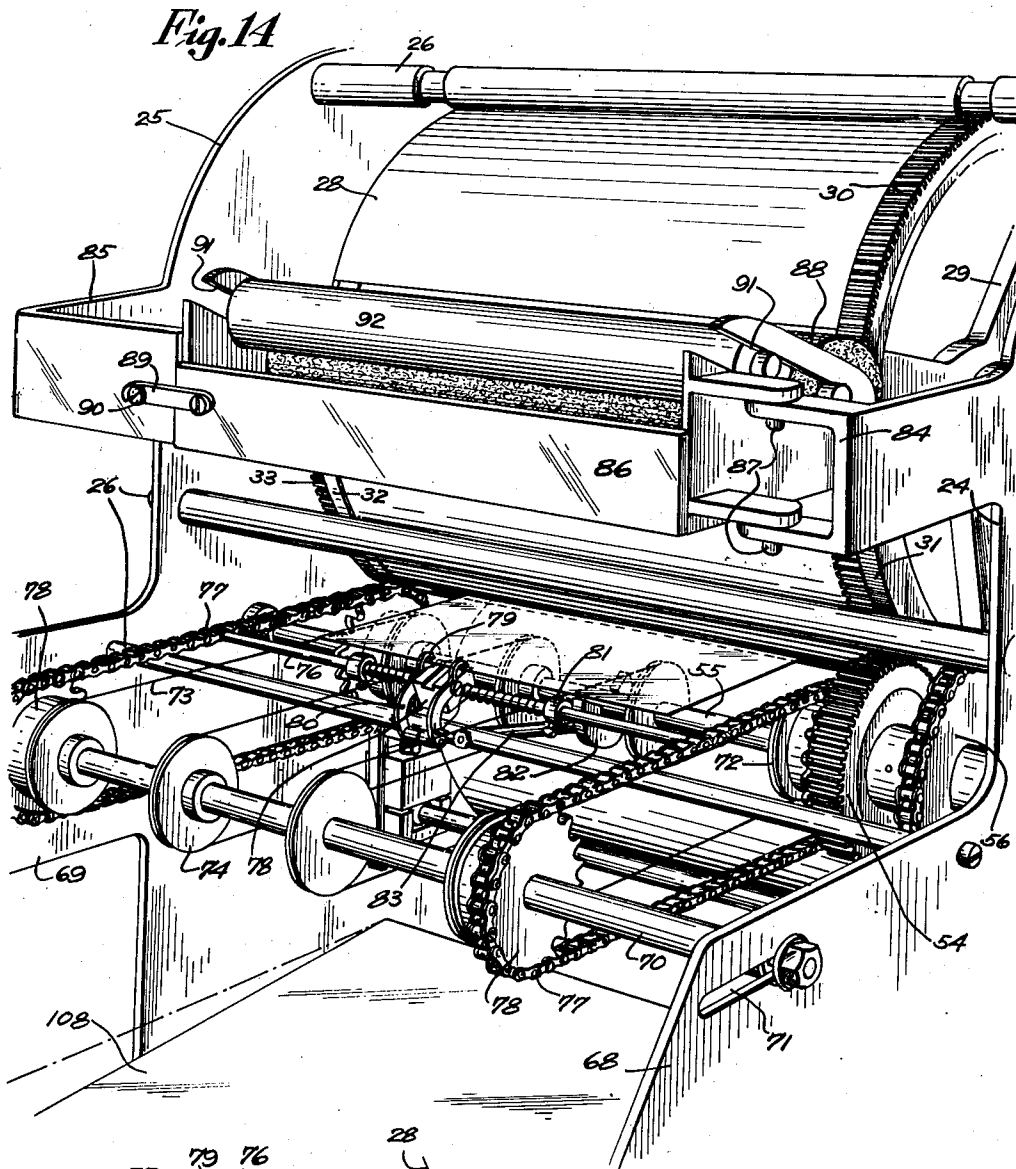
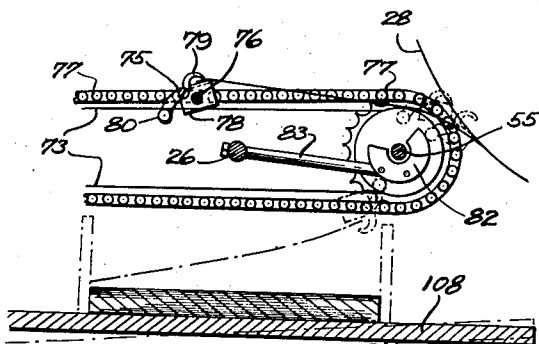


Fig.15

INVENTOR,
BY *Roy Aberle,*
Joseph J. Hughes,
ATTORNEY.

UNITED STATES PATENT OFFICE

2,140,256

OFFSET LITHOGRAPHIC MACHINE

Roy Aberle, Long Branch, N. J., assignor to Sanlin
Offset Press Manufacturing Corporation, New
York, N. Y., a corporation of New York

Application August 29, 1935, Serial No. 38,423

2 Claims. (Cl. 101-142)

This invention relates generally to printing machines and more particularly to such machines wherein printing matter is transferred from a lithographic printing plate to an offset rubber blanket or impression cylinder and therefrom to a blank sheet of paper.

The main object of this invention is the provision of structure wherein a single main cylinder carries the lithographic printing plate and also the blank sheets of paper on which the printed matter is to be placed.

Another object of the present invention is the provision of a machine having an offset impression cylinder which has a substantially less diameter than the cylinder carrying the lithographic plate and the blank paper, so that the offset impression cylinder is enabled to make more intimate contact with said lithographic plate and said paper.

An object of this invention is the provision of means for simply attaching and removing the lithographic sheet to the main cylinder.

Another object of this invention is the provision of structure whereby feeding rollers are replaced by gripping fingers which assure positive feed.

Still another object of the present invention is to provide a machine in which the separate sheets of paper, as fed through the machine, are not at any time allowed freedom, but are continuously and positively gripped either by pneumatic or mechanical means.

