

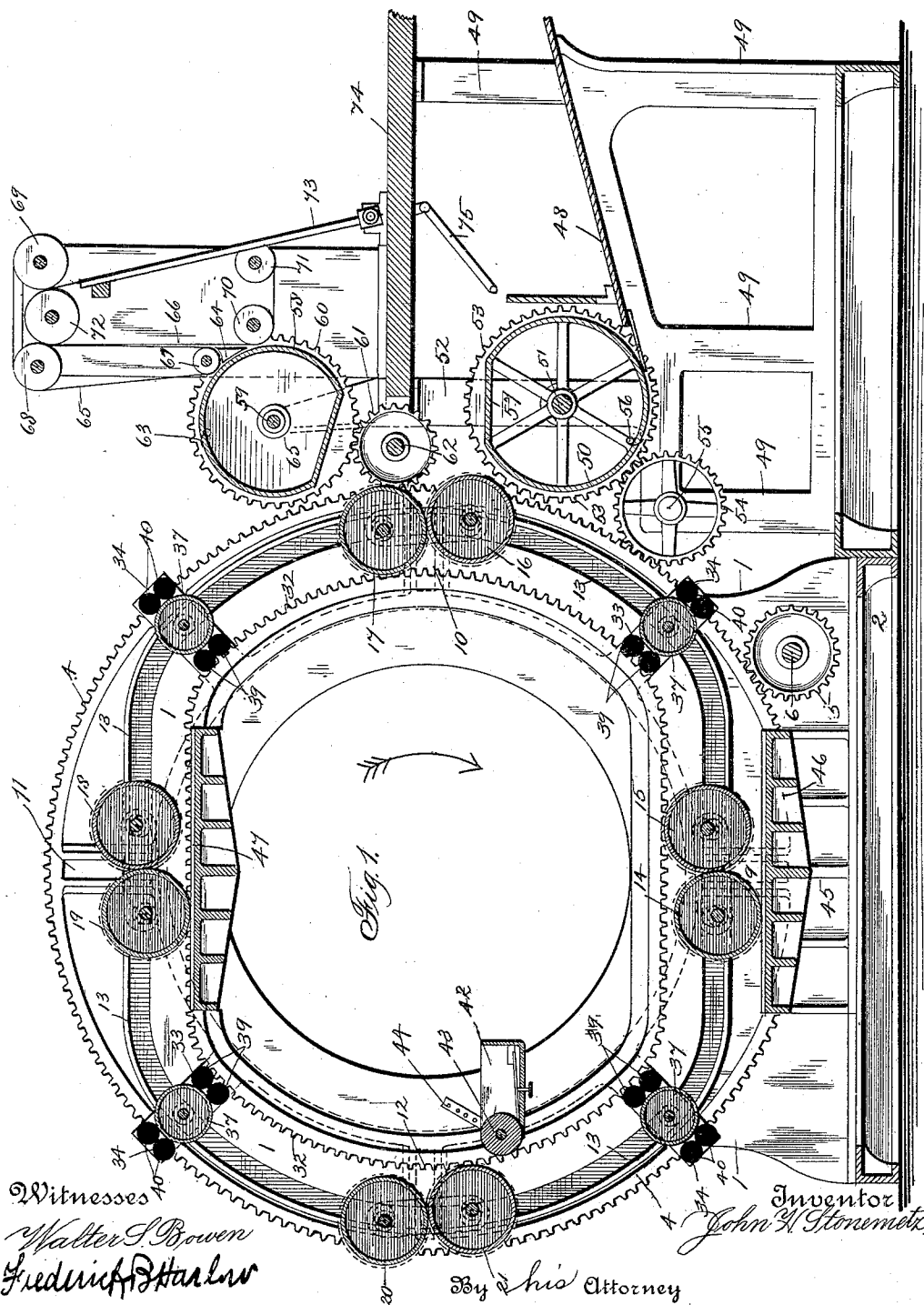
(No Model.)

6 Sheets—Sheet 1.

J. H. STONEMETZ.
TRAVELING CYLINDER PRINTING PRESS.

No. 465,634.

Patented Dec. 22, 1891.



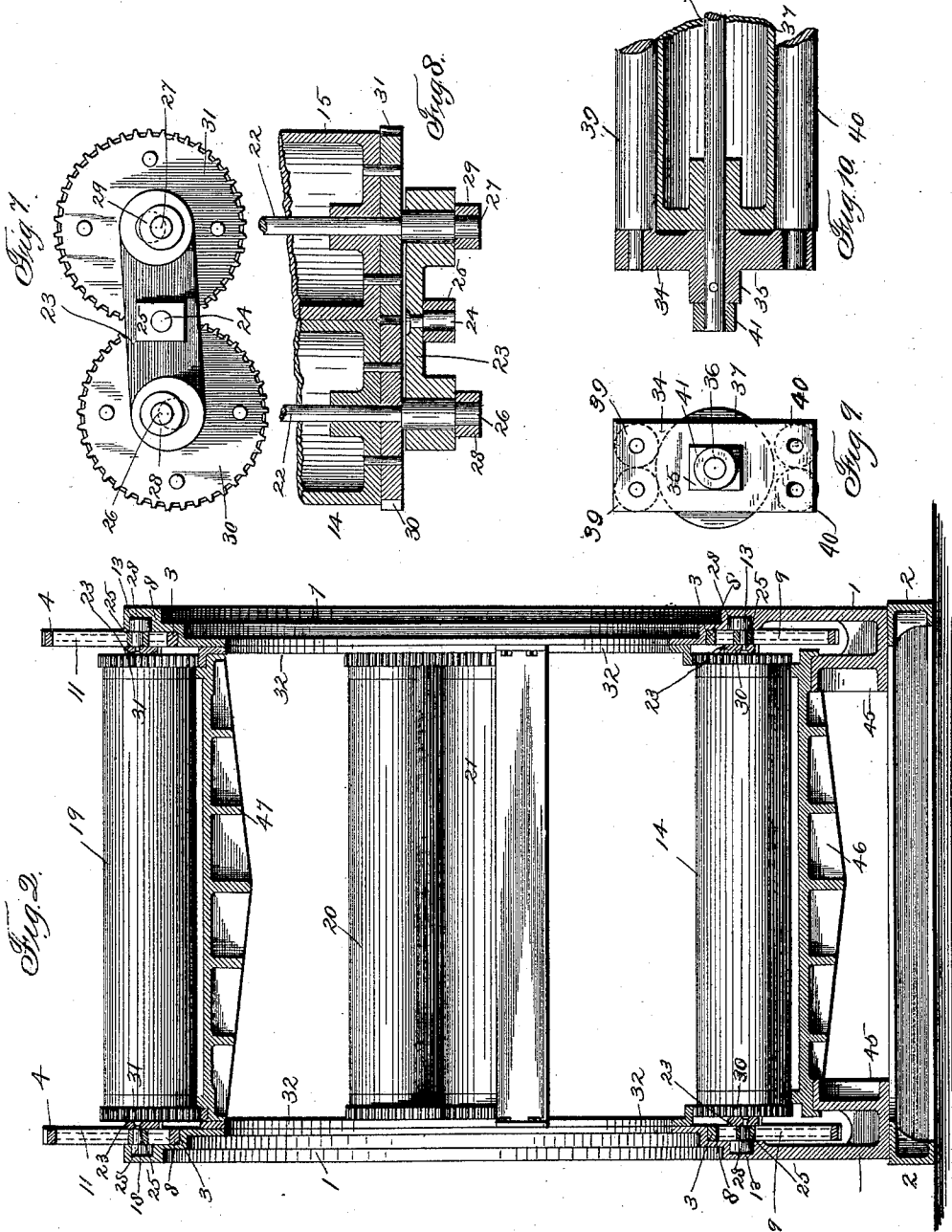
(No Model.)

