(No Model.)

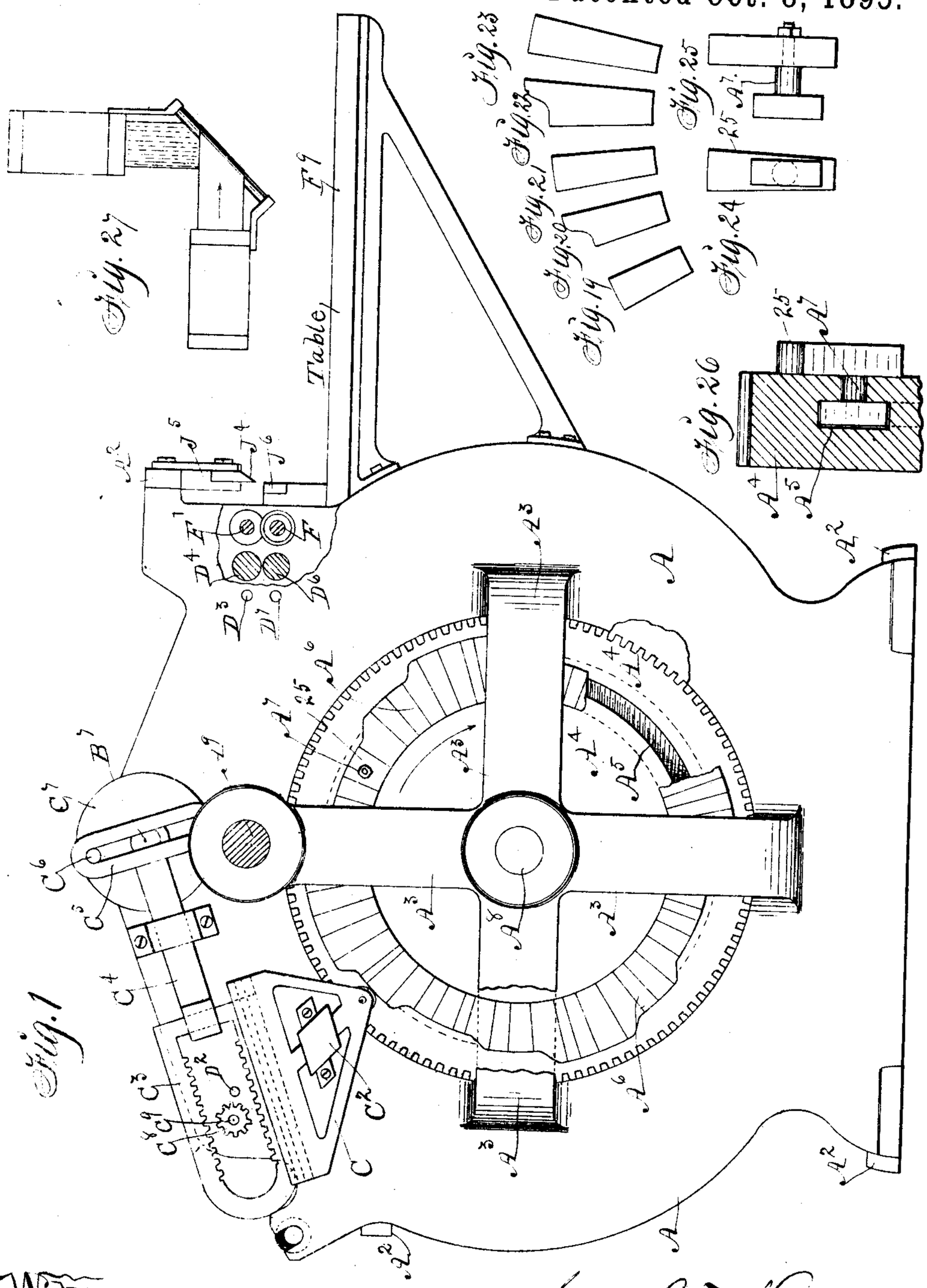
6 Sheets—Sheet 1.

S. G. WELLS.

PRINTING PRESS.

No. 547,758.

Patented Oct. 8, 1895.



Witnesses:
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H. A. Ballard.

Inventor: Semer G. Wells,
By Thomas G. Orwig, Attorney.

(No Model.)

6 Sheets—Sheet 2.

S. G. WELLS.

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Fig. 2

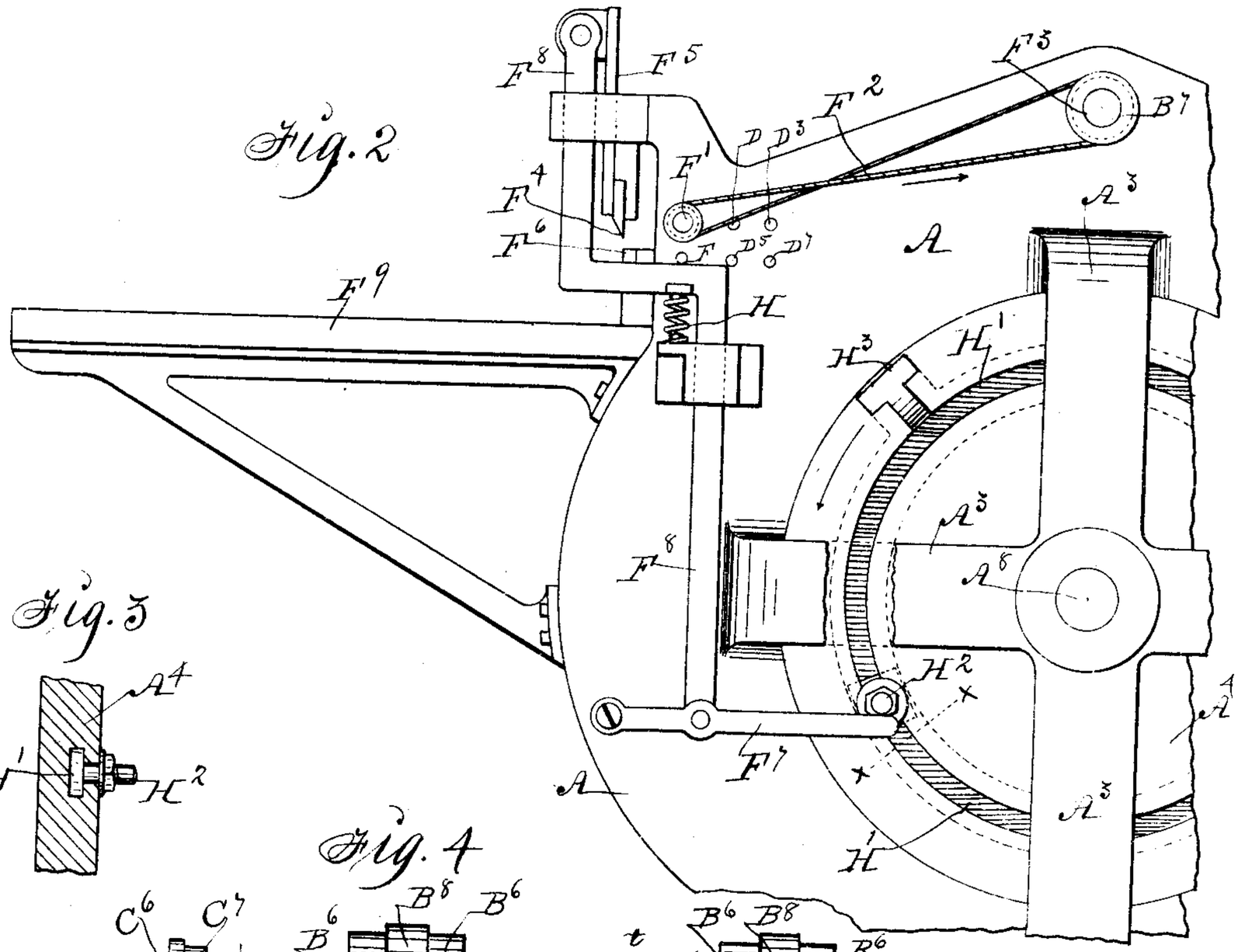
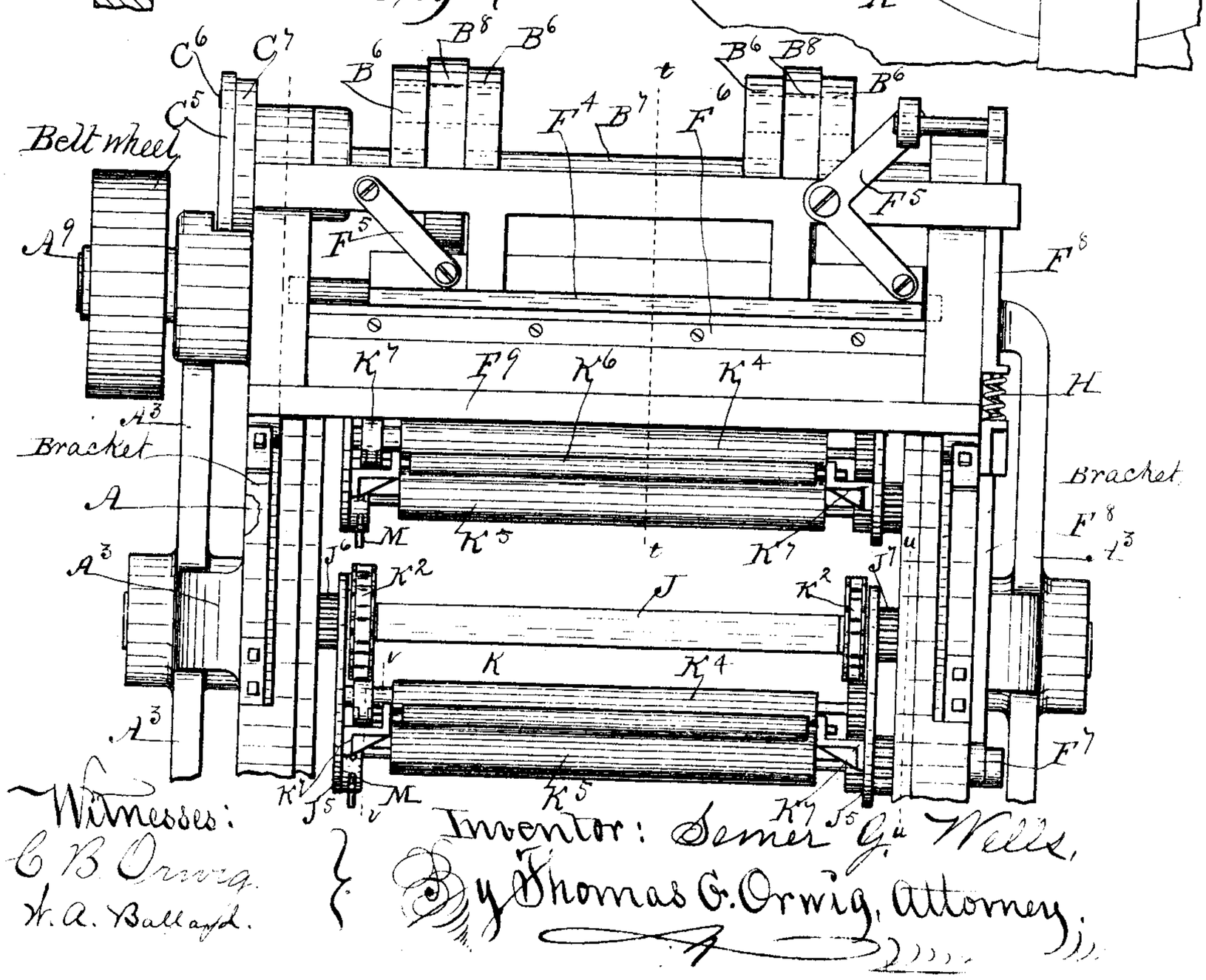