Another object of the invention is to provide a machine of this kind which permits of frequent and efficient cleaning in a simple manner by reason of the increased accessibility of the parts thereof subject to soilage.

An additional object of the invention is to provide a machine of this kind, having a safety stopping mechanism whereby upon the failure of the feeder to properly insert a blank sheet of paper into the transfer, the feeder is stopped and the offset impression cylinder is dropped out of contact with the sheet carrying surface on the main cylinder.

An advantage of this machine is the provision of mechanism for adjusting the clearance between the offset impression cylinder and the carrying surface of the main cylinder to correspond with the different thicknesses of the various types of papers suitable for lithography.

Another advantage of the present machine is the provision of structure in the discharging and stacking mechanism, whereby the sheets, after having an impression put thereon, are in-

verted so that the printed matter thereon appears face up and a constant check up of the quality of the printing thereon may be easily made.

Another advantage of the present machine is the provision of structure whereby the feeder is operable as an independent unit and may be simply and quickly detached for purposes of cleaning, repair or substitution of types having different capacities.

A further advantage of the invention is the provision of structure which assures accurate registration of the separate sheets as they pass through the machine, so that the printing material thereof is properly aligned and spaced from the edges of said sheets.

A still further object of the invention is to provide a machine of this kind which can be operated without any special skill or effort and is thus suitable for use in offices, schools, et cetera.

Another object of the invention is the provision of an offset lithographic machine which takes up little space by virtue of the compact and co-operative arrangement of the various sub-assemblies therein.

A still further advantage of the invention is the reduction in the number and complexity of the parts, whereby corresponding economies are accomplished in the manufacture and use thereof.

These objects and other ends and advantages will more fully appear in the progress of this disclosure and as pointed out in the appended claims.

In the accompanying drawings, right and left designations indicate right and left hand sides as the operator faces the front of the machine which carries the feeder, while the same numerals are used to indicate corresponding parts throughout the several views thereof.

Figure 1 is a schematic view of the upper portion of the machine as seen from the right side thereof, showing part of the feeder, transfer, main and impression cylinders, the discharging and stacking mechanism, and associated parts.

Figure 2 is a schematic view including the lower portion of the machine showing the main motor and principal drives therefrom as seen from the left side thereof.

Figure 3 is a fragmentary perspective view, showing in detail a portion of the main cylinder and the means thereon for attaching the forward end of the lithographic sheet.

Figure 4 is an elevational view showing the

right side of the entire machine with the legs thereof broken off.

Figure 4A is a fragmentary detailed view in perspective of the inking roller assembly manual elevating mechanism.

Figure 5 is a view in perspective of the feeder detached from the machine.

Figure 6 is a rear elevational view, slightly reduced, of the feeder shown in Figure 5.

Figure 7 is a fragmentary sectional view of Figure 5 along the plane 7-7 thereon, showing in detail the paper elevating mechanism control of the feeder.

Figure 8 is a fragmentary view in perspective looking toward the right into the machine with the feeder detached and showing in detail the automatic stop re-setting mechanism, transfer and associated parts.

Figure 9 is a fragmentary longitudinal, vertical, sectional view of the machine taken through the transfer and main cylinder.

Figure 10 is a reduced fragmentary rear elevational view showing in detail the mechanism for actuating the gripping fingers on the transfer.

Figure 11 is a fragmentary vertical, longitudinal, sectional view of the machine, taken just inside the left wall of the machine and showing mechanism adjacent the left wall and also the inner surface of the right wall and mechanism adjacent thereto.

Figure 12 is a fragmentary rear sectional view of Figure 11 substantially along the lines 12-12 thereon.

Figure 13 is a view in perspective of the compensating regulator for variations in paper thickness and automatic feed stop.

Figure 14 is a fragmentary perspective view of the rear upper portion of the machine looking toward the inner surface of the right wall and showing in detail the discharging and stacking mechanism.

Figure 15 is a fragmentary detailed schematic view in section of the discharging and stacking mechanism.

As best seen in Figure 4, the machine is supported upon a table-like frame 20 having vertical legs 21 which also support a lower shelf 22 carrying the main electrical motor 23 and also a compressor-vacuum pump (not shown). Projecting upwardly from both sides of frame 20 are two vertical irregularly shaped plates 24 and 25 which, by reason of the bracing of several transverse tie-bars 26 which integrate the said plates, constitute the chassis of the machine. The upper edges of plates 24 and 25 are semicircular in shape and carry suitable trunnioned therebetween a horizontal transverse shaft 27 having fixedly mounted thereon by means of spider end heads 29 a main cylinder. Cylinder 28 carries integrally mounted thereon and to one side thereof a ring gear 30 and immediately outwardly thereof a peripheral flange 31, semicircular in shape, while on the other side thereof said cylinder carries another flange 32, identical with flange 31, and outwardly thereof a segmental gear 33 semicircular in shape.

Cylinder 28 is provided with two diametrically opposed transverse slots, 34 providing space for the lithographic sheet front edge attaching mechanism as best seen in Figure 3, and 35 providing space for the lithographic sheet rear edge attaching mechanism, and the cylinder blank paper front edge grippers as best seen in Figure 8.

The cylinder 28 at slot 34 is cut and bent inwardly to form the angularly disposed plane flange 36, carrying spaced guide blocks 37. The

front edge of the lithographic sheet 38 is provided with a series of spaced groups of aligned perforations which are adapted to be penetrated by the correspondingly placed pins 39. Pins 39 are integral projections downwardly extending from the small blocks 40 which are aligned and rotatable with the spindle 41. Spindle 41 is suitably trunnioned in spider heads 29 and controlled by a concealed spring 42 tends normally to rotate in a clockwise direction as viewed in Figure 3. A radial arm 43 is perpendicularly bent at its outer end and its inner end is affixed to said spindle 41. The forward portion of the under surface of the blocks 37 is slightly rabbetted and said blocks are mounted on a thin transverse spacer 44 in turn affixed to flange 36. It may now be seen that in attaching the front edge of the lithographic sheet, said edge is placed abutting the outer edge of spacer 44 and between the under surface of blocks 37 and flange 36 while the arm 43 is depressed. Arm 43 projects through head 29 and is manually operated. Upon the release of pressure on arm 43, spring 42 causes the pins 39 to penetrate the perforations in the forward edge of sheet 38 thus securing the sheet positively.