6 Sheets—Sheet 2.

J. H. STONEMETZ.
TRAVELING CYLINDER PRINTING PRESS.

No. 465,634.

Patented Dec. 22, 1891.



Witnesses
Walter S. Bowen
Frederick D. Harlow

Inventor
John H. Stonemetz,
By his Attorney
Louis W. Southgate

(No Model.)

6 Sheets—Sheet 3.

J. H. STONEMETZ.
TRAVELING CYLINDER PRINTING PRESS.

No. 465,634.

Patented Dec. 22, 1 91.

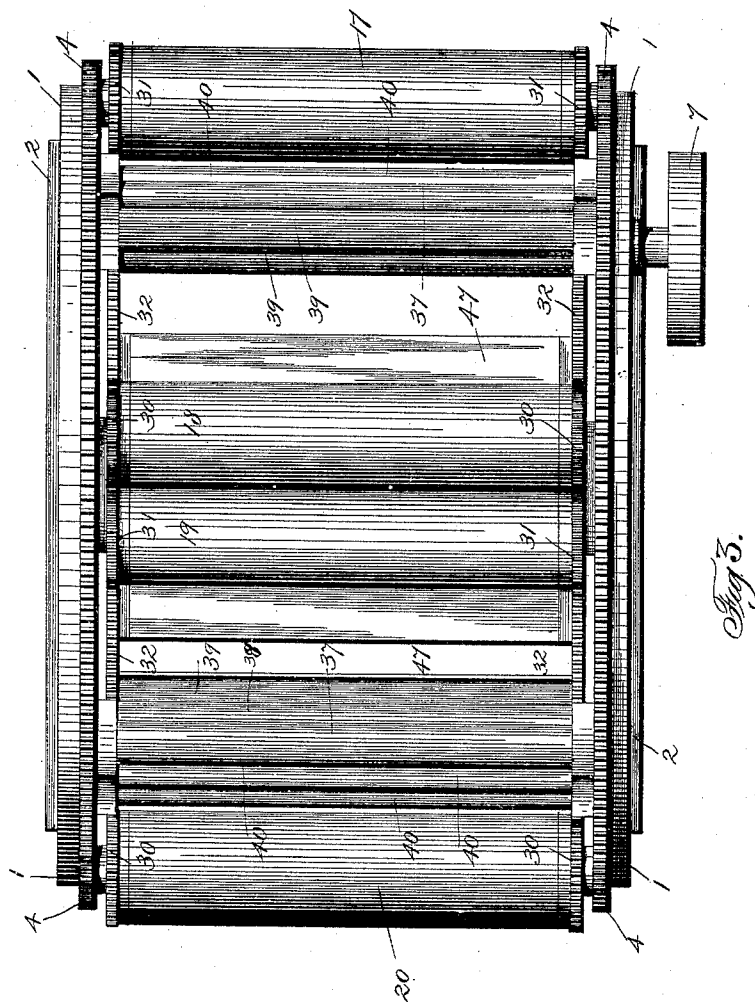


Fig 3.

Witnesses

Walter S. Bowen
Frederick H. Hauler

Inventor

John H. Stonemetz

By his Attorney

Louis W. Soutgate

(No Model.)

6 Sheets—Sheet 4.

J. H. STONEMETZ.

TRAVELING CYLINDER PRINTING PRESS.

No. 465,634.

Patented Dec. 22, 1891.