Fig. 3

Fig. 4



Witnesses:
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H. A. Ballard.

Inventor: Semer G. Wells.
By Thomas G. Orwig, Attorney.

(No Model.)

6 Sheets—Sheet 3.

S. G. WELLS.

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Fig. 2

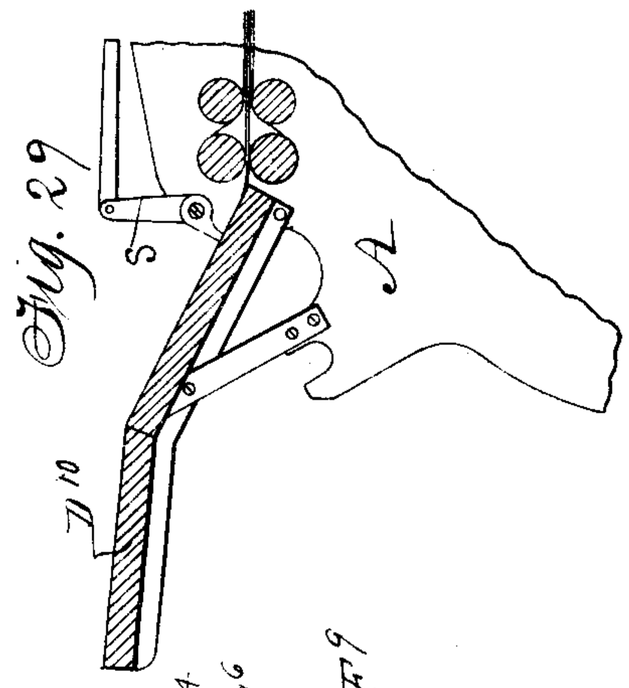

Fig. 7

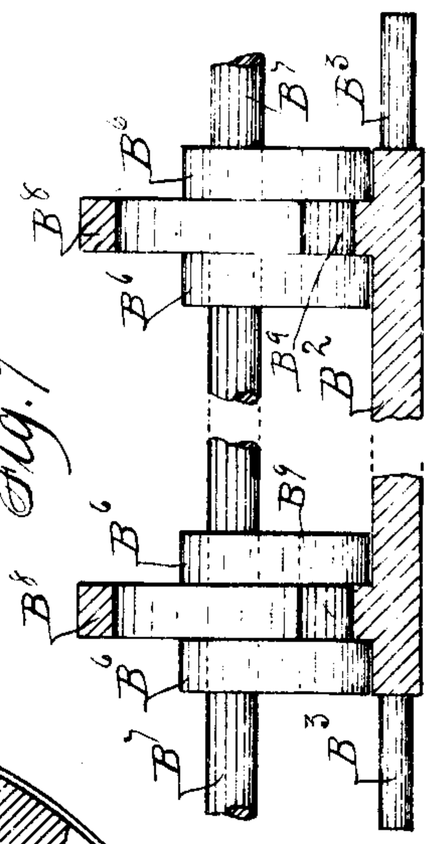

Fig. 5

Fig. 6

Witnesses:
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(No Model.)

6 Sheets—Sheet 4.

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No. 547,758. Patented Oct. 8, 1895.