It may be noted at this point that the mechanism just described permits the lithographic sheet 38 to be detached from the main cylinder 28 by releasing the front edge of the sheet first and the rear edge last. The advantage of this is that it allows the lithographic sheet to be removed without unduly wrinkling it and without cutting or damaging the rubber blanket 113 on the impression cylinder 112.

The cylinder 28 at slot 35 is provided with a roller 45 having a series of spaced groups of short aligned pins which engage corresponding perforations in the rear edge of the sheet 38. Roller 45 is suitably trunnioned in heads 29 penetrating therethrough to have attached at one end an ordinary spring controlled ratchet 46 and at the other end thereof an ordinary operating handle (not shown). Turning roller 45 in a counterclockwise direction as viewed in Figure 8 assures the even and proper tension of the sheet 38 so that it lies smoothly on the cylinder 28 thereunder.

Situated also in the slot 35 are the grippers for holding the front edge of the blank sheet of paper. These grippers 47 are composed preferably of thin spring steel and are adapted when in the closed position thereof to hold the blank sheet firmly against the cylinder 28 thereat. Grippers 47 are suitably mounted upon a series of spaced projections on a sleeve 48 carried by a spindle 49. Spindle 49 is transversely disposed and trunnioned in heads 29, penetrating through the left head 29 and having affixed to the exposed terminal thereof a short radial follower 50 with a roller mounted thereon. Numeral 51 indicates a pin which projects from the outer face of flange 31 and serves both as a stop for the rotation of follower 50 and as an anchor for a coil spring 52. The other end of spring 52 is connected to the spindle 49 and serves to turn said spindle in a clockwise direction as viewed in Figure 8 thereby normally retaining the grippers 47 in their open or disengaged position. Grippers 47 are closed by the rotation of spindle 47 which occurs whenever the roller on the follower 50 engages the stationary ramp or cam 53. Cam 53 is indicated in Figures 2 and 9, and is spaced from and affixed to the inner face of plate 24.

Ring gear 30; best seen in Figures 14 and 2, de-

5 gives rotation by meshing with a gear 54 fixed on a transverse shaft 55, a sprocket 56 also on shaft 55, a chain 57, a sprocket 58 on shaft 59, a pulley 60 also on shaft 59, a belt 61, a pulley 62 on a shaft 63, a pulley 64 also on shaft 63, a belt 65 and a pulley 66 affixed to the rotor shaft of the motor 23. Shafts 55 and 59 are suitably mounted in bearings in the plates 24 and 25, while shaft 63 is supported by an upright 67 off shelf 22.

10 Plates 24 and 25 are provided with integral rear extensions 68 and 69 which carry mounted therebetween a transverse shaft 70. Shaft 70 is rotatable and the bearings therefor are adjustable in slots 71 in said extensions 68 and 69, in order to insure the tautness of the belts and chains surrounding shafts 70 and 55. Shaft 55 has fixed thereon four pulleys 72 which carry individual parallel continuous belts 73 with identical pulleys 74 correspondingly fixed on shaft 70. Belts 73 are preferably composed of linen cord as the greatest load placed thereon is a single sheet of paper as seen in Figure 14.

15 A traveling discharging gripper 75 is carried on a transverse rod 76 which is non-rotatably mounted between a pair of chains 77. Chains 77 are carried by oppositely mounted pulleys 78 on shafts 55 and 70. Discharging gripper 75 is comprised of a mounting block 78 affixed to rod 76 centrally thereof, a pair of arcuately bent fingers 79 pivotally mounted on the outer sides of said block, small operating levers 80 integral with said fingers, rollers on the ends of said levers, and coil springs wound about rod 76 and fixed thereto at the outer ends of said springs in collars 81 and at the inner ends thereof to said levers. The outer face of block 78 is provided with a groove in order to enable it to clear a stationary cam 82 which rides on shaft 55 and is prevented from rotating by the supporting arm 83 extending off the tie-bar 26 adjacent thereto. The fingers 79 are slightly inwardly offset so that the small tips thereof bear against the outer surface of block 78 thereat. The rollers on the outer ends of levers 80 are adapted to contact cam 82 as the gripper 75 is carried about by the chains 77 thus periodically opening the fingers 79 against the action of the coil springs on rod 76 which springs keep the fingers 79 in the closed position thereof. The action of the gripper is illustrated in Figure 15.

20 Plates 24 and 25 have integral extensions 84 and 85 respectively which serve as mounting brackets for the water roller carriage 86 best seen in Figure 14. Extension 84 is bent inwardly at right angles and is provided with two horizontal orificed ears, adapted to receive pins 87. Pins 87 are downward integral projections from two lugs extending off the left side of the carriage 86. The water roller carriage may be entirely detached from the chassis, but when the pins 87 are inserted in the ears on extension 84 the carriage pivots about said pins. When the carriage 86 is swung into the transverse position thereof the water roller 88 composed of any suitable absorbent material, is brought into contact with the sheet 38 on the cylinder 28. Carriage 86 is retained in active position by a latch 89 pivotally attached to one end thereof and adapted to engage a headed pin 90 affixed to extension 85 which is inwardly and perpendicularly offset adjacent thereto. The water roller 88 is mounted on a spindle which projects therefrom at each end and is trunnioned in two angularly disposed slots 91 in carriage 86. Slots 91 are open at the upper 75 ends thereof and carry trunnioned therewithin a

roller 92. Roller 92 is composed preferably of noncorrosive metal such as brass and serves to press the water roller 88 in contact with the lithographic sheet 38 as carried by the cylinder 28, and also to evenly distribute the moisture within roller 88. The slots 91 permit the easy removal of rollers 88 and 92 and also allow said rollers to ride away from the cylinder when the flanges 31 and 32, which act as cams, raise the roller 88 which is suitably reinforced at the point of contact therewith.