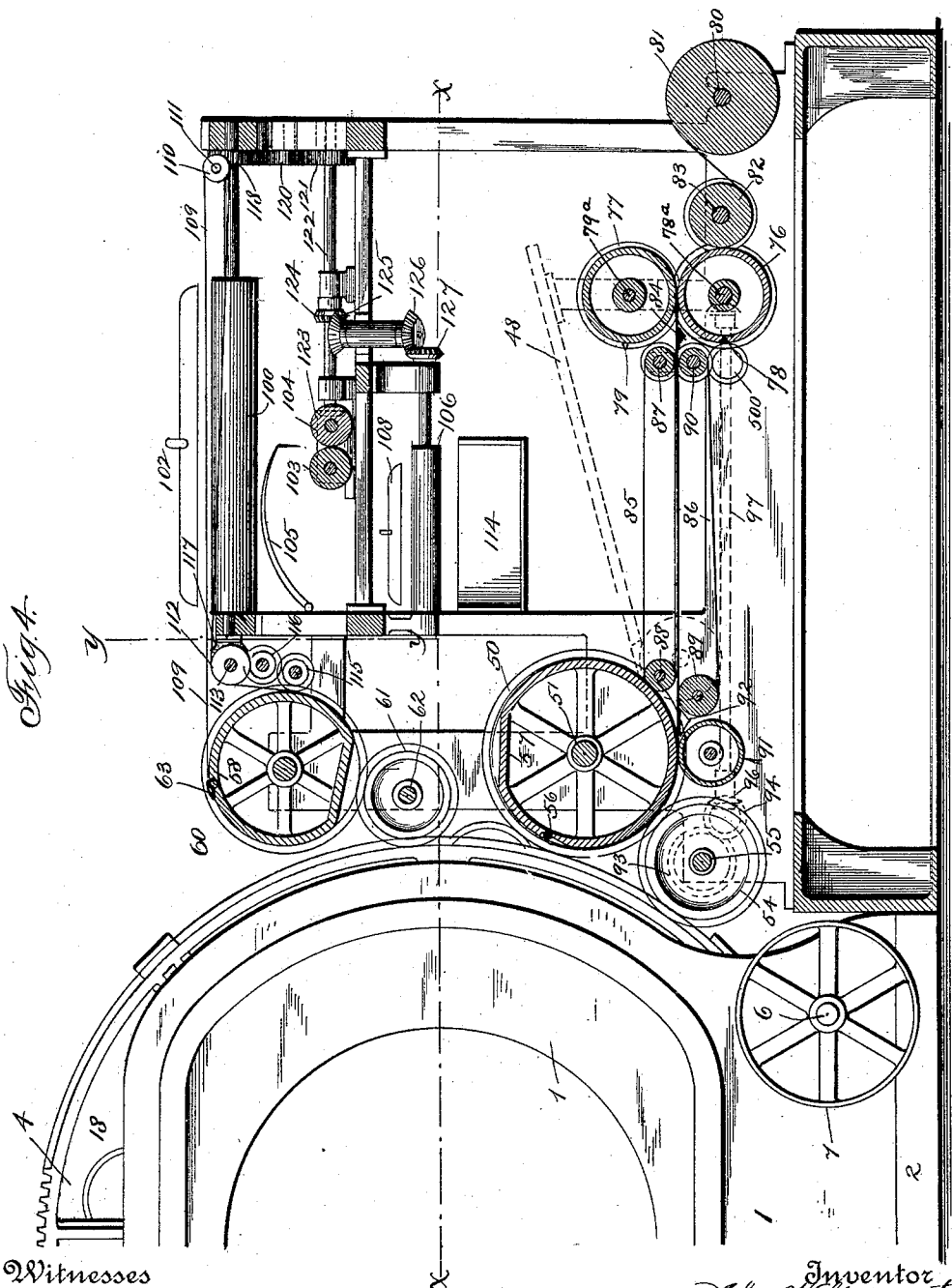


Fig. 4.

Witnesses

Walter S. Bowen.
Frederick B. Harlow

By his Attorney

Inventor
John H. Stonemetz.
Louis W. Southgate

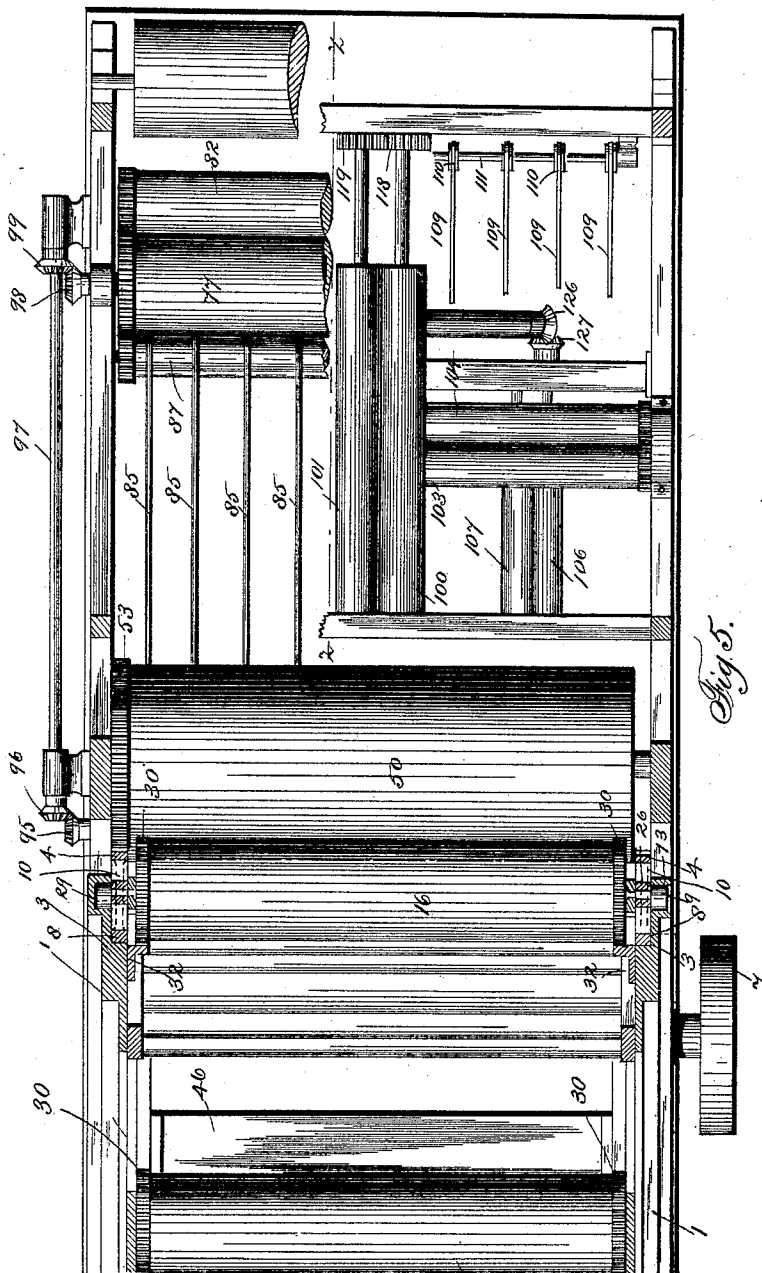
(No Model.)

6 Sheets—Sheet 5.

J. H. STONEMETZ.
TRAVELING CYLINDER PRINTING PRESS.

No. 465,634.

Patented Dec. 22, 1891.



