(No Model.) 11 Sheets—Sheet 1.

T. GIBSON.

PRINTING MACHINE.

No. 482,733. Patented Sept. 20, 1892.

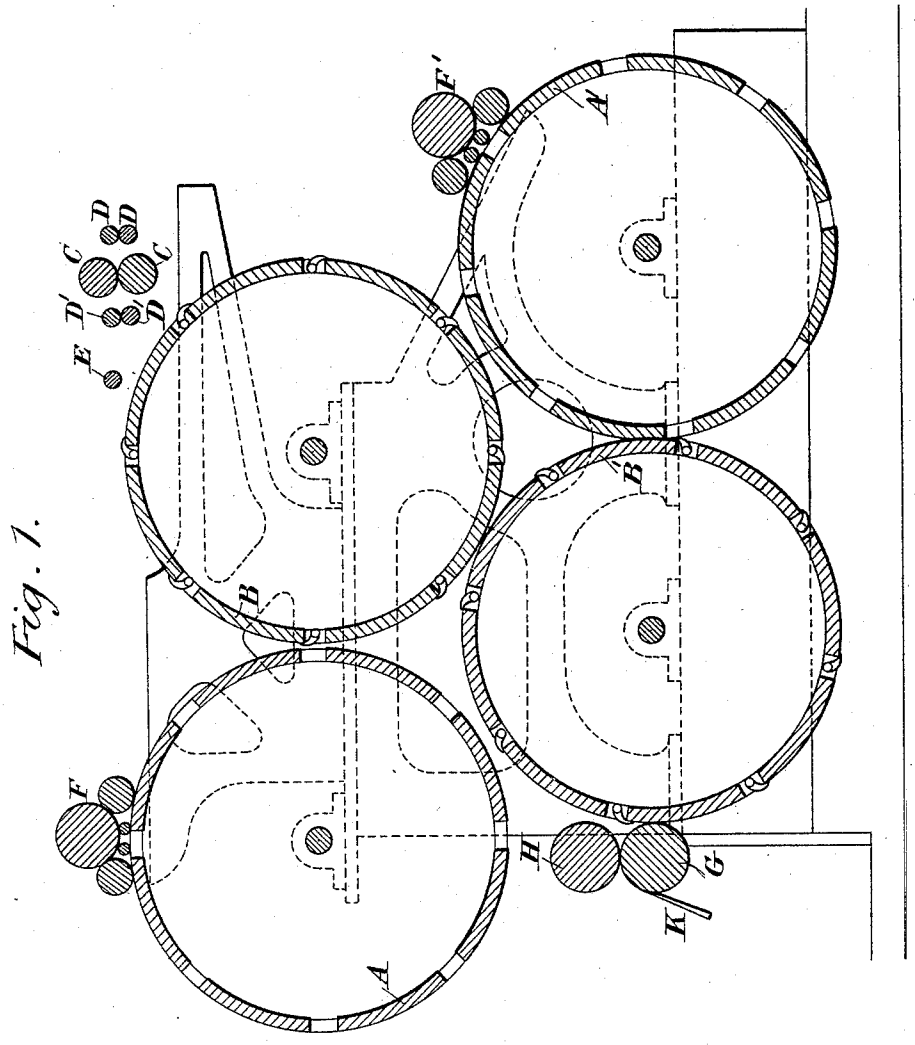


Fig. 1.

Witnesses
P. Washington Miller.
L. M. Brooke.

Inventor
Thomas Gibson,
By his Attorneys,
Baldwin, Davidson & Wright.

(No Model.) 11 Sheets—Sheet 2.

T. GIBSON.

PRINTING MACHINE.

No. 482,733. Patented Sept. 20, 1892.

Fig. 2.

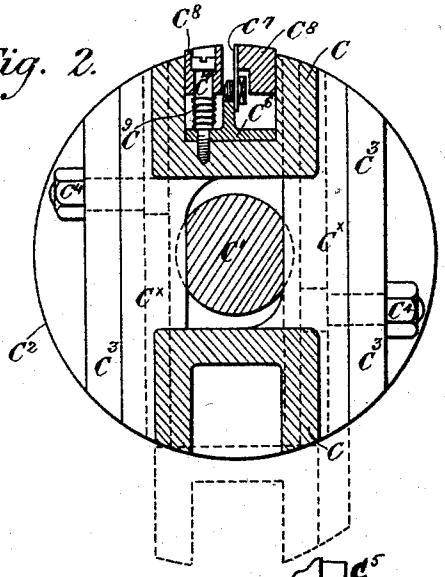
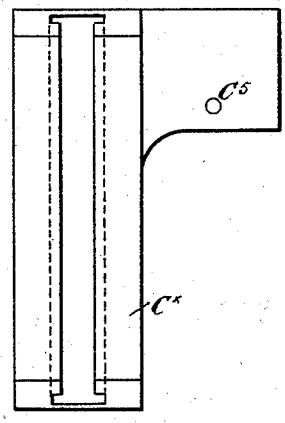


Fig. 5.