Numeral 93 indicates the inking device (best seen in Figure 1 and 4A). Inking device 93 comprises two vertical irregularly shaped plates 94 which together with transverse tie-bars 95 constitute the frame thereof, two inking rollers 96, two distributor rollers 97 and 98, and an ink reservoir and feeding roller 99. Distributor roller 98 is a laterally oscillating roller well known in the printing art, having a fixed axle and pin engaging an internal way in said roller. The axle of roller 98 is fixed in plates 94 at the top thereof. Rollers 97 and 96 are trunnioned in slots 100 cut in plates 93 to permit radial movement thereof with relation to cylinder 28. The roller 99 associated with the ink reservoir is trunnioned in plates 93. Each of the rollers 96 carries a gear 101 which meshes with the ring gear 30 thereby assuring the constant rotation thereof. The drive through gears 101 also precludes the possibility of damage to lithographic sheet 38 were the rotary movement of rollers 96 to be derived frictionally therefrom. Inking is accomplished by manually pressing the ink reservoir 99 rearwardly thereby contacting the lower roller 96, and feeding a small quantity of the ink thereto. The spindles of rollers 96 are each provided with annular flanges 102 which act as followers for the cams 31 and 32 which periodically raise the said rollers out of contact with the cylinder 28. The purpose of this last mentioned cam action is to raise the rollers 96 out of contact with that portion of cylinder 28 used to carry the blank sheet's of paper and allow the ink to reach only the lithographic sheet 38. This prevents soiling the backs of the blank sheets.

Provision is made for the operation of the machine with the inking device 93 completely disengaged by the mounting of said device on an eccentric carriage therefor. Each of the plates is provided with two indentations at the lower edge thereof, and these indentations rest upon and engage two transverse rods 103. The outer ends of rods 103 are provided with integral radial arms 104 and eccentric spindles 105 which are trunnioned in plates 24 and 25 adjacent the upper edge thereof. The lower radial arm 104 is provided with an integral handle 106, and the both radial arms 104 are interconnected by a link 107. Movement of handle 106 results in raising or lowering the eccentric carriage and consequently the inking device 93.

Situated below extensions 68 and 69 is a pivotally mounted shelf 108 for receiving and stacking the printed sheets as they are released by the gripper 75. Shelf 108 is provided with side vertical guides 109 and front and rear vertical guides 110. These guides 109 and 110 project through slots in the shelf 108 from blocks and set screws riding on rods suitably supported from the under surface of said shelf as illustrated in Figure 1. The forward edge of shelf 108 is hinged to the chassis and is adapted for movement about said hinge to facilitate the removal of the stacks of paper deposited thereon. Shelf 108 is held in

operative position by a combined hook and handle 111 pivotally connected at the lower end thereof to said shelf adjacent the rear edge thereof and detachably attached near the upper end thereof to a tie-bar 26 by hooking thereon.

Situated below cylinder 28 is an offset impression cylinder 112 having the outer surface thereof covered with a suitable material such as a rubber blanket 113. Blanket 113 is affixed to cylinder 112 by inserting the ends thereof into a transverse slot 114 (see Fig. 8) in said cylinder and hooking said ends on a series of spaced pins 115 on a transverse roller 116 suitably trunnioned in the heads of the impression cylinder 112. A known spring controlled ratchet (not shown) acting on roller 116 serves to maintain proper tension of the rubber blanket 113.

Cylinder 112 is mounted on an axle 117 free to rotate thereabout, but is restrained by a worm 118 mounted on the left head of said cylinder which engages a gear 119 fixed to axle 117. Worm 118 is carried on a spindle mounted in two aligned orificed lugs laterally projecting from the left head of cylinder 112, said spindle projecting through one of said lugs and terminating in a slotted shank so that it is capable of being rotated with an ordinary screw driver. Axle 117 has a gear 120 affixed thereon having one-half the number of teeth of and meshing with gear 30. It may now be seen that cylinder 112 rotates at twice the speed of cylinder 28 and that the rotational displacement of the impression cylinder may be conveniently adjusted with relation to the main cylinder so that the ink may be transferred from the lithographic sheet 38 to the correct area on the rubber blanket 113 to assure exact registration of the printed material on the blank sheets.

Axle 117 is journaled at both ends thereof in channelled bearing blocks 121 which are vertically slideable between guideways 122 affixed to the inner faces of plates 24 and 25 by short posts at the ends of said guideways as best seen in Figures 8 and 11. Bearing blocks 121 are maintained in position vertically by bolts 123 in threaded engagement with the undersurface of blocks 121, the heads of said bolts resting on channelled sliding blocks 124 also on guideways 122. The distance between blocks 121 and blocks 124 is regulated by turning the bolts 123 and then locking the lock-nuts thereon. Blocks 123 rest on cams 125 affixed to a transverse axle 126, and said cams are in turn supported in the channelled U shaped blocks 127 also on guideways 122, said blocks 127 being prevented from dropping by the transverse tie-rod 128 connecting the plates 24 and 25. It may thus be seen that rotation of axle 126 will result in the raising or lowering of axle 117 and the impression cylinder 112.

Rotation of shaft 126 is accomplished by the following means. Shaft 27 carries fixed thereon adjacent plate 24 a cam 129 which causes a push rod follower 130 therefor to actuate a cam 131 freely mounted on axle 126 therebelow. Follower 130 is capable of vertical reciprocation within the aligned orificed guides 132 projecting from the inner face of plate 24, and is provided with rollers mounted on the ends thereof. A contractile spring 133 interconnects follower 130 with the upper guide 132 and maintains the follower in active position, while a turnbuckle section 134 permits alteration of the effective length of said follower for purposes of adjustment, as best seen on Figure 11. Cam 131 is maintained in contact with the lower roller on follower 130 by a contractile

spring 134 which interconnects said cam with a short upright post 135 fixed vertically in axle 126 adjacent thereto. A pulley 136, slideably keyed to axle 126, has an orifice in the inner face thereof adapted to engage a corresponding projecting pin on the cam 131 whenever the said pulley is moved inwardly along axle by means of a bifurcated lever 137. Lever 137 is pivotally mounted proximate the middle thereof in an upright 138 laterally projecting from plate 25, the yoke portion of said lever riding in the annular groove of said pulley 136 while the upper arm of said lever is adapted to be contacted and moved outwardly of the machine by a disc 139 affixed to the inner end of a horizontal reciprocating re-setting control 140.