Witnesses
Walter S. Bowen
Frederick H. Taylor

Inventor
John H. Stonemetz
By his Attorney
Louis W. Southgate

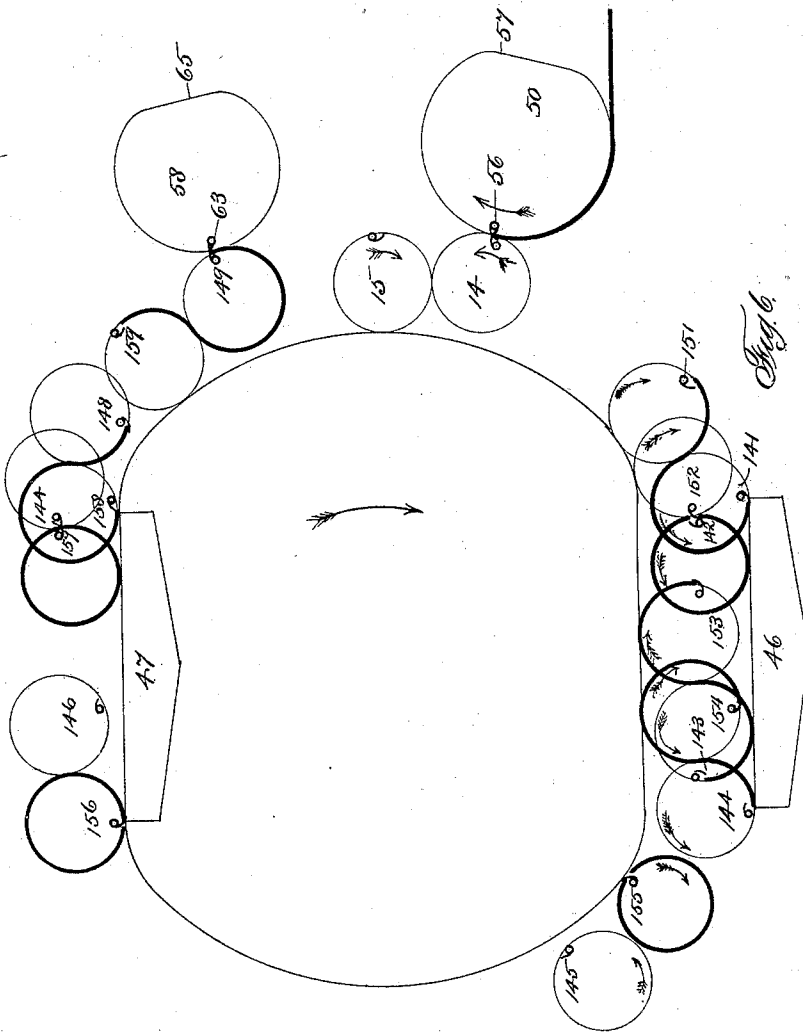
(No Model.)

6 Sheets—Sheet 6.

J. H. STONEMETZ.
TRAVELING CYLINDER PRINTING PRESS.

No. 465,634.

Patented Dec. 22, 1891.



Witnesses
Walter L. Bowen
Frederick H. Harlow

Inventor
John H. Stonemetz
By his Attorney
Louis W. Southgate

UNITED STATES PATENT OFFICE.

JOHN H. STONEMETZ, OF MILLBURY, MASSACHUSETTS, ASSIGNOR TO THE STONEMETZ PRINTERS MACHINERY COMPANY, OF SAME PLACE.

TRAVELING-CYLINDER PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 465,634, dated December 22, 1891.

Application filed May 25, 1891. Serial No. 393,951. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. STONEMETZ, a citizen of the United States, residing at Millbury, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Traveling-Cylinder Printing-Presses, of which the following is a specification.

The aim of this invention is to produce a machine that will print newspapers or other matter from flat or stationary forms and which will deliver the sheets either flat or folded, as desired.

To this end the invention consists of the device described and claimed in this specification and illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal sectional elevation of the printing-machine as it may be arranged to be fed by hand and from which the sheets are delivered flat. Fig. 2 is an end elevation of a central section of the printing-machine proper. Fig. 3 is a plan of the printing-machine. Fig. 4 is a side elevation of the printing-machine with a web-feeding device and with a folder mechanism to which the sheets are delivered, the latter being in section. Fig. 5 is a section cut on line X X of Fig. 4, the folding mechanism to the right of the line Y Y, Fig. 4, and in front of the line Z Z, Fig. 5, being in top plan. Fig. 6 is a diagram illustrating how the sheets are fed to and carried over the forms and delivered by the impression-cylinders of the machine. Fig. 7 is an end view of a pair of impression-cylinders, showing the means by which the same are held together, driven, and guided. Fig. 8 is a sectional plan of the device shown in Fig. 7. Fig. 9 is an end view of one of the inking devices, and Fig. 10 is a sectional elevation of the device shown in Fig. 9.

In detail, 1 1 represent side frames or housings, within which the working parts of the machine are contained. These frames are bolted or fastened upon a suitable base-plate or foundation 2. On the inside of each of these main frames is the circular bearing or shoe 3. This bearing 3 is finished or turned so as to be circular, and upon each of the bearings thus formed rotates a skeleton wheel

or gear 4. These skeleton gears 4 are driven by pinions 5, set on the driving-shaft 6, which is journaled in bearings in the lower part of each of the side frames. On the end of this driving-shaft 6 is fastened the driving-pulley 7. These gears 4 4 consist each of two rings or annuli, on the outer of which are cut the teeth, and the inner 8 runs on the bearing 3. These two rings are connected together by a number of arms, and these arms or spokes are slotted, as indicated at 9, 10, 11, and 12. These slots are nicely finished and are used for a purpose hereinafter described.

On the inner side of each of the side frames 11 is cut the cam-slot 13. These cam-slots are circular, except over the forms, where the same are found on a line parallel with the form.

Arranged between the skeleton wheels 4 4 are a series of impression-cylinders 14 15, 16 17, 18 19, and 20 21 and inking devices, hereinafter described. Each impression-cylinder is journaled on a shaft 22, and the shafts of each pair of impression-cylinders are connected together by means of the links or yokes 23 23 on each end of the cylinders.

Fastened in the center of each yoke 23 is a stud 24, and on this stud is the square guide or box 25. The ends of the shafts 22 are extended through the yoke 23, as at 26 and 27, and these portions of the shafts are eccentric with the rest of the shaft, for a purpose hereinafter explained. On these portions 26 and 27 run the rollers 28 and 29. The shafts 22 are fast in the yokes, and the impression-cylinders turn on the same.

Upon the ends of each of the impression-cylinders are fastened the intermeshing gear-wheels 30 and 31, the pitch-circles of which are equal to the circumferences of the impression-cylinders, and thus the latter are driven synchronously. Each impression-cylinder has a longitudinal slot, in which is journaled a rod carrying the usual sets of gripper-fingers. These slots are set so as to meet. In other words, the grippers always come together on the tangent line of the cylinders. This gripper mechanism is of such ordinary construction and the operation of the same is so well understood that it has been deemed unnecessary to

essary to confuse the drawings by showing the same except in the diagram.

The impression-cylinders are mounted as follows: The square slide-box 25 of the link 23 upon each end of each pair of cylinders is held in one of the spokes or arms of the wheel 4 in one of the slots 9, 10, 11, or 12, previously described. Further, the rollers 28 and 29 on the ends of the shafts 22 22 fit into the cam-slots 13. These rollers 28 and 29 are set eccentric, as before described, and they are so set that the following or the right-hand impression-cylinder of each pair of cylinders as they pass over the lower form-bed will be set on a slightly shorter radius than the other cylinder. Bolted on the inside of each of the side frames 1 1 is the ring or annulus 32, and the same is of a shape parallel with the cam-slot 13. The gears 31 of each of the last of the pairs of impression-cylinders mesh into these rings 32; but the gears of the leading cylinders, being set at a greater radius than the other gears 31, will clear the rings 32, as shown.