Fig. 8

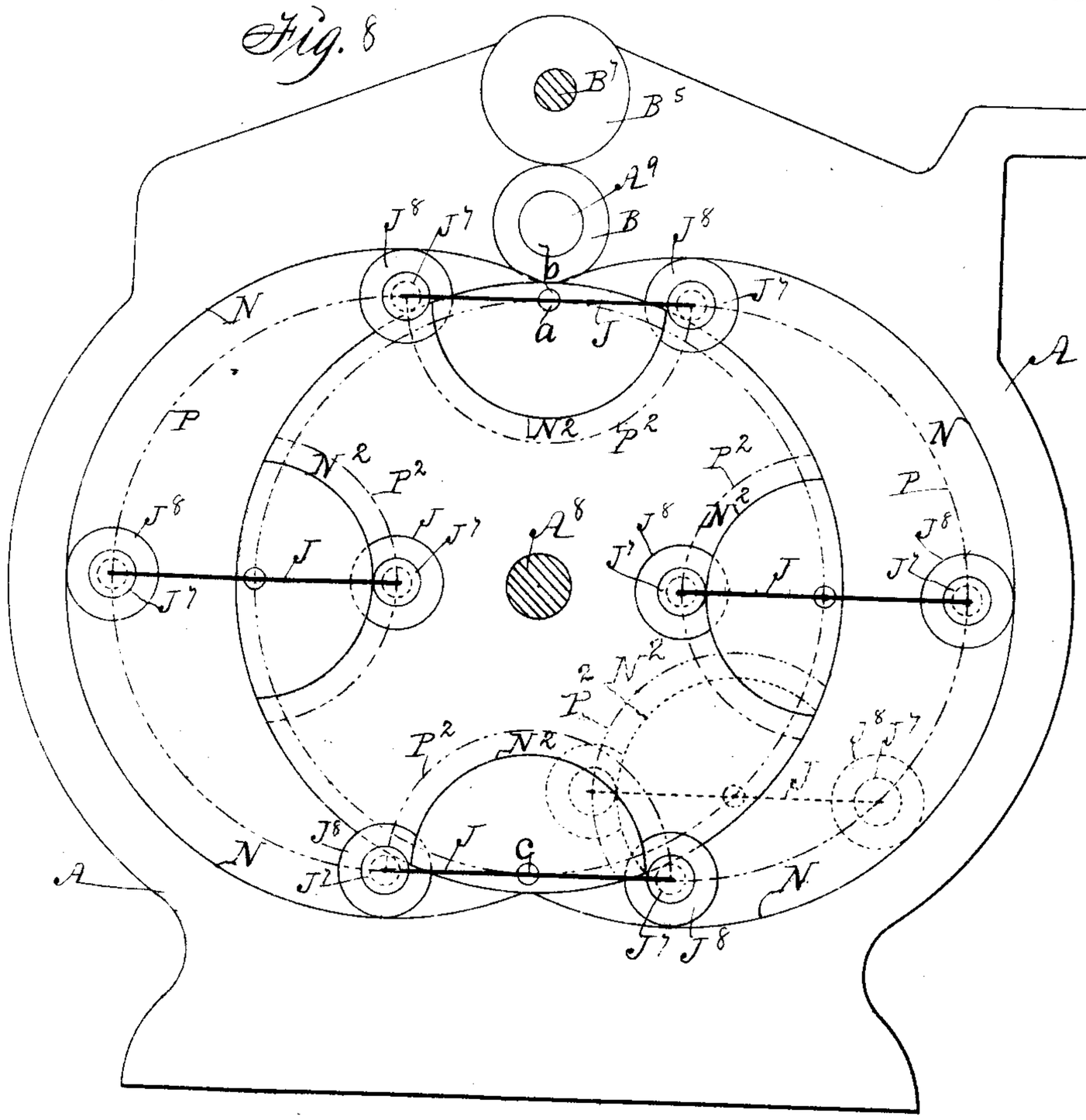


Fig. 17

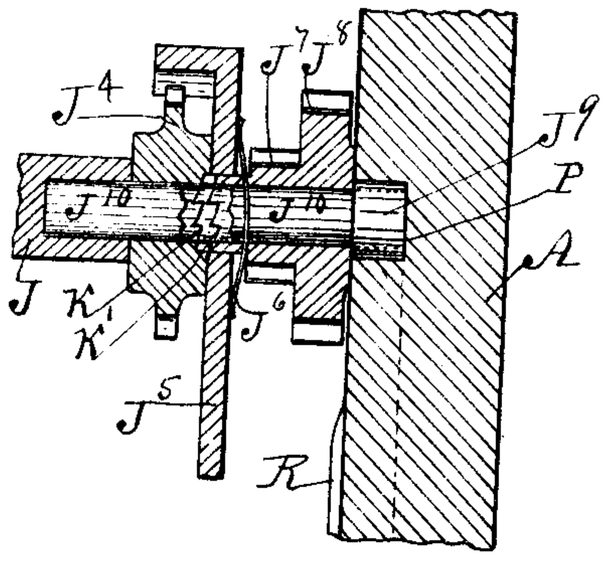


Fig. 18

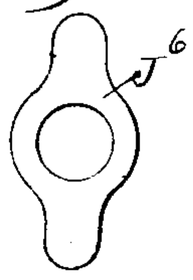
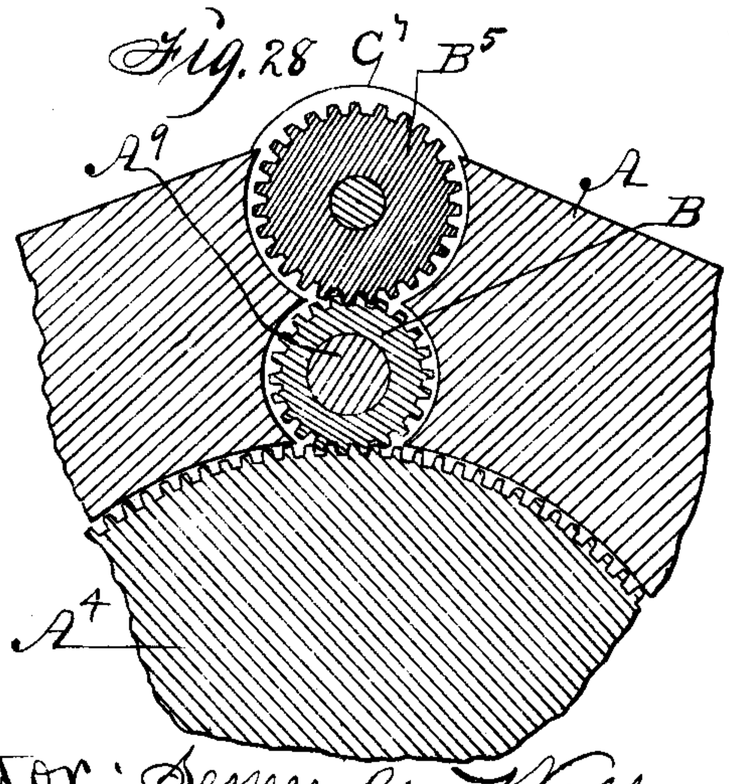


Fig. 28



Witnesses:
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(No Model.)

6 Sheets—Sheet 5.

S. G. WELLS.

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Patented Oct. 8, 1895.