Cam 129 is fixed on shaft 27 so that it forces (through the means just described) the blanket 113 on the impression cylinder 112 into intimate contact with the lithographic sheet 38 as carried on the main cylinder 28 and lowers cylinder 112 when the blank paper carrying portion of cylinder 28 is in a position to contact cylinder 112. Bolt 123 and turnbuckle section 134 are adjusted so that the required pressure is obtained to impart a good printing impression on the said blanket. Cam 129 thus serves only to force the impression cylinder up during only the impression taking part of the cycle, while during the printing part of the cycle the impression cylinder 112 is maintained in a raised position by the action of mechanism now to be described.

The left end of axle 126 projects through the plate 24 and has affixed to the terminal thereof a long slotted radial arm 141 which slideably engages a pin 142 in the slot thereof. Pin 142 projects laterally outward from a small block mounted on a sleeve 143 which is free to slide along a horizontal rod 144 mounted in a stud 145 at each end thereof. The sleeve 143 is prevented from rotating by reason of the fact that the inner face of the block thereon contacts the outer face of plate 24. Stud 145 projects from the outer face of plate 24 and act as permanent stops for the lateral displacement of sleeve 143, as best seen in Figure 13. An inverted L-shaped latch 146 is pivotally mounted to one side of and adjacent the lower edge of a block 147 which is adapted to slide along the rod 148 square in cross section. The ends of rod 148 are supported in two hangers 149 which in the lower portion thereof carry trunnioned therebetween a cranked rod 150. The offset portion 151 of cranked rod 150, when rod 150 is rotated through a quarter revolution in a clockwise direction as viewed in Figure 13, is adapted to contact the upper leg of the latch 146 and thereby raise the lower leg to a vertical position as shown by the dotted lines in the same figure. Since block 147 may be locked at any desired position along the rod 148 by means of the set screw 152, the lower leg of latch 146 acts as an adjustable stop for the pin 153 vertically projecting from the upper face of the block on the sleeve 143. The pin 153 is ordinarily to the left of latch 146 as viewed in Figure 13 although the arm 141 is shown in the released position thereof on that figure, and it may be seen that the further to the left the block 147 is moved the greater will be the movement of arm 141 and the rotation of axle 126 which will result in raising the impression cylinder 112 in a manner set forth above. Latch 146 is mounted loosely on its pivot so that when raised to its upper position by offset portion 151 and the said

portion is returned to the lowered position thereof, said latch would tend to drop to its lower position. This is so because the center of gravity of said latch 146 is below the pivotal mounting thereof. The latch 146 is thus retained in the upper position thereof by the pin 153 pressing against the lower leg thereof and frictionally engaging same. Since the impression taking pressure between cylinders 112 and 28 is slightly greater than the greatest printing pressure required, the cam 129 always rotates axle 126 so that the pin 153 disengages the latch during the impression taking part of the cycle, leaving said latch free to be set to the upper position thereof by the action of the offset portion 151. Offset portion 151 is raised just previous to and during the printing cycle by a radial arm 154 which pushes the radially bent portion 155 which is integral with the forward end of rod 150. Rod 150 penetrates forward hanger 149 and extends sufficiently to meet the arm 154. Arm 154 is affixed to the left end of a transverse spindle 156 which is trunnioned in two uprights 157 best seen in Figure 8 in which only the right upright 157 is shown. Uprights 157 project vertically from a narrow transverse shelf 158 supported between plates 24 and 25. A feeler 159 composed preferably of light spring steel is affixed to a collar in turn fixedly mounted on spindle 156 proximate the middle thereof. Feeler 159 is adapted to be tilted backward by a sheet of blank paper as said paper is fed thereunder in a manner to be more fully set forth below. Feeler 159 thus constitutes the non-feed safety stop actuator of this machine because the impression cylinder 112 is held up in a position to print only when a blank sheet of paper has backwardly displaced the feeler 159 sufficiently to raise the latch 146 and thereby hold said cylinder 112 up after the cam 129 has ceased to support said cylinder. Since the feeding of the front edge of the blank paper into the grippers 47 occurs at a point in time when cam 129 is still in an active position pin 153 does not restrict the free movement of latch 146. The total load on the feeler 159 is thus a combination of the mechanical friction of the bearings and the weight of latch 146. This load being very small results in a very sensitive action of the feeler 159 and the nonfeed stop which it controls.

Although vertical movement of axle 117 has been spoken of, when axle 117 is dropped the greatest distance encountered in the normal operation of the machine, this movement is not sufficient to disengage gears 120 and 30 so that the cylinders, when once regulated by turning the shank on worm 118, always remain in step regardless of the vertical oscillations of cylinder 112.

The feeder is constructed within a boxlike chassis consisting of two opposed irregularly shaped vertical plates 160 and 161 which are maintained in position by several transverse tie-rods 162, all of said rods not being shown for purposes of clarity. Plates 160 and 161 have the central portions thereof cut out to reduce the weight of the chassis. Plate 161 on the outer face and proximate the rear edge thereof is provided with two vertical pins 164 projecting downwardly from two lugs thereat, shown on Figure 4. These pins are adapted for insertion into two orificed brackets 163 affixed to the inner face of plate 25 proximate the forward edge thereof of which only the upper bracket 163 is seen in Figures 8 and 11. The feeder chassis

may thus be placed in hinged relation with the machine proper, or removed completely whenever this is found desirable. The feeder chassis is maintained in operative position by means of the latch 165 which is adapted to detachably engage a pin inwardly and laterally projecting from the inner face of the plate 24 adjacent the forward edge thereof, said pin being omitted from the drawings.