Arranged between each pair of impression-cylinders is an inking device, that will now be described. The skeleton gears 4 4 have other sets of spokes 33, exactly the same as the slotted spokes 9, 10, 11, and 12, previously described, arranged at equal distances between the spokes that drive the impression-cylinders. Bearing on each of these slotted spokes 33 is plate 34, which has the squared projection 35, fitting in the slot of each of the spokes 33. Fastened at each end in one of the plates 34 is the shaft 36, and journaled on the shaft 36 is the ink-distributing roller or cylinder 37. Above and below the ink-distributing cylinder 37 are the pairs of ink-depositing rollers 39 39 and 40 40, the outer rollers 40 40 being set loosely within slotted bearings in the pieces 34, so that while passing over and inking the form upon the lower bed they will be free of cylinder 37. This is necessary, because to get proper distribution of ink the cylinder 37 must always be turned in the same direction, and if both sets of rolls 39 39 and 40 40 bore on cylinder 37 while inking the cylinder 37 would be turned in one direction while inking the lower form-bed and in the other direction while inking the upper form-bed. This action would not distribute the ink on cylinder 37. The shaft 36 projects at each end through the squared portion 35 of the piece 34 and has a roller 41 upon the end thereof. These rollers 41 fit into the cam-slots 13 of the side frames 1 1. Bolted between the frames 1 1, transversely thereto, is an ink reservoir or fountain consisting of the bowl 42 and a roller 43, journaled therein, which may be actuated in any of the usual ways, as by the ratchet-lever 44. The position of this fountain is such that as each successive inking apparatus passes it the rollers 39 of the said apparatus will come in contact with the surface of the roller 43 and will be inked thereby. If desired, one or more similar foun-

tains may be placed at suitable points in the frame to supply ink at any other desired point. The side frames 1 1 are carried in, as at 45, to form supports, which support the bed 46, upon which one of the forms may be fastened in the usual manner. Fitting between and bolted on the rings 11 11 is a similar bed 47, upon which the opposing form may be placed. It will be noted the portions of the cam-slots 13 13 passing above the beds are made parallel to the said beds and that the straight portion of the cam-slots merges into the circular part by an easy curve. It will also be noted that the radial slots in the arms of the skeleton gears are of sufficient depth to permit of the several sets of printing and inking cylinders following the course of the cam-slots 13. Near the ends of the said beds 46 and 47 are arranged the ordinary bearers to support and steady the cylinders as they pass over said beds. It will also be noted that the toothed surfaces of the rings 32 32 are exactly parallel to the cam-slot 13, and thus as the sets of cylinders follow the said cam-slots 13 13 the gears 31 of the rear cylinders will nicely register and be in mesh with the rings 32 32.

The mechanism for feeding the sheets to and taking the same from the printing-machine will now be described. One suitable device to accomplish these functions is shown in Fig. 1. The same consists of an ordinary feed-table 48, supported upon brackets or framing 49 49. The said feed-board leads on an incline to near a point on the periphery of the feeding-cylinder 50. Said cylinder 50 is fastened on a shaft 51, journaled in brackets 52, and the same carries a gear 53, by which the same is driven. Said gear 53 is driven from one of the main gear-wheels 4 of the printing-machine by means of the intermediate 54, mounted upon a stud 55. The feeding-cylinder 50 carries at a point within its periphery gripping mechanism 56, of ordinary construction, and which will not be further described, except that its function is to take the edge of the sheet from the feed-board 48 and deliver the same to one of the leading impression-cylinders as the same meet for an instant. The speed of this feeding-cylinder 50 is approximately the surface speed of the leading impression-cylinder, and the same is so set that the grippers thereof will deliver a sheet to the grippers of each of the leading cylinders of each pair of impression-cylinders. The cylinder 50 is flattened, as at 57, so that the inking devices will clear the same as they pass. Mounted above this feeding mechanism and supported by the framing 49 is a sheet-delivering mechanism. The same consists of a delivery-cylinder 58, fastened on a shaft 59, journaled in suitable brackets. To this cylinder 58 is fastened the gear 60, and which is driven from the main gear 4 by means of the intermediate 61, mounted upon a stud 62. The cylinder 58 carries the gripping mechanism 63, the function of which is to

grasp the sheets from passing leading impression-cylinders and deliver the same to a guide 64. Cylinder 58 is flattened, as at 65, to clear the inking devices of the printing-machine, and the cylinder is driven at a proper speed to present the gripper mechanism 63 to each of the leading impression-cylinders. From the guide the sheets pass between two sets of endless tapes 65 and 66. The tapes 65 pass around the rolls 67, 68, and 69, and the tapes 66 pass around rolls 70, 71, and 72. The guide mechanism 64 guides each sheet after its release from the grippers 63 upward between the two series of tapes 65 and 66. Once within the grasp of these tapes said sheets are carried over the roller 72 and downward upon the fly 73, which deposits the same upon the delivery-board 74. This fly 73 is driven by the link 75 from any of the ordinary mechanisms. For very rapid printing it is advisable to feed the paper from a roll, and in certain forms of work it is necessary to fold the sheets after printing. To this end the mechanism shown in Figs. 4 and 5 may be used. Said feeding mechanism consists, primarily, of a pair of cutting or perforating cylinders 76 and 77, fastened on shafts 78^a and 79^a. Longitudinally in the periphery of the cylinder 76 is cut the slot 78, and meshing in the same is the knife 79, protruding from the cylinder 77. Thus as the web is fed from the roll 80, mounted in suitable bearings 81, the web will be perforated or wholly severed by the knife 79, meshing in the slot 78, and thus as the cylinders are geared together the web will be cut into sheets in width equal to the circumference of these cylinders. A suitable tension-cylinder 82, mounted on a shaft 83, is geared to run with the cutting-cylinder 76 and bears against the same to keep the web taut and to feed the same to the cutting-cylinders. From the cutting-cylinders the sheets are guided by means of fingers 84 between the tapes 85 and 86. These tapes are endless bands, and the tapes 85 pass around rolls 87 and 88 and the tapes 86 pass around the rolls 89 and 90. The rolls 87 and 90 are geared together, and the roll 90 is geared to the cylinder 76 through intermediate 500, and thus the tapes 85 and 86 are driven. These tapes deliver the sheets between the feeding-cylinder 50 and the roll 91 by means of the guide-fingers 92, where it is seized by the grippers on cylinder 50. The feeding-cylinder 50 is the same as before described and delivers the sheets to the leading impression-cylinders. The cutting-cylinders are driven at the proper speed to work as above described by means of gear 93, fastened to run with the intermediate 54, driven gear 94, miter-gears 95 and 96, shaft 97, journaled in suitable bearings fastened to the frame, miter-gear 98, and miter-gear 99, fast on the shaft of the cutting-cylinder 76. This train of gearing may be changed or varied so that the cutting-cylinders will deliver to the feeding-cylinder 50 as many sheets as there are pairs of impression-cylinders in operation.