Fig. 11

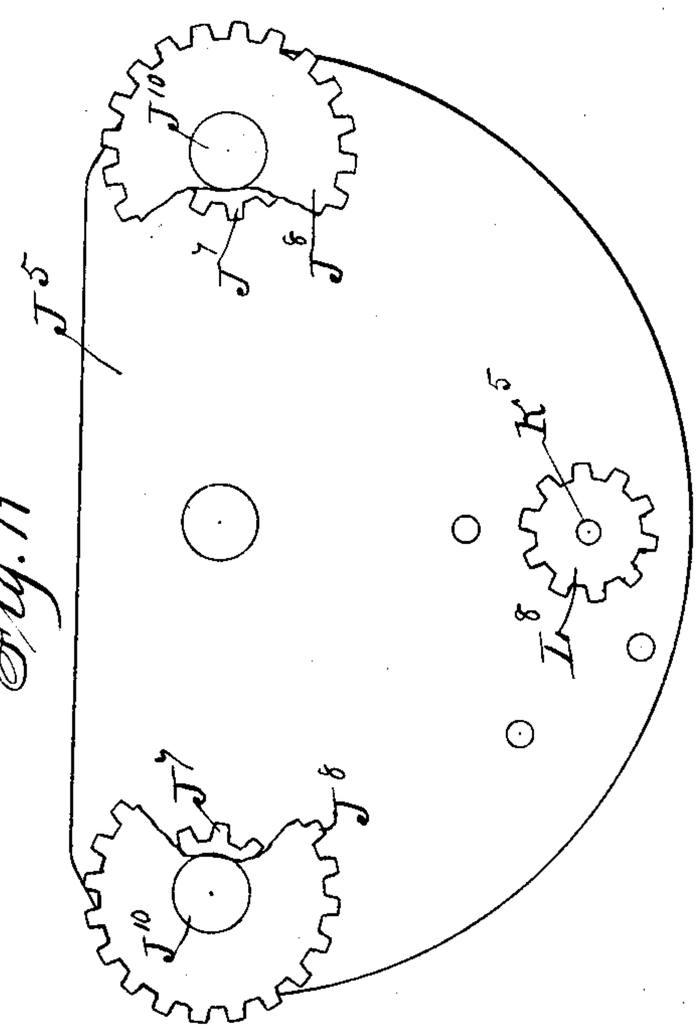


Fig. 10

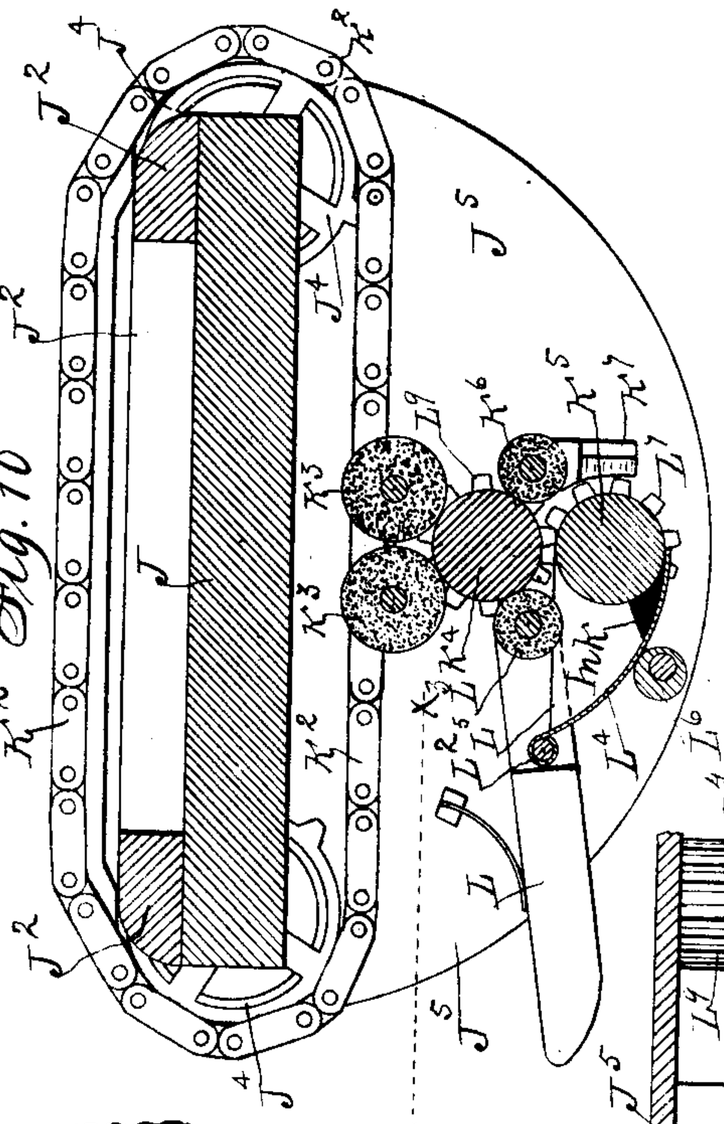


Fig. 9

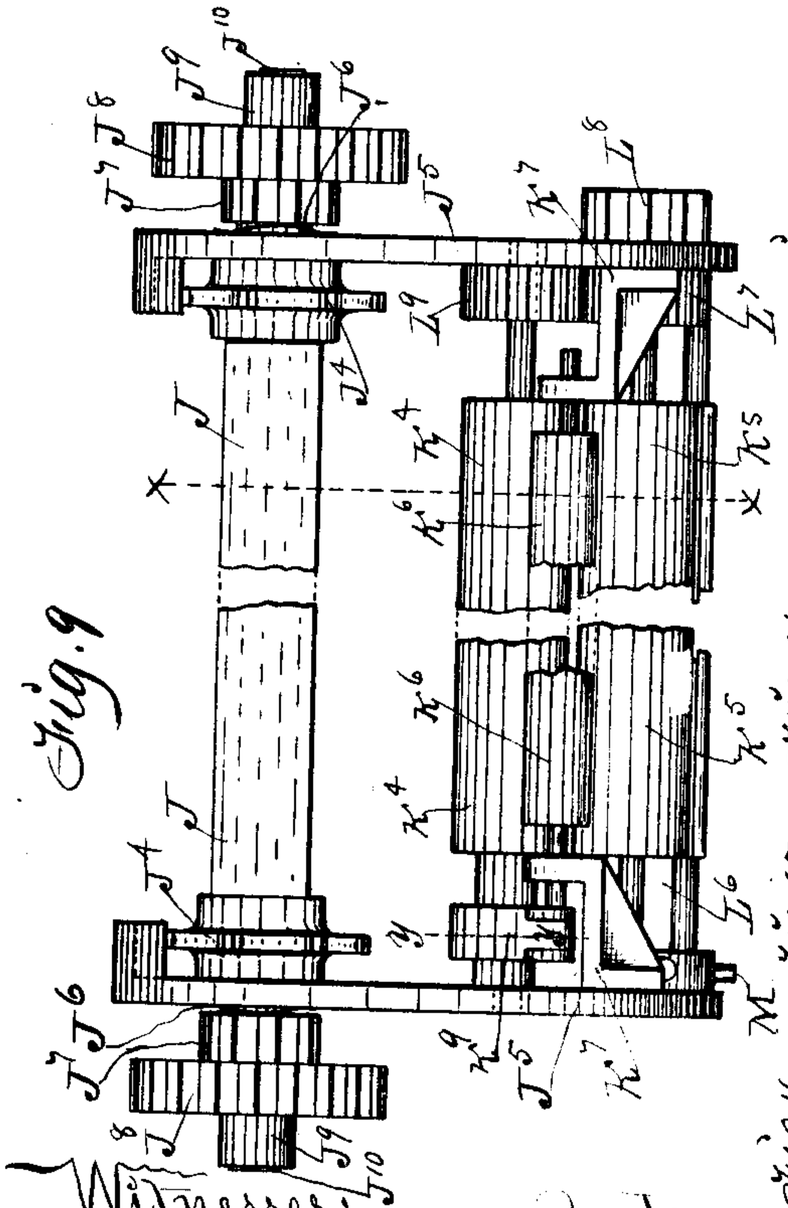


Fig. 13

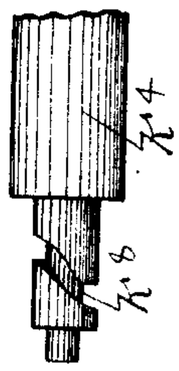


Fig. 12

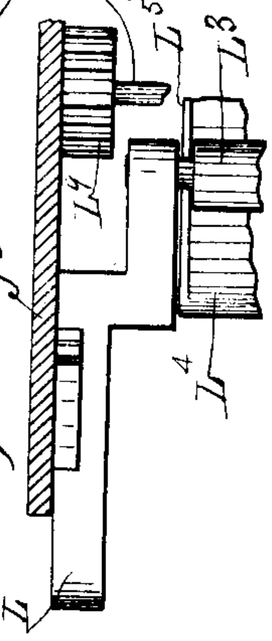


Fig. 14

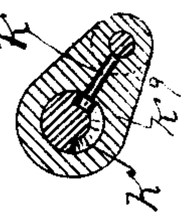


Fig. 15

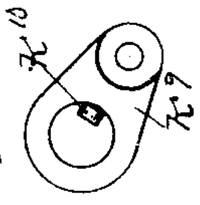
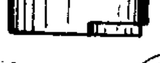


Fig. 16



Witnesses:
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(No Model.)

6 Sheets—Sheet 6.

S. G. WELLS.

PRINTING PRESS.

No. 547,758. Patented Oct. 8, 1895.

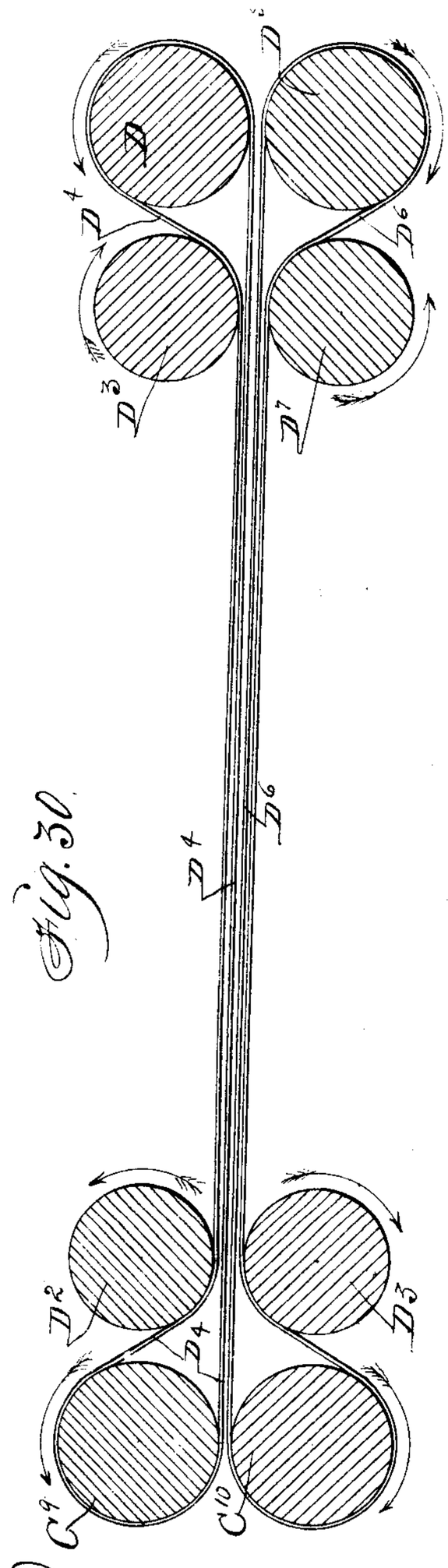

Fig. 30.

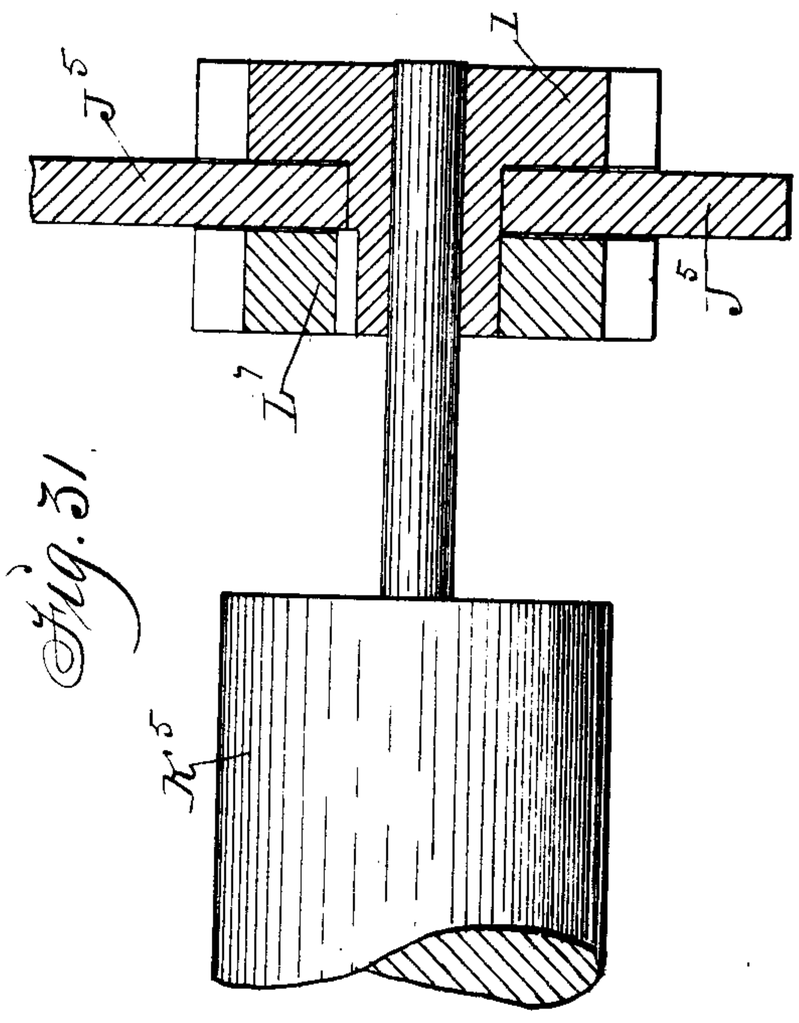

Fig. 31.

Witnesses:
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C. F. Wilcox.

Inventor: Semer G. Wells,
By Thomas G. Orwig, Attorney.

UNITED STATES PATENT OFFICE.

SEMER G. WELLS, OF DES MOINES, IOWA.

PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 547,758, dated October 8, 1895.

Application filed October 16, 1893. Serial No. 488,235. (No model.)

To all whom it may concern:

Be it known that I, SEMER G. WELLS, a citizen of the United States of America, residing at Des Moines, in the county of Polk and State of Iowa, have invented a Printing-Press, of which the following is a specification.