Trunnioned between plates 160 and 161 proximate the rear upper edges thereof is a transverse shaft 166 which projects therethrough at both ends thereof and has affixed to each end thereof one of the pair of discs 167. Discs 167 each have pivotally mounted thereon, off center and adjacent the periphery thereof, a pair of connecting links 168. Links 168 at the forward ends thereof are pivotally connected to a pair of levers 169 and a long link bar 170. Levers 169 are pivotally mounted proximate the lower ends thereof to the outer faces of plates 160 and 161, while said levers have the upper or load arms thereof slotted to carry trunnioned therebetween a transverse rod 171. Rod 171 is provided at each end thereof with integral spools and the annular grooves in said spools are engaged in the slots in the levers 169, while the integral collars on said spools ride along the guideways 172 which are hardened L shaped pieces affixed to corresponding cut out portions in the upper edges of plates 160 and 161. A pair of flat bars 173 bridge the gaps formed by the said cut out portions so that the travel of rod 171 is substantially that indicated by the train of arrows shown thereat on Figure 5, including of course the return motion as well. A pair of rigid hollow tubes 174 are angularly faced to form horizontal terminals at the rear extremities thereof and are mounted adjacent the forward ends thereof by penetrating a pair of blocks which are slideably mounted on rod 171. Said blocks may be fixed in position along the rod 171 by means of set screws in said blocks. The forward ends of tubes 174 communicate with a source of vacuum via the flexible tubes 175, the short offset tubes 176, the transverse hollow tube 177, the flexible tube 178, the relief intake valve 179, and the supply tube 180. Tube 180 is connected with any suitable source of vacuum such as a vane type pump powered by an auxiliary electric motor, and said pump and motor may well be placed upon shelf 22 but are not specifically shown as they are believed well known. The valve 179 is comprised of a block having three intercommunicating openings. One of said openings is connected to the tube 178, another to the tube 180, and the third communicates with the atmosphere when a slideable cover closing same is laterally displaced. Displacement of the cover on valve 179 is accomplished by means of a link 181 interconnecting said cover with the slotted link 182 which is in turn pivotally connected to the load arm of the right hand lever 169 at a point proximate the pivotal point thereof (best seen in Figure 4). Link 181 is provided with a short pin which is adapted to slide within the slot in link 182 so that a rearward motion of said link 182 will open valve 179 and a forward motion will close said valve. The effective length and relative positioning of the slot in link 182 is accomplished by adjustment of two screws and lock nuts therefor secured in the said slot, one of the said screws being in front of the pin on link 181 and the other to the rear of said pin.

These screws are adjusted so that the valve 179 is opened just as the tubes 174 reach the rear-most position thereof, and so that said valve is closed as the tubes 174 reach the foremost position thereof. Since the pin on link 181 is slideable within the slot in link 182 an open or closed position of the valve 179 lags until a new position is substituted. Thus it is seen that the tubes 174 pick up the topmost sheet in the stack by suction and advance it into the machine releasing said sheet just as the grippers on the transfer take hold of it.

The blank paper stack supporting platform 183 is supported by two large internally threaded blocks 184 which are adapted to ride up and down two vertical threaded rods 185 suitably trunnioned in bearing blocks projecting inwardly from plates 160 and 161. The lower ends of the rods 185 penetrate the lower bearing blocks and terminate in bevel gears which mesh with corresponding bevel gears 186 affixed to the transverse shaft 187. Shaft 187 is trunnioned in tab-like extensions of the lower edges of plates 160 and 161 and penetrates therethrough to have affixed at one end thereof the manual control wheel 188, and at the other a pinion 189 and a short radial arm 190, said arm being free to rotate on said shaft. Arm 190 carries mounted thereon a ratchet pawl 191 which engages the pinion 189. The free end of radial arm 190 is pivotally connected by means of the vertical connecting rod 192 to one arm of a bell crank lever 193 pivotally attached to plate 160 proximate the top edge thereof. The other arm of crank lever 193 is provided with an integral projecting pin which rides within a slot in the upper portion of the link bar 170. The plate 160 is indented adjacent the crank lever 193 so that an integral lug 194, projecting inwardly from the same arm of lever 193 to which rod 192 is attached, may extend to meet a feeler lever 195. Lever 195 is pivotally attached to a short stud 196 projecting inwardly of plate 160, and the configuration of said lever is best seen in Figure 7. The longer arm of lever 195 rests on the top sheet of the blank paper stack 197 while the shorter upstanding arm is adapted to move in and out under the lug 194. Since paper stack 197 is carried by the platform 183 it may be seen that when the platform has been raised so that the top sheet of said stack is at a predetermined height the lever 195 will have been also raised from a position indicated by the dot-dash lines on Figure 7 to a position indicated by the full lines thereon. Lever 195 in the latter position raises the lug 194 together with the crank lever 193 thereby preventing rod 192 from dropping. The action of link bar 170 is not inhibited because the pin on lever 193 is free to ride in the slot therein. If rod 192 is not allowed to drop, the pawl 191 can engage no new teeth on the pinion 189. Thus the platform 183 is always maintained at a proper level for feeding the blank sheets from the stack 197 thereon.

A transverse brace 198 supported between plates 160 and 161 immediately below the hollow tube 177 carries affixed to the middle thereof and at right angles thereto a channel bar 199. A front paper stack guide 200 is adapted to slide along and frictionally engage the channel bar 199 so that said guide may be adjusted forwardly or rearwardly to accommodate stacks having sheets of different lengths.