A feeding-table 48 is dotted in above this feeding mechanism, so that the machine may be fed either or both ways, and the same may be added, if desired. Above this sheet severing and feeding device is placed a folding mechanism. This mechanism consists of the first fold-rollers 100 and 101, the folding blade or knife 102, the second fold-rollers 103 and 104, the folding-blade 105, the third fold-rollers 106 and 107, and the folding-blade 108. These rollers are driven by the gearing hereinafter described, so that the same turn toward each other on the top, and each folding-blade is hung on a lever over the tangent line of each pair of cylinders. These folding-blades are operated by any of the well-known mechanisms used for this purpose, and it is not thought necessary to show and describe such mechanisms, as the details and operation of the same are so well understood. The delivery-cylinder 58 used in connection with this folder mechanism is the same as described in connection with the delivery mechanism shown in Fig. 1. A series of endless tapes 109 run around the cylinder 58, over the rollers 100 and 101, to tape-rolls 110, which are fastened on shafts 111, mounted in bearings held on the frame. The tapes 109 return to the cylinder over tape-rollers 112, mounted on a shaft 113, journaled in bearings bolted to the frame. When the sheet is carried into proper position over the rollers 100 and 101, the same is tucked between the folding-rollers in the well-known manner and given the desired number of folds and delivered into box 114. The shaft 113 is driven from the gear 60 by means of two intermediates 115 and 116 and a driven gear fast on said shaft. Mounted on said shaft is a miter-gear, which meshes in a miter-gear 117, fast on the shaft of the roller 100. The rollers 100 and 101 are geared together by gears 118 and 119. The rollers 103 and 104 are driven from the gear 118 on the roller 100 by means of the intermediate gear 120, gear 121, mounted on the shaft 122, mounted in suitable bearings bolted to the frame, and a pair of miter-gears 123, one of which is fastened on the shaft of the cylinder 104. The rollers 106 and 107 are driven from the shaft 122 by means of miter-gears 124 125, the oblique shaft journaled in a suitable bearing bolted to the frame, and miter-gears 126 127, the latter of which is fast on the shaft of roller 106. This particular form of gearing shown is not material, as any form of gearing may be used that will give the proper rotation to the various sets of folding-rollers. Another set of folding-rolls may be added and the entire series disposed in the ordinary way, so as to give the sheet four folds instead of three, if so desired. Further, while I show one particular form of folder, I am not to be limited to the use of this particular mechanism, as any other device that will properly fold the sheets may be used.

I will now describe the operation of the

device, and first will describe the operation of the printing-machine proper. Type-forms are placed on the beds 46 and 47 and the fountain 42 is filled with ink. Referring to the diagram, Fig. 6, a sheet is fed by the feeding-cylinder 50 to one of the leading impression-cylinders, as 14. As soon as the sheet is seized by the grippers on the leading impression-cylinder the same is immediately carried in between the cylinders 14 and 15, and the last part of the paper is deposited upon the cylinder 15 as the cylinders move past the feeding-cylinder 50. The front edge of the sheet remains in the grippers on the cylinder 14 until the same presents this edge to the right-hand point of the form upon the bed 46, the said form having been previously inked by the inking device in front of this set of impression-cylinders. It will be noticed that these sets of impression-cylinders are being revolved around the center of the machine by the gear-wheels 44 and that each cylinder is constrained to move in the course laid out by the cam-slots 13. The cam-slots 13 serve to conform the lateral movement of the said sets of impression-cylinders and inking apparatus to a horizontal plane over each bed. It must also be kept in mind that these impression-cylinders are revolving on their respective axes in the directions indicated by the arrows, and, further, that each of the outer or leading of the impression-cylinders is set to bear against the bed 46. Further, as the ring 32 is exactly parallel to the bed 46 above the same, the cylinder 14 will revolve across the bed 46 exactly at the same speed and direction as if the gears 30 were in mesh with a rack placed on the bed 46, the pitch-line of which was in the same plane as the top of the form. As the cylinders 14 and 15 continue to travel across the bed 46 the sheet is printed upon one side. When the gripper mechanisms of the two cylinders come together at the points 142 and 152, the sheet is released by the grippers of leading impression-cylinder and is grasped by those of the cylinder 15, and thus the sheet is gradually transferred after the same is being printed onto the following impression-cylinder 15. The various positions of the gripper mechanisms are illustrated at 140 150, 141 151, 142 152, 143 153, 144 154, 145 155, &c. In this last position the sheet is wholly upon the following impression-cylinder 15. The cylinders own travel up to the bed 47. The cylinders are constrained to move over the same, so that the cylinder 15 will bear on the same, and the ring 32 is flattened, so as to form, practically, a rack on each side of the table, the pitch-line of which is in the same plane as the top of the form on the bed 47. When the cylinder 15 reaches a point where the same is centrally over the left-hand edge of the form on the bed 47, the gripper mechanism will present the front edge of the sheet to the left edge of this form. The gear-rings 32 32 are proportioned so that this result will be the

same with each pair of cylinders. This cylinder 15 presents the opposite side of the sheet to the form on bed 47, thus printing it on the other side and perfecting the printing of the sheet. When the grippers meet again, which will happen again at the point 147 and 157, the sheet will be started back on the leading impression-cylinder 14, as at 148 158, until the front edge of the same is carried around to the point indicated at 149, where the grippers of the leading impression-cylinder meet the grippers 63 of the delivery-cylinder 58 and deliver the edge of the sheet to these grippers. The cylinder 58 now delivers the printed sheets to either the folding or delivery mechanisms, before described. Thus a sheet is carried around over both forms and is printed on both sides in a very rapid and accurate manner. Several pairs of impression-cylinders may be used, as desired; but the best way to arrange the same is diametrically-opposite each other, so that the same will balance and so that the gears 44 can be driven easily at a very high speed. The number of beds may be increased, as desired, and the beds may be disposed at any suitable angles to each other and the cam-slots made to give the cylinders the proper motion or movement over the same. The machine with a number of beds may be advantageously used as a multicolor-printing device.

The operation of the feeding device and delivery mechanism (shown in Fig. 1) is not thought to require any further description, the sheets being fed from the feed-board and delivered by the fly mechanism in the usual manner.