My object is, first, to rotate a flat bed carrying a type-form in such a manner that it will engage a platen at each revolution as required to print an impression upon paper from the form; second, to carry and rotate two or more flat beds carrying an equal number of type-forms simultaneously in such a manner that they will be successively engaged by the platen at each revolution of each form; third, to combine an independent inking device with each flat bed in such a manner that each form on each bed may be inked with a color differing from the colors applied to the other forms, as required in chromatic printing, or each form inked independently with colors alike; fourth, to combine paper-feeding mechanism with the rotating bed-carrier and the platen in such a manner that paper from a roll will be advanced between the platen and each form as required to print an impression by means of each form without requiring any intermittent motions of the rotary bed-carrier; fifth, to combine paper-cutting mechanism with the rotary bed-carrier and the paper-feeding mechanism in such a manner that it can be adjusted to cut off paper from a continuous roll or from flat paper after each impression of the form or forms carried on each flat bed, or after any number of impressions have been made by different forms on different beds during each revolution of the rotating bed-carrier; sixth, to combine paper-cutting disks with the paper-feeding mechanism in such a manner that the roll-paper can be divided longitudinally and trimmed to suit the sizes of forms carried on the flat beds; seventh, to combine a feed-board with the paper-feeding and paper-cutting mechanism in such a manner that flat cut paper can be substituted for roll-paper in the operation of my invention; eighth, to provide mechanism for controlling the operations of the paper-feeding mechanism in such a manner that the paper is retained stationary relative to the platen as required to make impressions thereon successively from different forms on different beds on the rotary bed-carrier; ninth, to combine stop mechanism with the paper feeding and cutting mechanisms in such a manner that the motion of the paper can be arrested, so that different lengths can be advanced successively as required to suit forms of different sizes upon the different beds carried by the rotary bed-carrier.

My invention consists in the construction, arrangement, and combination of a rotatable bed-carrier, flat beds adapted to support forms of type in position as they are carried around in a circle, inking mechanisms, paper-cutting mechanism for cutting off different lengths from a roll or a flat sheet, mechanism for dividing paper longitudinally, stop mechanism for regulating the lengths of paper cut off from a roll or a flat sheet, and driving mechanism with a supporting-frame, as hereinafter set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which—

Figure 1 is a right-hand elevation of my press, showing the form of the end portion of the frame, which has a circular opening in the center, and the edge of the circular opening broken away at one point to disclose the relative position of the toothed circular end of the bed-carrier fitted in the circular opening of the frame. One of the arms formed integral with the frame to support the axis of the rotating bed-carrier is also partly broken away. Part of the top portion of the frame, where the cutting mechanism is located, is also broken away to disclose disk-cutters for splitting and trimming paper. Fig. 2 is an outside elevation of a portion of the left end of the frame having a central circular opening corresponding with the opening in the right-hand elevation shown in Fig. 1. The end of the rotating bed-carrier shown within the circular opening has a concentric groove in its face, within which a pin is adjustably fastened to engage and operate the paper-cutting mechanism, also shown in this view. Fig. 3 is a detail section through the line $x\,x$ across the circular groove shown in Fig. 2, showing the adjustable pin clamped fast in the groove. Fig. 4 is an end view of the press, looking toward the cutting mechanism and table where the printed sheets are delivered. Fig. 5 is in part an inside face view of the left-hand end

of the frame and also of the inside face of the end of the rotating bed-carrier fitted in the central circular opening thereof, and in part a section through the gearing at the right-hand end of one of the beds, also showing a central section of another of the beds and its inking apparatus and an inside face view of the left-hand end plate of another bed. Fig. 6 is a sectional view through the line *x x* of Fig. 5, showing the relative positions of the parts of one of the devices for preventing a bed from tipping as carried around by the bed-carrier. Fig. 7 is a sectional view on the line *y y* at the top of Fig. 5, showing the mechanism for actuating the platen relative to the movements of the beds carrying forms to be engaged successively by the platen. Fig. 8 is a diagram showing the relative positions and centers of motion of the different gears carried by the rotating bed-carrier and the racks which actuate them, and grooves concentric with the racks as required to prevent the beds from tipping and to actuate the inking-rollers. Fig. 9 is an enlarged view showing the construction and connection of the inking mechanism carried with a bed. Fig. 10 is a transverse section through the line *x x* of Fig. 9. Fig. 11 is a side view of a plate fixed to the end of a flat bed and gearing carried therewith. Fig. 12 is a sectional view looking downward from the line *x x* of Fig. 10. Fig. 13 shows a cam-groove for moving an inking-roller longitudinally. Fig. 14 is a view through the line *y y* of Fig. 9, showing the cam-groove that moves the roller-bearer laterally as required to move the ink-roller longitudinally. Fig. 15 is a side view, and Fig. 16 an edge view, of the same roller-bearer. Fig. 17 is an enlarged sectional view showing a device for imparting intermittent motions to the inking mechanism. Fig. 18 shows the form of a spring used to retain the clutch mechanism shown in Fig. 17 in an inoperative position. Figs. 19, 20, 21, 22, and 23 are face views of sections of a transformable cam-wheel for operating paper-feeding mechanism and advancing different lengths at different times. Fig. 24 is a back view, and Fig. 25 an edge view, of one of the sections of the transformable cam-wheel, showing the integral device for fastening the section to a base. Fig. 26 is a sectional view of a portion of one of the ends of the rotary bed-carrier having an annular groove to admit and retain the fastening devices integral with the transformable cam-wheel sections. Fig. 27 is a diagram showing how a continuous sheet of paper may be transferred from one press to another and turned over when the two presses are in right-angled positions to each other. Fig. 28 is an enlarged sectional view showing the connection between the drive-shaft and the rotating bed-carrier. Fig. 29 is a sectional view of a feed-board connected with the frame in place of a roller for supporting paper. Fig. 30 is an enlarged detail view showing the arrangement of tapes and rollers for carrying the paper between the platen and type-forms on the beds. Fig. 31 is an enlarged sectional view of Fig. 9, showing two wheels connected on a hollow hub.

The letter A, wherever shown in the various figures, designates an end piece of the main frame, and A^2 are cross-pieces that connect the two mating end pieces A.

A^3 are the arms formed on or fixed to the outside faces of the end pieces A to support bearings for the axis of the rotating bed-carrier in a concentric position with the circular openings in the central portions of the pieces A.

A^4 are the circular end pieces of the rotating type-bed carrier fitted in the circular openings of the end pieces A.

A^5 is the annular groove in the outside face of one of the pieces A^4, as clearly shown in Figs. 1 and 26, to admit the fastening devices of the transformable cam-wheel A^6. It is obvious that the piece A^4 is thus made to serve as a base upon which to fix the cam-wheel A^6 in such a manner that the sections thereof can be detachably and interchangeably fastened, as required to transform the cam-surface on its periphery, by increasing and diminishing the lengths of spaces between the inclines that govern the operation of the paper-feeding mechanism, so that different lengths of paper can be advanced at different times to suit type-forms differing in size.

Figs. 19 to 26, inclusive, illustrate the construction and application of the interchangeable sections composing the transformable cam-wheel A^6. It is obvious that the width and length and shapes at their outer ends vary as required to produce a wheel that has a variable cam-surface on its periphery. All the sections excepting one, No. 25, are provided with a fixed stud adapted to enter and traverse the groove A^5, as shown in Fig. 26, to be collectively keyed fast by means of a section that is provided with a bolt, as shown in Fig. 25. In order to fasten all the sections securely, one of them is provided with a detachable bolt A^7, that has a head adapted to be turned in the groove A^5, and the section then placed upon the bolt and secured in its place by means of a nut, as shown in Fig. 25.

A^8 is the axle of the rotating bed-carrier to which the end pieces A^4 are fixed.

A^9 is the driving-shaft shown in Figs. 4, 8, and 28.

One of the end pieces A^4 has cogs on its periphery and is engaged by a gear-wheel B on the drive-shaft A^9, as required to be rotated thereby.

B^2 is a flat platen that has projections B^3 on its ends adapted to slide in bearings B^4, formed in the end pieces A on the frame, as shown in Fig. 5.

B^5 is a gear-wheel that meshes with the drive-wheel B and transmits motion to the

platen in its bearings B^4 by means of cranks B^6, formed in the shaft B^7, to which the gear-wheel B^5 is fixed.

B^8 are bridles projecting upward from the ends of the platen through which the crank-pins B^9 are extended from the arms B^6, as clearly shown in Fig. 7, in such a manner that a rectilinear reciprocating motion will be imparted to the platen at each revolution of the shaft B^7 as the gang of beds carried by the bed-carrier are successively brought in position to present type-forms against the platen, as shown in Fig. 5, and as required to print an impression upon paper between the type-form and the platen. The type-form on the bed and the platen move in the same direction and at the same rate of speed at the instant the impression is made and during sufficient time before and after the impression to allow the parts to clear and prevent slurring, the platen moving in a straight line and the type and bed in a circle, and it is therefore obvious that the impression is made when the centers of the moving platen and the moving type-bed are in line with the axis A of the bed-carrier and the axis of the shaft B^7 that operates the platen.

C is a device for throwing the paper-feeding mechanism in and out of gear at intervals by means of the transformable cam-wheel A^5. It is of triangular form, as shown in Fig. 1, and supported in a bearing C^2, fixed to the face of the frame-piece A in such a manner that an antifriction-roller at its bottom will rest upon the periphery of the wheel and rise and fall upon the variable cams.

C^3 is a duplex rack that has a sliding connection with the top edge of the device C.

C^4 is a bar that has a vertically-sliding connection with the end of rack C^3 and a bridle C^5 at its other end, through which is extended a crank-pin C^6 from the face of a disk C^7, fixed to the shaft B^7. As the disk C^7 is rotated the rack C^8 will be reciprocated, and when it engages the pinion C^8 motion will thereby be imparted to the feed-roller C^9, (shown in Fig. 5,) as required to actuate the paper-roller C^{10} contiguous thereto, between which two rollers paper is advanced to the type-forms on the beds as they are brought into position relative to the platen.

D is a roller located on the delivery side of the press and connected with the roller C^9 by means of an endless tape D^4, and D^2 and D^3 are guide-rollers that direct the tape.