The stack 197 is maintained in position laterally by a pair of U shaped guides 201 at either side thereof. Guides 201 are each comprised of a

horizontal bar 202, a front vertical guidepiece 203, and a rear vertical guidepiece 204. The rear guidepieces 204 are rearwardly bent and have horizontal upper tips 205 which rest upon a transverse horizontal shelf 206 supported between plates 160 and 161 at the upper rear corners thereof. Rear guidepieces 204 carry suitably affixed thereto perforated tubes 207 which have the upper ends thereof occluded and the lower ends thereof connected by means of flexible tubing 208 to a suitable source of air under pressure said source not being shown, but which may very well be obtained from the same vane type pump used to obtain vacuum, as referred to hereinabove. The air emitted by tubes 207 serves to separate the upper sheets in the stack 197, as seen in Figure 6 and indicated by the dotted lines thereon, for the purpose of increasing the air pressure under the topmost sheet in the stack thereby permitting the vacuum in tubes 174 to become effective in temporarily securing the top sheet to the ends of said tubes 174. The upright guidepieces 203 and 204 penetrate upwardly through the platform 183 in slots therein and are moved inwardly or outwardly in a lateral plane and transversely of the machine by means of the horizontal bars 202 threadedly engaging the compound threaded shaft 209 which is horizontally and transversely mounted between plates 160 and 161. Because of the two oppositely threaded halves of shaft 209, rotation thereof by means of a handwheel 210 thereon results in the U shaped guides 201 either approaching or receding from each other depending upon the direction of rotation of said handwheel. In order that the two guidepieces 201 may be moved simultaneously from side to side without disturbing the spacing therebetween, the shaft 209 may be laterally displaced in the following manner. The left end of shaft 209 is slideably mounted in a sleeve affixed to plate 160, said shaft penetrating both the sleeve and the plate. The right end of shaft 209 is journaled in a bearing 212 and retained thereat by a pair of collars affixed on said shaft abutting said bearing on either side thereof. The bearing comprises an externally threaded tube, in engagement with an internally threaded journal 213 integral with plate 161, and a handwheel 214. Rotation of the handwheel 214 thus shifts the bearing 212 laterally and accurate adjustment may be made. This adjustment is valuable in obtaining correct registration of the printed material on the blank sheets of paper.

Power is communicated to the feeder by means of a pin 215 which projects laterally and inwardly from the face of a pulley 216 slidably mounted on a short fixed shaft 217 projecting from the inner face of plate 25 adjacent the forward edge thereof as best seen in Figure 12. Pin 215 penetrates through a corresponding hold in a sprocket 218 which is mounted on shaft 217 free to rotate thereabout but prevented from displacement therealong. Pin 215 is positioned to move inwardly and to strike the head of a hardened screw 219 said screw being in threaded engagement with the right hand disc 167 and serving also to pivotally attach the connecting link 168 thereat as set forth above. Pin 215 is moved with the pulley 216 and said pulley is shifted laterally by means of a lever 220 pivotally mounted in a post 220' affixed to the inner face of plate 25. The upper end of lever 220 is reduced so that it engages the annular groove in pulley 216 while the lower end of said lever is provided with an integral rearwardly projecting rod 221 75

which rides on resetting control 140 between two collars fixed thereon inwardly of the plate 25 best seen in Figure 8. A contractile coil spring 222 interconnects the lower end of lever 220 and the upper bracket 163 and thereby tends to move the pulley 216 outwardly and disengage the pin 215 and screw 219, while another similar spring 223 tends to pull the lower arm of lever 137 outwardly and to thus disengage the pulley 136 from the cam 131. Springs 222 and 223 would thus stop the feeding and printing of the machine were it not for the action of a latching lever 224 which is adapted to engage an annular groove in the portion of re-setting control 140 which extends outside the plate 25. Latching lever 224 is pivotally attached at the lower end thereof to the outer surface of plate 25 while the movements of said lever are governed by a radial arm 225 affixed to the right hand end of axle 126. Radial arm 225 and latching lever 224 are interconnected by a coil spring 226 which is normally relaxed. As long as the entire machine operates normally and the axle 126 is rotated so as to maintain impression cylinder 112 in the raised positions thereof in a manner fully set forth above the spring 226, because of radial arm 225, will tend to keep the lever 224 in the annular groove in the re-setting control 140, when however the feeler 159 is not actuated by a properly fed sheet of blank paper and the impression cylinder 112 is allowed to drop to the lowered position thereof, radial arm 225 moves to the right as viewed in Figure 11 (forwardly of the machine) and the spring 226 completely relaxed acts like a comparatively stiff connecting link thereby pushing lever 224 out of engagement with the annular groove in the starting control 140. At this point springs 222 and 223 function to disengage the feeder drive and to disengage the mechanism for elevating the impression cylinder 112, and these remain inactive until the re-setting control 140 is manually pulled outwardly after any irregularity has been corrected. It may thus be seen that upon the failure of a single sheet to feed correctly not only is the feeder stopped, until manually started, but the impression cylinder 112 drops down to a non-print position so that it is not damaged by contact with the bare portion of cylinder 28 and also so that an impression is not placed on cylinder 28 which will smudge the backs of the sheets of paper to be subsequently fed into the machine.

Sprocket 218 is driven by a continuous chain 227 which also encircles a sprocket 228 fixed on shaft 27 adjacent plate 25 and an idler sprocket 229 mounted on plate 25. Sprockets 218 and 228 rotate at the same speed and in step with each other, and since the feeder is driven by pin 215 it must always be coordinated with relation to cylinder 28 since said feeder will not commence to operate until the pin 215 pushes the screw 219.