The operation of the sheet severing and feeding device is as follows: As the cutting-cylinders 76 and 77 and the tension-cylinder 82 are positively driven and as the tension-cylinder is set in close contact with the female cutting-cylinder 76, and geared therewith, the sheet will be drawn from the roll 80. The sheet now passes beneath cylinder 82, between cylinders 82 and 76 and then between cylinders 76 and 77, where the sheet is cut off or perforated at fixed intervals. The sheet is drawn from between cylinders 76 and 77 by tapes 85 and 86 to cylinder 50, where it is gripped between the same and the cylinder 91, and also by the grippers on the feed-cylinder 50. As the peripheral speed of the cylinder 50 is faster than that of the cutting-cylinders 76 and 77, the sheet will be given an accelerated movement, and thus the same will be severed on the line of the perforations made by the cutting-cylinders. The sheets are delivered by the feeding-cylinder to the printing-machine, as before described. The sheets are delivered from the printing-machine to the delivery-cylinder, as before described, and from here are carried by the tapes 109 underneath the folding-blade 102 and above the folding-rolls 100 and 101. When in proper position here, the sheet is tucked by said blade 102, so that the same is tucked between the

rolls 100 and 101, and there given the first fold in the usual manner by being carried between the said rolls 100 and 101. From here the sheet is carried by the usual tapes (not shown) underneath the folding-blade or tucker 105, and over the folding-rollers 103 and 104. At the proper time, when the sheet is in the proper position, the same is tucked between these rolls 103 and 104, and thus given the second fold. The sheet is then carried by tapes to the third folding device 106 107 and blade 108, similar to the devices just described, given a third fold, and deposited, printed on both sides and folded, in a box 114. Of course other sets of rollers could be added to make any desired number of folds.

Broadly speaking, any folder and feeding mechanism can be used in connection with my printing-machine without in the least departing from the scope of my invention, and while I have shown specific feeding and folding mechanisms I do not wish to limit myself to the use of the same.

The details and arrangements of the various mechanisms can be almost infinitely varied by a skilled mechanic or designer without departing from the scope of my invention.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination, in a printing-machine, of a plurality of stationary form-beds arranged substantially around a fixed center, a pair of coacting impression-cylinders, and means for rotating or turning the same around said fixed center, whereby the said cylinders will pass over said form-beds, substantially as described.

2. The combination, in a printing-machine, of a plurality of stationary form-beds arranged substantially around a fixed center, a series of impression-cylinders arranged in pairs, and means for rotating or turning the same around said fixed center, whereby the said cylinders will pass over said form-beds, substantially as described.

3. The combination of a pair of impression-cylinders mounted to rotate around a fixed center, and gearing by which said cylinders will be also rotated around their respective axes in opposite directions, said cylinders bearing against each other, gripper mechanism adapted to transfer a sheet from one cylinder to the other, and a plurality of form-beds, one arranged to face said center and another with its back to said center, the cylinders and beds being arranged relatively to the center, so that one cylinder will bear on one form-bed and the other cylinder on the other form-bed, whereby a sheet may be perfected by the operation described, substantially as described.

4. The combination, in a printing-press, of two parallel horizontal form-beds, a pair of coacting impression-cylinders, a frame in which said cylinders are mounted, and means

for rotating said frame, substantially as described.

5. The combination, in a printing-machine, of two parallel horizontal form-beds, a series of impression-cylinders arranged in coacting pairs, a frame in which said cylinders are mounted, and means for rotating said frame, substantially as described.

6. The combination, in a printing-machine, of a plurality of form-beds mounted in a frame, one of said beds facing a fixed center and another of said beds arranged with its back to said center, said beds being set at different distances from said fixed centers, of a fixed gear or rack held by said frame, and a pair of impression-cylinders geared together and to the fixed rack, said cylinders being arranged at different radial distances from said center, whereby one cylinder will bear against one of said beds and the other of said cylinders against the other of said form-beds, means for transferring a sheet from one cylinder to the other, and means for moving said pair of cylinders together around said center, whereby a sheet may be perfected, substantially as described.

7. The combination, in a printing-machine, of a plurality of form-beds mounted in a frame, one of said beds facing a fixed center and another of said beds arranged with its back to said center, said beds being set at different distances from said fixed center, of a fixed gear or rack held by said frame, and a plurality of pairs of impression-cylinders, each pair geared together and to the fixed rack, each of the cylinders of said pairs being arranged at different radial distances relatively to each other, whereby one cylinder of each pair will bear against one form-bed and the other cylinder of each pair against the other form-bed, means for transferring a sheet from one cylinder of each pair to the other, and means for moving said pairs of cylinders together around said center, whereby a plurality of sheets will be perfected, substantially as described.

8. The combination of two form-beds and a pair of traveling coacting impression-cylinders moving around a fixed center, but constrained to pass over said form-beds, said cylinders being set at slightly-varying distances from said fixed center, said form-beds being also set at varying distances from said center, this difference being the diameter of an impression-cylinder plus the difference of said impression-cylinders from said fixed center, whereby one cylinder coacts with one of said form-beds and the other impression-cylinder with the other form-bed, substantially as described.

9. The combination of two form-beds and a plurality of pairs of traveling coacting impression-cylinders moving around a fixed center, but constrained to pass over said form-beds, the cylinders of each pair being set at slightly-varying distances from the said fixed

center, said form-beds being also set at varying distances from said fixed center, this difference being the diameter of an impression-cylinder plus the difference of said impression-cylinders from said fixed center, whereby one cylinder of each pair coacts with one form-bed and the other impression-cylinder of the pair with the other form-bed, substantially as described.

10 10. The combination of two form-beds and a plurality of pairs of traveling impression-cylinders moving around a fixed center, the leading cylinder of each of said pairs being set at a slightly-greater distance from said
15 fixed center than the following cylinder of each pair, said form-beds being also set at varying distances from said fixed center, this difference being the diameter of an impression-cylinder plus the difference of said impression-cylinders from said fixed center, whereby all the leading cylinders will coact with one form-bed and all the following cylinders with the other form-bed, substantially as described.

25 11. The combination, in a printing-machine, of a plurality of form-beds, a pair of impression-cylinders traveling together, rotating about a fixed center, but constrained to pass over said form-beds, and an inking device
30 mounted in front of the pair of impression-cylinders, so as to move in unison therewith and along the same pathway, substantially as described.

35 12. The combination, in a printing-machine, of two form-beds, a plurality of pairs of rotating traveling impression-cylinders, each pair traveling together and constrained to pass over said form-beds, and an inking device mounted between each of said pairs of
40 impression-cylinders and moving therewith, said inking devices being also constrained to pass over said form-beds, substantially as described.

45 13. The combination, in a printing-machine, of the side frames, the gears running on said side-frames, a pair of traveling impression-cylinders carried by said gears, a plurality of form-beds mounted between said side frames, cam-grooves cut in said side frames, and projections carried by said cylinders running in
50 said grooves, substantially as described.