D^5 is a roller connected with the roller C^{10} by means of a tape D^6, and D^7 and D^8 are directing-rollers that engage the tape D^6.

D^9 represents a roll of paper and D^{10} (shown in Fig. 29) a feed-board. Paper advanced from the paper-roll or the said feed-board passes between the rollers C^9 and C^{10} and the carrying tapes D^4 and D^6, and by means of said tapes the paper is carried and guided between the platen and type-form, where it receives an impression, and then onward to and between the rollers D' and D^5.

F is a roller carrying cutting-disks, and F' is a mating roller, and as the paper is advanced from between the rollers D and D^5 and between F and F' it is split longitudinally into widths as desired.

F^2 (shown in Fig. 2), is a belt connected with a pulley F^3 on the end of the shaft B^7 and the roller F', as required to actuate the paper-splitting rollers F and F'.

F^4 is a knife and F^5 a knife-carrier and F^6 a shear-edge, and as the paper passes between the cutters F and F' and is split and trimmed the desired widths it is advanced past the shear-edge F^6 and cut the desired lengths by the descent of the knife F^4.

F^7 is a lever pivoted to the frame-piece A and connected with the knife-carrier F^5 by means of a bent bar F^8 or in any suitable way, so that the knife will be actuated by the vibration of the lever F^7, as required to cut off the length of paper desired to fall upon the receiving-table F^9.

H is a spring that in its normal position retains the knife F^4 elevated.

H' is a groove in the face of the left-hand end piece A^4, and H^2 is a pin adjustably clamped fast in said groove, as shown in Fig. 3, to engage the free end of the lever F^7, as required to vibrate the said lever. It is obvious any number of pins may be thus attached to successively engage and vibrate the said lever as the bed-carrier is rotated, and as required to cut off different lengths of paper at different intervals.

H^3 is an inclined groove that extends inward from the edge of the circular end piece A^4 and intersects the groove H' in such a manner that the heads of pins H^2 can be readily passed from the outside of the piece A^4 into the groove H', and vice versa.

It is obvious from above description that as the gear-wheel B, which meshes with the end piece A^4, having cogs on its periphery, is rotated the bed-carrier is rotated and the gang of beds carried thereby are successively brought in contact with the platen B^2. It is also obvious that one or more beds may be carried by the bed-carrier, or when more than one is carried one or more of them may be carried empty while one or more carry type-forms. It is also obvious that the ratio of revolutions of the shaft B^7 and the shaft A^8 must be in the proportion of one to the total number of type-beds carried.

J are the flat beds for carrying type-forms, connected with the bed-carriers in such a manner that they will move in the same orbit and successively pass the platen B^2, as required to make an impression upon the paper as it passes the platen B^2.

J' (shown in Fig. 5) is a pivot in the end of the bed J, connected with the bed-carrier A^4.

J^2 is a chase carried on the bed J, as shown in Figs. 5 and 10, as required to retain the type-form J^3, as shown in Fig. 5.

J^4 are sprocket-wheels.

J^5 is a plate of segmental shape provided

with a flange at its top, as shown in Figs. 9, 10, and 17; J^6, a spring. (Shown in Figs. 9, 17 and 18.)

J^7 and J^8 are integral pinions, and J^9 is a roller, all assembled on a shaft J^{10}, that is fixed to the type-bed J, as shown in Figs. 4, 9, and 17.

The sprocket-wheels J^4 have ratchet-faces K, and the hubs of the integral pinions J^7 and J^8 have corresponding ratchet-faces K′ to engage the ratchet-faces K of the sprocket-wheels J^4 and serve as a clutch by means of which motion is imparted at intervals from the pinions J^7 and J^8 to the sprocket-wheels J^4. The spring J^6 is placed on the hub of the pinions J^7 and J^8, which extends through the plate J^5 and rests against the face of the pinion J^7, as shown in Fig. 17, in such a manner that it will hold said pinions disengaged from the sprocket-wheels J^4.

K^2 is an endless chain extended over the sprocket-wheels J^4, as shown in Figs. 4, 5, and 10.

K^3 are composition inking-rollers journaled to the chains K^2 in any suitable way, in such a manner that they will be supported and carried thereby, as required to traverse the type-forms on the beds J.

K^4 and K^5 are metal rollers journaled to the metal plates J^5, to be carried therewith.

K^6 is a composition roller that engages the surface of the roller K^5. It is journaled to brackets K^7, as shown in Figs. 4, 9, and 10.

K^8 is a cam-groove on the end of the roller K^4, as shown in Fig. 13, and K^9 is an arm placed on the said grooved journal, as shown in Fig. 9, in such a manner that the arm will move back and forth on said journal as the roller is rotated. This movement of the arm is caused by the pin K^{10}, fixed in the arm to extend into the cam-groove, as clearly shown in Fig. 14. The shaft of the roller K^6 is extended through the brackets K^7 and through the movable arm K^9 and secured thereto by means of collars, or in any suitable way, so that the motions of the arm will carry the roller back and forth endwise.

L are spring-actuated levers pivoted to the plate J^5 by means of a rod L^2 to carry a composition roller L^3 at their inner ends in such a manner that the roller will, in its normal condition, be in engagement with the roller K^4, as shown in Figs. 5, 10, and 12.

L^4 is a curved sheet-metal plate extended between the levers and hinged at its top edge to the rod L^2.

L^5 are end pieces of the plate L^4 that adapt it to retain printer's ink.

L^6 is an eccentric roller journaled to the plates J^5 in such a manner and position relative to the plate L^4 that it will retain the free edge of the plate in contact with the roller K^5, as shown in Fig. 10.

It is obvious that the flow of ink from the plate L^4 to the roller K^5 can be readily regulated by simply turning the eccentric roller.

L^7 is a gear-wheel journaled on the end of the roller K^5, that extends through the plate J^5 and is located on the inside of said plate. L^8 is a corresponding wheel on the outside of the plate J^5 and fixed to the wheel L^7, so that they will rotate jointly on the shaft of the roller K^5.

It is obvious that the bored hub of one of the wheels is extended through a bearing in plate J^5 and the other wheel then fixed to the extended hub and the shaft of the roller K^5 extended through the same hub to rotate therein.

L^9 is a gear-wheel fixed to the roller K^4 and meshes with and is actuated by the gear L^7.

M is a pin-wheel fixed on the opposite end of the roller K^5 from the gear-wheel L^7.

M^2 is a pin projecting from the face of the frame A, as shown in Fig. 5, and actuates the pin-wheel every time a bed J and the plates J^5 are carried past the pin, as required to impart motion to the roller K^5.

M^3 (shown in Fig 5) is a cam fixed to the frame A in such a manner that it will engage and actuate the lever L every time the lever is brought in contact therewith, as required to depress the roller L^3 to bring it in contact with the roller K^5 to take ink therefrom and to be rotated thereby at the same time the roller K^5 is being actuated by the pin-wheel M, passing over the pin M^2.

N are concave racks fixed to the inside face of the frame A, as shown in Fig. 5 and indicated in Fig. 8.

N^2 are convex racks fixed to the end piece A^4 of the rotating bed-carrier, as shown in Figs. 5 and 6. As the bed-carrier is rotated, the wheels J^8 engage the concave racks N and the wheels J^7 the convex racks N^2, successively, and are actuated by said racks, as required to operate the sprocket-wheels J^4 to carry the inking-rollers K^3 around the bed J, and at the same time to retain the bed in a parallel position relative to the platen D^2.

Figs. 1 and 5 are drawn on a scale of one-fourth ($\frac{1}{4}$) inch to the inch. The disk C^7 is four and a half ($4\frac{1}{2}$) inches in diameter. The pin C^6 is a half ($\frac{1}{2}$) inch in diameter. The slot in the bridle C^5 is four (4) inches in diameter. This gives the pin C^6 a motion of three inches and a half ($3\frac{1}{2}$) in the bridle C^5, both going and coming, which is equal to the motion given to the platen B^2 (see Fig. 5) by the crank-pin B^5, working on the arm B^6, and the pin B^9, working in the bridle B^8, which are all of the same relative proportions to each other. A motion of three and a half ($3\frac{1}{2}$) inches is imparted to the platen B^2 and to the rack C^3, both going and coming, making a total motion of seven (7) inches to each impression when all the beds are carrying forms. Therefore it is obvious that the extreme limit of paper that can be used on a form when there is a form on each bed is seven (7) inches, or when there is a form on every alternate bed fourteen (14) inches of paper can be used, and when there are two forms on two successive beds one form can use seven (7) inches of paper and

the other one twenty-one (21) inches, or each form can be printed on the extreme ends of a sheet twenty-eight (28) inches long, or by cutting in two can be made into two (2) jobs of fourteen (14) inches length, or can be printed in the middle of a job twenty-eight (28) inches long. When each alternate form is used each form can be given fourteen (14) inches of paper, or a job can be printed twenty-eight inches long with each alternate page blank, or when forms are carried on all the beds, not duplicates of each other, a job may be printed twenty-eight (28) inches long, or of four (4) pages each seven (7) inches long. This shows the extreme length of paper that can be used in any job in the press herein described, and so the problem now arises how to get that length of that paper through the press at the proper speed so as not to slur on the type or to tear the paper.