The transfer is designed to pick up the sheets of paper as fed to it by the pneumatic tubes 174 and to transfer said sheets to the grippers 47 on the main cylinder 28. The transfer is comprised of a shaft 230 having integrally affixed thereto a plurality of aligned blocks 231, grippers 232 slideably mounted in channels in said blocks and retained by plates 231', a transverse cam-bar 233, and a pair of cam-bar support brackets 234 only the right bracket being shown. The grippers 232 have right angle offset tips which grip the paper against the top surface of the blocks 231 under tension furnished by the con-

tractile coil springs 235 which interconnect the lower portion of the grippers 232 and the blocks 231. The grippers 232 extend in a radial direction from the shaft 230, but the lower portions of said grippers are rearwardly offset to permit them to pass in back of said shaft and to permit the lower terminals of said grippers to act as followers for the several cam surfaces in the cam-bar 233. The cam-bar 233 is carried by brackets 234 which allow said bar to reciprocate there-through transversely of the machine. Shaft 230 is trunnioned in plates 24 and 25 and has fixed thereon adjacent plate 25, a gear 236 which intermittently engages the segmental gear 33. In order that the gear 236 may always return to the original position thereof, and that the blocks 231 may be properly aligned within the several cut out portions of the shelf 158 at the time a pick up is made, a resilient stop is provided. This resilient stop comprises a notched L shaped lever 237 which is pivotally mounted on a short pin 238 projecting inwardly from plate 24, a spring 239 wound about pin 238 and anchored by the pin 240 also in plate 24, and a radial latch arm 241. Lever 237 is forced up by the spring 239 so that each time shaft 230 makes a complete revolution the arm 241 snaps into the notch in said lever. The cam-bar 233 is reduced in cross section at the right hand end thereof and it penetrates a corresponding hole in the gear 236 to finally terminate in affixation to the inner face of a pulley 242 slideably mounted on shaft 230. The transverse movement of pulley 242, and consequently the opening and closing of the grippers 232 is controlled by a bifurcated lever 243. The lower or yoke portion of lever 243 is provided with diametrically opposed mounted rollers which engage the annular groove in pulley 242, while the upper end of said lever is provided with a mounted roller which engages a rim cam 244 fixed on shaft 27 inwardly of the sprocket 228. Lever 243 is pivotally mounted on a short upright 245 projecting inwardly from plate 25, while a contractile coil spring 246 interconnects the upper arm of said lever with said plate thereby securing the necessary follower action. Cam 244 is positioned on shaft 27 so that the level portion thereof is opposite lever 246 when the transfer is in the position shown by the full lines in Figure 9 at which time the grippers 47 are closed and the grippers 232 are fully open. Figure 9 schematically illustrates the action of the transfer. The grippers 232 remain open during more than three quarters of the revolution made by the transfer carriage, closing only momentarily when the depressed portion 249 of cam 244 is opposite the upper end of lever 246, the correlation of the cams being best seen in Figure 1. The grippers 232 are timed to close as soon as a sheet has been placed under the tips thereof by the pneumatic tubes 174 and to open as soon as the grippers 47 have closed over the edge of said sheet.

One side of the slot 35 is provided with a row of indentations 247 spaced to correspond with the upper tips of the grippers 232 and through which said grippers pass as the transfer carriage is revolved. These indentations allow the transfer and the cylinder 28 to approach very closely at the time the paper is transferred from one to the other.

In order that the front edge of the sheet as fed by the pneumatic tubes 174 shall not pass over the upper tips of the grippers 232 a row of loosely mounted gently curved strips 248 are 75

provided. Strips 248 are preferably light in weight and composed of metal and the combined weight thereof is sufficient to depress the front edge of the blank sheet under the upper tips of the grippers 232 without unduly restricting the movement of said sheet. Strips 248 are freely mounted on a stationary transverse spindle 250 carried at either end thereof in uprights 157 previously described.

General operation

It is believed that to those skilled in the art to which this machine pertains, the operation thereof will be apparent.

A previously prepared lithographic plate 38 is placed upon the cylinder 28 and fastened thereto. The machine is started by connecting the motor 23 to a suitable E. M. F. but the re-setting control is released (moved inwardly of the machine). With the machine running the inking device 93 is manually lowered by moving lever 106 and the ink reservoir is moved into contact with its associated roller for a period of time sufficient to place a proper supply of ink on the rollers in said device.

A stack of paper is placed on the platform 183 and the guides adjusted by sliding guide 200 and turning the wheels 210 and 214. The platform 183 is then raised by turning wheel 188 until lever 195 engages lug 194. Now upon pulling re-setting control 140 the impression cylinder 112 will rise and the feeder will commence to feed. The tubes 174 will pick up the top sheet of paper and place it within the transfer which will in turn carry said sheet to the gripper 47 on the cylinder 28. The paper will then be carried around by cylinder 28 and will be printed upon by the blanket 113. When the front edge of the paper is opposite the traveling gripper 75, the grippers 47 open and the gripper 75 snaps shut over said paper edge.

The paper is then carried out and inverted and released, finally stacking, face up on shelf 108 between the guides which have been properly set thereon.

This process is then repeated.

It is distinctly understood that minor changes in the material structure, and arrangement of

the parts of this machine may be indulged in without departing from the spirit of the invention and the scope of the appended claims.

I claim:

1. In an offset lithographic machine having a feeder associated therewith, a main cylinder adapted to carry on one portion thereof a lithographic sheet and on another portion thereof a blank paper sheet, a movable impression cylinder adapted to coast with said main cylinder, elevating means adapted to force the impression cylinder into contact with the main cylinder, actuating means associated with the main cylinder for actuating said elevating means whereby the impression cylinder contacts the lithographic sheet carrying portion of the main cylinder, a second actuating means being manually adjustable for actuating said elevating means whereby the impression cylinder contacts the paper carrying portion of said main cylinder, a manually operable resetting control for connecting said actuating means and said second actuating means with said elevating means, means for upsetting said resetting control thereby disconnecting the said actuating means and the second actuating means from said elevating means upon the failure of a sheet to be properly fed by said feeder into said machine.

2. In an offset lithographic machine, a main cylinder adapted to carry a lithographic sheet on a first portion thereof and a blank sheet of paper on a second portion thereof, the impression cylinder coasting with and adapted for movement toward and away from said main cylinder, automatic means to move the impression cylinder toward or away from the first portion of the main cylinder operated by rotation of said main cylinder in correlation with the rotational displacement thereof, manually adjustable means to regulate said first mentioned automatic means; second automatic means to move the impression cylinder toward or away from the second portion of the main cylinder operated by rotation of said main cylinder in correlation with the rotational displacement thereof and second manually adjustable means to regulate said second automatic means.

ROY ABERLE.