55 14. The combination, in a printing-machine, of the side frames having the cam-grooves, a plurality of form-beds held between said side frames, and gears mounted to run on said side frames, said gears carrying a plurality of pairs of impression-cylinders, said cylinders having projections fitting in said cam-grooves, substantially as described.

60 15. The combination, in a printing-machine, of the side frames having the cam-grooves, the toothed rings bolted to the same, the gears running on said frames carrying one or more
65 pairs of impression-cylinders, said cylinders being geared together and one of the gears meshing into said toothed rings, said cylinders having projections that run in said cam-

grooves, and a plurality of form-beds over which said cylinders are constrained to pass, substantially as described.

70 16. The combination, in a printing-machine, of the side frames, the skeleton gears running on said side frames, the arms of which are slotted, one or more pairs of impression-cylinders held together by yokes, said yokes having the portions fitting in said slots, and a plurality of form-beds over which said pair of
75 cylinders is constrained to move, substantially as described.

80 17. The combination, in a printing-machine, of the side frames having the cam-grooves, the skeleton gears running on said side frames, the arms of which are slotted, one or more pairs of impression-cylinders held together by yokes, said yokes having the portions fitting in said slots, the shafts of said cylinders being extended through said yokes and fitting in said cam-grooves, and a plurality of
85 form-beds over which said pair of cylinders is constrained to pass, substantially as described.

90 18. The combination of two form-beds set at different distances from a fixed center and an inking device therefor, consisting of the central cylinder and the sets of rolls, one above
95 and the other below the central cylinder, said inking apparatus being moved around said fixed center, but constrained to pass over said form-beds, whereby one set of rolls inks one form and the other set of rolls inks the other
100 form, substantially as described.

105 19. The combination of two form-beds set at different distances from a fixed center and an inking device therefor, consisting of the central cylinder and the two sets of rolls, one
110 above and the other below the central inking cylinder, one of said sets being loosely mounted, so as to drop away from said central inking-cylinder when inking one of said forms, and means for moving said inking devices
115 around said fixed center, but constraining the same to pass over said forms, substantially as described.

120 20. In a form-bed printing-press, the combination of the frames 1 1, having the cam-slots
125 13, the gears 4 4 running on said frames 1 1, having the slotted arms, one or more pairs of impression-cylinders mounted in the yokes 23 23, having the portions 25 fitting in said slotted arms and the rollers 28 29 running in
130 said cam-grooves, said rollers being set so as to place one of the impression-cylinders at a greater radius than the other, and two form-beds, one set at a greater and the other at a less radius, to coact with the pair of impression-cylinders, substantially as described.

135 21. The combination of two form-beds, one set at a greater and the other at a less distance from a fixed center, said form-beds being set between side frames 1 1, having the
140 cam-slots 13, the gears 4 4, running on said side frames, said gears having the slotted arms set opposite to each other, and an even number of pairs of impression-cylinders mounted

in yokes fitting in said slotted arms, said yokes having extended portions fitting in said cam-slots 13, the yokes being set so as to place one impression-cylinder of each pair at a greater distance than the other cylinder of each pair, substantially as described.

22. In a form-bed printing-press, the combination of the frames 1 1, having the cam-slots 13, the gears 4 4, running on said frames 1 1, having the slotted arms, one or more pairs of impression-cylinders mounted in the yokes 23 23 on the shafts 22, said yokes having the squared portions 25 fitting in said slotted arms, the shafts 22 22 being extended through the yokes and having the eccentric portions 26 27, said eccentric portions having rollers fitting in the cam-slots 13, so that one cylinder is set on a larger radius than the other, and two form-beds, one set at a greater and the other at a less radius, to coact with the pair of impression-cylinders, substantially as described.

23. The combination, in a machine for printing from form-beds, of the side frames 1 1, having the cam-slots 13, the gears 4 4, running on said frames, the rings 32 32, bolted to said frames, one or more pairs of impression-cylinders geared together by gears 30 and 31, said gears 31 running or meshing in said rings 32 32, said cylinders being driven by said gears 4 4 and having projections working in said cam-slots, said projections being set so that the gears on one cylinder will mesh with said rings and so that the gears on the other will clear said rings, and two form-beds, one set at a greater and the other at a less radius, to coact with the pair of impression-cylinders, substantially as described.

24. The combination, in a machine for printing from form-beds, of the side frames 1 1, the gears 4 4, running on said frames, said gears having slotted arms, and one or more pairs of impression-cylinders and sets of inking apparatus carried by said arms, and two form-beds set at different distances from the center of the machine and adapted to coact with the impression-cylinders to perfect a sheet, substantially as described.

25. The combination, in a printing-machine, of a form-bed, a traveling impression-cylinder running over said form-bed, an inking apparatus also running over said form-bed, and a feeding-cylinder, as 50, for feeding sheets to said impression-cylinder, said feeding-cylinder being cut away, as at 57, to clear the inking apparatus, substantially as described.

26. The combination, in a printing-machine,

of a plurality of form-beds, a pair of traveling impression-cylinders geared together and bearing on each other at all times, said cylinders running over said form-beds, as described, and a delivery-cylinder to which the sheets are delivered by one of said impression-cylinders, substantially as described.

27. The combination, in a printing-machine, of a stationary form, an impression-cylinder running over said form, an inking device also running over said form, and a delivery-cylinder, as 58, to which the sheets are delivered from said impression-cylinder, said delivery-cylinder being cut away, as at 65, to clear the inking apparatus, substantially as described.

28. The combination, in a printing-machine, of a plurality of form-beds arranged around a fixed center, a pair of coating traveling impression-cylinders turning around said center and thus running over said form-beds, means for feeding a sheet to one of said cylinders, means for transferring the sheet to the other cylinder and then back again, whereby the sheet is perfected, and means for taking the sheet from the same impression-cylinder to which it was fed, substantially as described.

29. The combination, in a printing-machine, of a plurality of flat forms, a pair of traveling impression-cylinders running over said forms, a feeding-cylinder, as 50, and a delivery-cylinder, as 58, for feeding the sheets to and taking the same from one of said impression-cylinders, and coacting gripper mechanism on each of said cylinders, whereby the sheet is fed to one cylinder, printed on one side, transferred to the other cylinder and printed on the other side, and then transferred back to the first cylinder, so as to be carried off by the delivery mechanism, substantially as described.

30. The combination, in a printing-machine, of a stationary form, a traveling impression-cylinder running over said form, an inking apparatus also running over said form, a feeding-cylinder, and a delivery-cylinder coacting with the impression-cylinder, said feeding and delivery cylinders being cut away to clear the inking apparatus, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOHN H. STONEMETZ.

Witnesses:

LOUIS W. SOUTHGATE,
R. H. SOUTHGATE.