The toothed rack C^3, attached to the sliding-bar C^4 and connected to the bridle C^5, is driven by the crank-pin C^6 at the same rate of speed as the platen B, as above described. The pinion C^8 on the shaft C^9 in Fig. 1, has a diameter of one (1) inch on its pitch-line. The roller on the shaft C^9 and the roller C^{10}, Fig. 5, which co-operates with C^9, are one inch in diameter and should be made scant enough so that when the tape is over them they will have the capacity of an inch-roller in moving paper. Each side of the toothed rack C^3 is toothed for a distance of four (4) inches. When the device C is in the position shown in Fig. 1 the feed mechanism is inactive and the paper standing still. When the machine is started the bed-carrier rolls around until the antifriction-roller which carries the device C drops down to the periphery of the cam-wheel A^6 nearest its axis. If the different parts were so assembled on their various shafts that the platen B^2 and type-form were now in conjunction and the rack C^3 was in such a position that the pinion C^8 was clear at one end of the rack C^3, and assuming that we want to print paper seven (7) inches to each form and a form on each type-bed, the cam-wheel A^6 must be so constructed that the antifriction-roller which carries the device C will remain on the inner periphery until the disk C^7, carrying the pin C^6, has made half a revolution and carried the rack C^3 until the pinion reaches the opposite end of the rack. At this point the said antifriction-roller must be elevated to the periphery of the cam-wheel A^8 most distant from the axis of said wheel, and then the press is ready for the other half-revolution of the disk C^7. It is obvious that there is a slight loss of motion to the paper each time the motion of the rack C^3 is thus reversed by the action of the cam-wheel A^6. All the parts of the press must be so assembled that this lost motion of the paper will occur at the same time that the motion of the platen B^2 is reversed. Thus it will be seen that at the time the type-bed is nearing the platen and at the time it is in conjunction with and at the time it is going away from the platen it is moving with the platen, so that there is no friction between the paper and the platen, and the platen and type-bed are moving together and all the parts working harmoniously without friction between the type and the paper or between the paper and the platen. Now, when it is desired to use less than seven (7) inches of paper, the cam-wheel A^7 must be transformed so as to increase the length of time between the racks C^3 going out of mesh on one side and in the mesh of the other side of the pinion C^8. This holds the paper still for a longer time while the motion of the platen is being reversed, and may be increased down to a time when there is danger of slurring by the paper standing still while the type-bed is near the platen.

It is obvious that at each revolution of the bed-carrier each bed will be carried around in the orbit of the carrier without changing its parallel position relative to the platen, and that this is accomplished by means of the concave racks N, fixed to the stationary frame of the press, and the smaller convex racks N^2, fixed to the rotating carrier, and the gear-wheels J^8 that travel in the concave racks N and the gear-wheels J^7 that travel on the smaller convex racks N^2.

Referring to Fig. 8, which represents the pitch-lines and the orbits traveled by the various moving parts when the center of a bed is at the point marked *a*, the two gears J^8 are in mesh with the racks N and the gear-wheels J^7 are in mesh with the racks N^2, the gear-wheels J^7 on the right-hand side of the bed just going out of mesh and the gears J^7 on the left-hand side just going into mesh with the rack N^2, and as the bed-carrier moves forward for a short distance the gears on the left-hand side of the bed are both in mesh, J^8 with rack N and J^7 with rack N^2. When the left-hand gears get to the point *b*, J^8 runs out of mesh. From the point *b* to the point *c*, J^8 is in mesh with rack N on the right-hand side of the bed and J^7 is in mesh with rack N^2 on the left-hand side of the bed. The said racks and pinions are so proportioned that the pinions at the opposite ends of the beds will have the same rate of rotation. From *c* back to the point *a* the movements described are simply repeated, the work done by the left-hand gears coming from *a* to *c* now being done by the right-hand gears going from *c* to *a*. In other words, the right and left hand gears act alternately relative to the racks N and N^2 during each revolution of the bed-carrier.

While the groove P^2 is concentric with the axes of the beds it is obvious that they simply act as a clearance for the rollers which travel in the grooves P and P^2; but when said rollers are in the groove P which is not concentric with the axes of the beds the groove P guides said rollers and maintains the beds in their horizontal positions during the entire revolution of the beds except at

the point where all the axes of the gears J^7 J^8, the journals J', and the axis of the bed-carrier A^8 are all in line. At this time the gears J^7 and J^8 are tied together by the sprocket-chains and both running in the same direction and same speed, being driven by the racks N and N^2, both sides of the bed being carried forward at the same time and same rate of speed. Neither side of the bed can lag behind or get ahead without breaking the sprocket-chains, and as this forward motion is equal to the forward motion given to the bed by the bed-carrier it is obvious that the type-bed cannot tip, for the reason that it is supported at three points—first, the journals J', to which power is applied by the bed-carrier; second, by the gear J^8 on one side, and, third, by the gear J^7 on the other side.

P are grooves in the inside face of the frame-piece A corresponding with the segment of the orbit of the gears J^7 and J^8, which is outside of the boundary line of the end piece A^4 of the bed-carrier.

P^2 are grooves in the surface of the inside face of the end piece A^4 of the bed-carrier, and together with the motion of said bed-carrier completes the orbit traveled by the gears J^7 and J^8. The rollers J^9 on the ends of the shafts J^{10} traverse the grooves P and P^2 successively and serve as guides and bearings for the gears J^7 and J^8. When a type-bed J is at or near the points marked *a* and *c* in Fig. 8, the rollers J^9, traveling in the grooves P and P^2, are sufficient guides and support for the type-bed to keep it in its parallel position relative to the platen B^2, and the gears J^7 and J^8 are disconnected with the sprocket-wheel J^4 by the action of the spring J^6, and the sprocket-chain K^2 and the rollers K^3 are at rest, said rollers K^3 being in contact with the metal roller K^4 and being actuated thereby, as shown in Figs. 5 and 10.

The gear-wheel L^8 meshes with and is actuated by the convex rack N^2 and runs loosely upon the shaft of the roller K^5, connecting with and driving the gear L^7, which meshes with and actuates the gear L^9 and drives the roller K^4, thereby transmitting ink from the receptacle L^4 to the form-rollers K^3 while at rest, as heretofore described, and as shown in Figs. 4, 5, 9, and 10. After the impression is made by the type-forms carried upon the bed J coming in contact with the platen B^2 and the type-bed is advanced by the rotary motion of the end piece A^4 to the end of lugs R and R^2 (which are projections on the faces, the frame-piece A, and the end piece A^4 of the bed-carrier, one set being shown in Fig. 5 and a corresponding set is provided on the opposite side) the ratchet-faces of the gears J^7 and J^8 are pressed into contact with the ratchet-faces of the sprocket-wheels J^4. The sprocket-wheels J^4, carrying the chain and rollers, as before described, are now actuated until the form-rollers make a half-way trip around the type-form. During this time the gears are bound together by the sprocket-chain, and by that means the bed is held in its parallel position relative to the platen J. The gears then run off the lugs R and R^2 and the sprockets, chains, and form-rollers come to rest until the type-bed is carried to the opposite side of the frame, where corresponding lugs are reached and the gears thereby again locked to the chains, as before stated, and the form-rollers carried over the remaining half of their trip. After passing off these lugs, the rollers, having finished their trip, come to rest again, as before described, in contact with the inking-roller K^4. The type-form then passes in conjunction with the platen, as heretofore described.

It is obvious that as each bed and type form thereon has a complete set of rollers and inking apparatus each form may be inked with a different color of ink. It is also obvious that as many colors may be printed upon a sheet as there are type-beds carried by the rotary bed-carrier by adjusting the transformable cam-wheel so that the paper will be held in a stationary position relative to the platen until the desired number of colors have been successively printed thereon.

If it is desired to print from colors, put a different color in each one of the four fountains, adjust the transformable cam-wheel so that the distance the paper will be advanced by the periphery nearest the axis of the bed-carrier plus the distance it will be advanced by the periphery farthest from the axis is equal to the size of the job required. This fixes the matter so far as the first form is concerned, and the balance of that quarter of the cam-wheel should be filled with the sections making the middle-sized periphery for holding the feeding mechanism inactive. The other three quarters of the cam-wheel must now be constructed so that the paper will be drawn back after each impression far enough to be ready to be carried forward with the bed and platen in making the succeeding impression.

S (shown in Fig. 29) represents a device for holding cut paper on the feed-board.

From the foregoing detailed description of the construction and each function of each element and each combination of the complete machine the practical operation of my complete invention will be obvious to persons familiar with printing machinery, and a repetition of the operation is deemed unnecessary.

I claim as my invention—

1. In a printing press, a transformable cam wheel for regulating the movement of paper and advancing different lengths of paper at different times, in combination with a device for throwing the paper feeding mechanism in and out of gear consisting of a duplex reciprocating rack, a pinion between the parallel toothed parts of the rack, and a vertically moving support for the rack operated by the transformable cam, and paper feeding mechanism connected with said pinion.

2. In a printing press the combination of a transformable cam wheel composed of interchangeable sections of different widths and lengths detachably fastened to a base, a reciprocating rack to drive paper-feeding mechanism, means of reciprocating the racks, paper feeding mechanism intermittently driven by the racks and means for transferring motion from the cam wheel to the rack, for the purposes stated.

3. The combination of interchangeable cam wheel sections having T-shaped projections, a section having a transverse bore and a bolt and nut, with the end of a rotatable bed carrier having an annular groove in its face to admit the said T-shaped projections and the head of the bolt in the manner set forth for the purposes stated.

4. In a printing press, a frame consisting of two mating end pieces, a rotating bed carrier mounted within circular openings in the frame, paper feeding mechanism attached on the outside of one of the mating end pieces of the frame with means for operating said mechanism, paper cutting mechanism attached to the other mating end piece of the frame, a delivery table and sheet splitting apparatus attached to the frame, toothed racks on the inside of said mating end pieces for the purpose of operating inking devices and holding flat type beds from tipping while they are being carried in an orbit by the bed carrier, two or more flat bed types all carried in the same orbit by the bed carrier, an independent inking device carried with each flat type bed, a rest attached to the frame for supporting a roll of paper, a flat platen and means for actuating the platen supported by the frame, a transformable cam wheel on one end of the rotating bed carrier, for operating the paper feeding mechanism, one or more pins adjustably fixed in a groove in the other end of the rotating bed carrier for the purpose of operating the paper cutting mechanism, all arranged and combined for the purposes stated and to operate in the manner set forth.

5. In a printing press, the combination of a rotary bed carrier adapted to carry two or more flat type beds connected with the rotary carrier, two or more flat type beds connected with the bed carrier, means for carrying the beds around in an orbit concentric with the axis of the bed carrier and without tipping the beds, a flat platen and means for moving the platen in a line parallel with the flat surfaces of the type beds as the beds are brought successively in contact with the platen, for the purposes stated.

6. In a printing press, a rotary bed carrier, two or more flat type beds carried with the bed carrier, at each revolution, in an orbit concentric with the axis of the bed carrier, means for preventing the bed from tipping, and a flat platen in a parallel position with beds carried by the rotating bed carrier and means for moving the platen in a parallel line with the flat surfaces of the beds, and paper feeding mechanism for intermittently advancing paper between said flat platen and the type beds arranged and combined to operate in the manner set forth for the purposes stated.

7. In a printing press, the combination of a rotating bed carrier, two or more flat type beds journaled to the bed carrier, a set of form rollers carried with each type bed, sprocket chains, sprocket wheels, pinions, toothed racks, lugs and springs, arranged to give an intermittent motion to the form rollers, a roller ink fountain attached to the under side of each flat type bed, means for imparting motion to the ink fountain, a flat platen so actuated that it works successively in conjunction with each flat bed, all for the purposes stated.

8. In a printing press, the combination of a rotary bed carrier, two or more flat beds moving in the same orbit connected with the said carrier, means for carrying the flat beds around in an orbit concentric with the axis of the bed carrier and without tipping the beds, form rollers and means for carrying the rollers in an orbit around the beds, for the purposes stated.

9. In a printing press, the combination of a rotary bed carrier, two or more flat beds moving in the same orbit connected with the carrier, means for carrying the flat beds around in an orbit concentric with the axis of the bed carrier, and without tipping, sprocket wheels at the corners of the flat beds, endless chains upon the sprocket wheels, form rollers attached to the chains and means for distributing ink to the form rollers, to operate in the manner set forth for the purposes stated.

10. In a printing press, two or more flat beds moving in the same orbit, each having sprocket wheels at its corners, endless chains upon the sprocket wheels, form rollers attached to the chains to travel over the forms upon the beds and into contact with an inking roller, arranged and combined with a rotary bed carrier to operate in the manner set forth, for the purposes stated.

11. In a printing press, the combination of two or more flat type beds for carrying forms, an ink fountain and form rollers carried with each bed, and means for operating all the parts so that each bed may be supplied with an independent color, a flat platen and means for bringing the beds successively in contact with the platen, for the purposes stated.

12. In a printing press, the combination of two or more flat type beds moving in the same orbit, means for rotating the beds in a circular orbit, sprocket wheels attached to the corners of the beds, chains extended over the sprocket wheels, form rollers attached to the chains, plates extended at right angles from the end portions of the beds, two metal rollers journaled to the said plates in parallel position to each other, a composition roller in contact with one of said metal rollers, an adjustable ink receptacle in contact with the other

metal roller, levers adapted for carrying a composition roller from one of said metal rollers to the other at intervals, a roller journaled to the said levers, and means for vibrating said levers at intervals for the purposes stated.

13. The bed J having a fixed plate J^5, carrying the lever L and the pin wheel M, the lever L carrying the roller L^3, the rollers K^4 and K^5, means for carrying the bed in an orbit and the frame A having the fixed pin M^2 and the fixed cam M^3, arranged and combined to operate the rollers K^4 and L^3 at intervals in the manner set forth for the purposes stated.

14. In a printing press, a frame having segmental concave racks on the inside faces of its end pieces, grooves in the same faces in concentric position with said racks, a rotating bed carrier having circular ends and convex racks on the inside faces of said ends and grooves in concentric position with the racks, a flat type bed pivoted at its center to the bed carrier, gear wheels and sprocket wheels journaled near the four corners of the bed and said gear wheels adapted to alternately engage the said convex and concave racks and the said sprocket wheels connected by endless chains and rollers on the ends of the shafts carrying said gear wheels adapted to traverse the said concentric grooves alternately, arranged and combined to operate in the manner set forth for the purposes stated.

15. The combination of the bed carrier having an external gear on one of the end pieces, flat type beds having journals on their ends to traverse grooves in the ends of the bed carrier, pinions journaled to the beds, sprocket wheels connected with said pinions, sprocket chains on said sprocket wheels, and convex racks, and grooves in concentric position to the racks, said racks and grooves located in the inside faces of said end pieces of the bed carrier and a frame adapted to support the said carrier having concave racks and grooves concentric to the racks, said racks and grooves located on the inside faces of the pieces comprising the frame and to work in conjunction with the convex racks and grooves on the bed carrier in concentric position therewith and means for rotating the bed carrier for the purpose of operating flat type beds carried by the rotating bed carrier in the manner set forth.

16. In a printing press, a platen having rollers on its ends adapted to traverse grooves and bridles projecting at right angles from one of the faces, in combination with a frame having straight grooves to admit the rollers on the ends of the platen and a rotating shaft having crank arms carrying pins extended through said bridles on the platen to impart a rectilinear reciprocating motion to the platen, and a flat bed carried by a rotating bed carrier, arranged and combined as set forth.

17. In a printing press, a frame having a support for a rotating bed carrier, a rotating bed carrier, two or more flat type beds connected with said carrier, means for preventing the type beds from tipping as they are carried in an orbit concentric with the axis of the bed carrier, and a flat platen supported by the same frame that supports the bed carrier, and means for imparting rectilinear reciprocating motion to the platen at intervals, during each revolution of the bed carrier, in a line parallel with the flat surface of the beds to engage the beds in succession, arranged and combined for the purposes stated.

18. The lugs R on the inside faces of the frames A and the lugs R^2 on the inside faces of the end pieces A^4 of the rotating bed carrier, in combination with the shaft J^{10}, the ratchets K and K′, the spring J^6, the sprocket wheels J^4, the frames A having grooves P and racks N, the end pieces A^4 having grooves P^2 and racks N^2, a rotating bed carrier having end-pieces A^4 an endless chain on said sprocket wheels and the gear-wheels J^7 and J^8, arranged and combined to operate in the manner set forth for the purposes stated.

19. A paper feeding device for a printing press, comprising a rotating wheel having a continuous and transformable cam-surface, a rack carrier connected with a stationary frame and provided with a roller to engage the cam surface of the wheel, a rack having a sliding connection with the rack carrier, and a rotating paper moving roller having a pinion in such a position relative to the rack that the motions of the rack carrier will bring the rack and pinion in and out of gear at intervals during the revolution of the cam wheel, and means for reciprocating the rack, all arranged and combined to operate in the manner set forth for the purposes stated.

20. The combination of a transformable cam wheel, a rack carrier adapted to engage the cam wheel and to transmit motion to paper-feeding mechanism comprising a duplex rack having a sliding connection with the rack carrier, a paper-feeding roller having a pinion adapted to engage the rack and means for reciprocating the rack, feed rollers and tapes connected with said pinion, arranged and combined in a printing press to advance paper at intervals, and in different lengths, as and for the purposes stated.

21. In a paper feeding device for a printing press, a rack that has a sliding connection with a rack carrier, a pinion co-operating with said rack, a rack carrier that moves at right angles to the rack, an arm that has a sliding connection with a bar, a bar that extends at right angles from the rack and has a bridle at its free end, and a crank wheel having a pin extending through the bridle, and a cam wheel for raising and lowering said rack connected with a rotary bed carrier, arranged and combined to operate in the manner set forth for the purposes stated.

22. In a printing press, a paper cutter comprising a knife, a knife carrier, a sliding bar in bearings fixed to the frame and connected with a lever pivoted to the frame, a spring, a shear edge fixed to the frame, a rotating bed carrier having a continuous groove, one or

more pins adjustably fixed in said groove to engage the free end of the lever supporting the bar, arranged and combined to operate in the manner set forth in combination with two or more flat type beds carried by the rotating bed carrier, a transformable cam wheel on one end of the rotating bed carrier, a flat platen working in conjunction with the flat beds and paper feeding mechanism operated by the transformable cam wheel for the purposes stated.

23. In a printing press, a paper splitting device composed of two mating spindles with shear cutting disks adjustably attached, in combination with two or more flat beds carried by a rotating bed carrier, a flat platen working in conjunction with a rotating bed carrier, a transformable cam wheel on one end of the rotating bed carrier, the flat beds and paper feeding mechanism operated by the transformable cam wheel, in the manner set forth and for the purposes stated.

24. In a printing press, a flat platen, a rotating bed carrier, two or more flat type beds carried by the carrier in a circular orbit to engage the platen, means for moving the platen in a line parallel with the flat surface of the bed, and paper moving mechanism composed of pairs of rollers located on opposite sides of the platen, and endless paper-carrying tapes extended over said rollers and between the platen and the rotating bed carrier, arranged and combined to operate in the manner set forth for the purposes stated.

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