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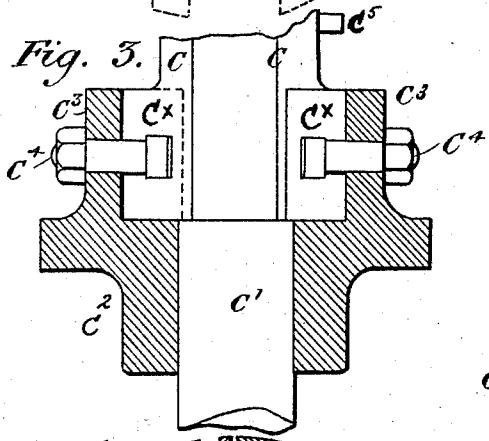
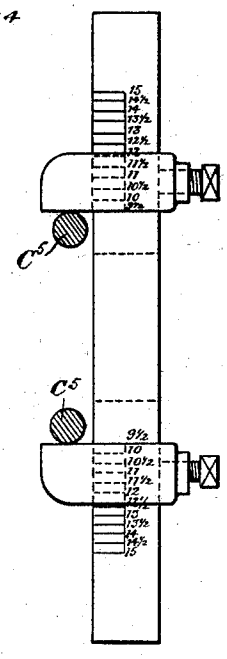


Fig. 6.



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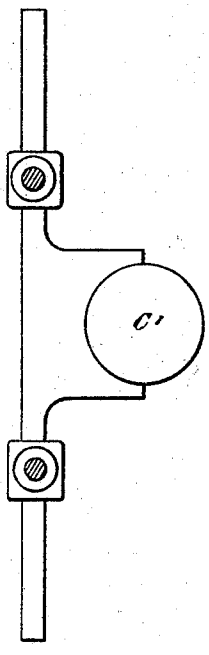

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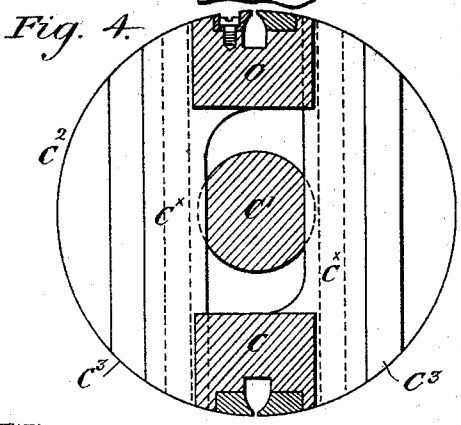


Witnesses.
W. Washington Miller.
C. W. Burke

Inventor:
Thomas Gibson,
By his Attorneys,
Baldwin, Davidson & Wright

(No Model.)

11 Sheets—Sheet 3.

T. GIBSON.

PRINTING MACHINE.

No. 482,733. Patented Sept. 20, 1892.

Fig. 2a

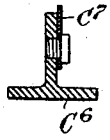


Fig. 2b

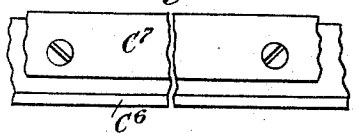


Fig. 2c

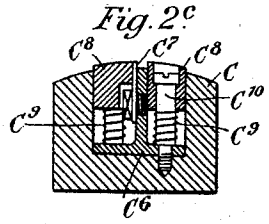


Fig. 8a

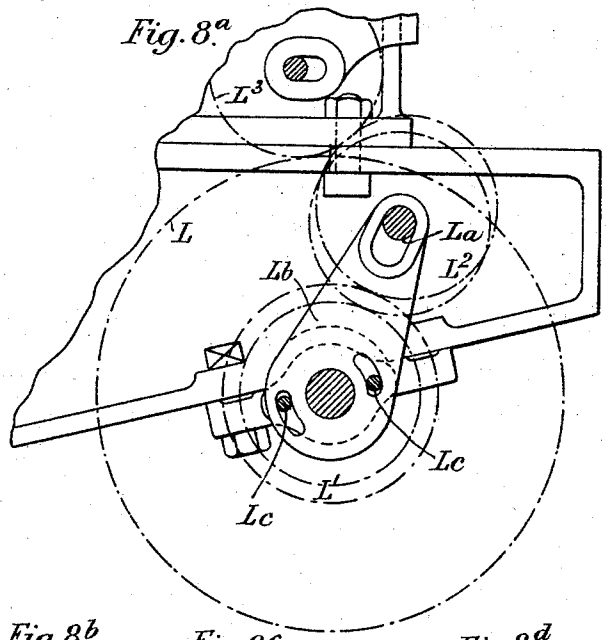


Fig. 8b

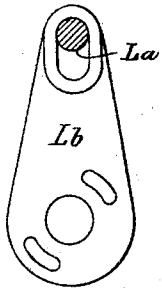


Fig. 8c

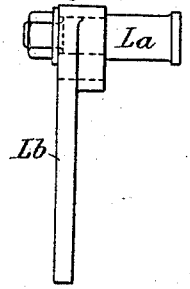


Fig. 8d

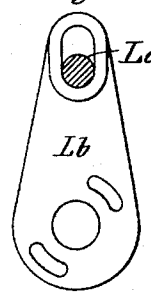
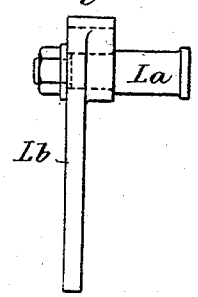


Fig. 8e



Witnesses
B. M. Miller.
Baltus D. Long.

Inventor
Thomas Gibson
By his Attorneys.
Baldwin Davidson & Wright.

(No Model.)

11 Sheets—Sheet 4.

T. GIBSON.

PRINTING MACHINE.

No. 482,733. Patented Sept. 20, 1892.

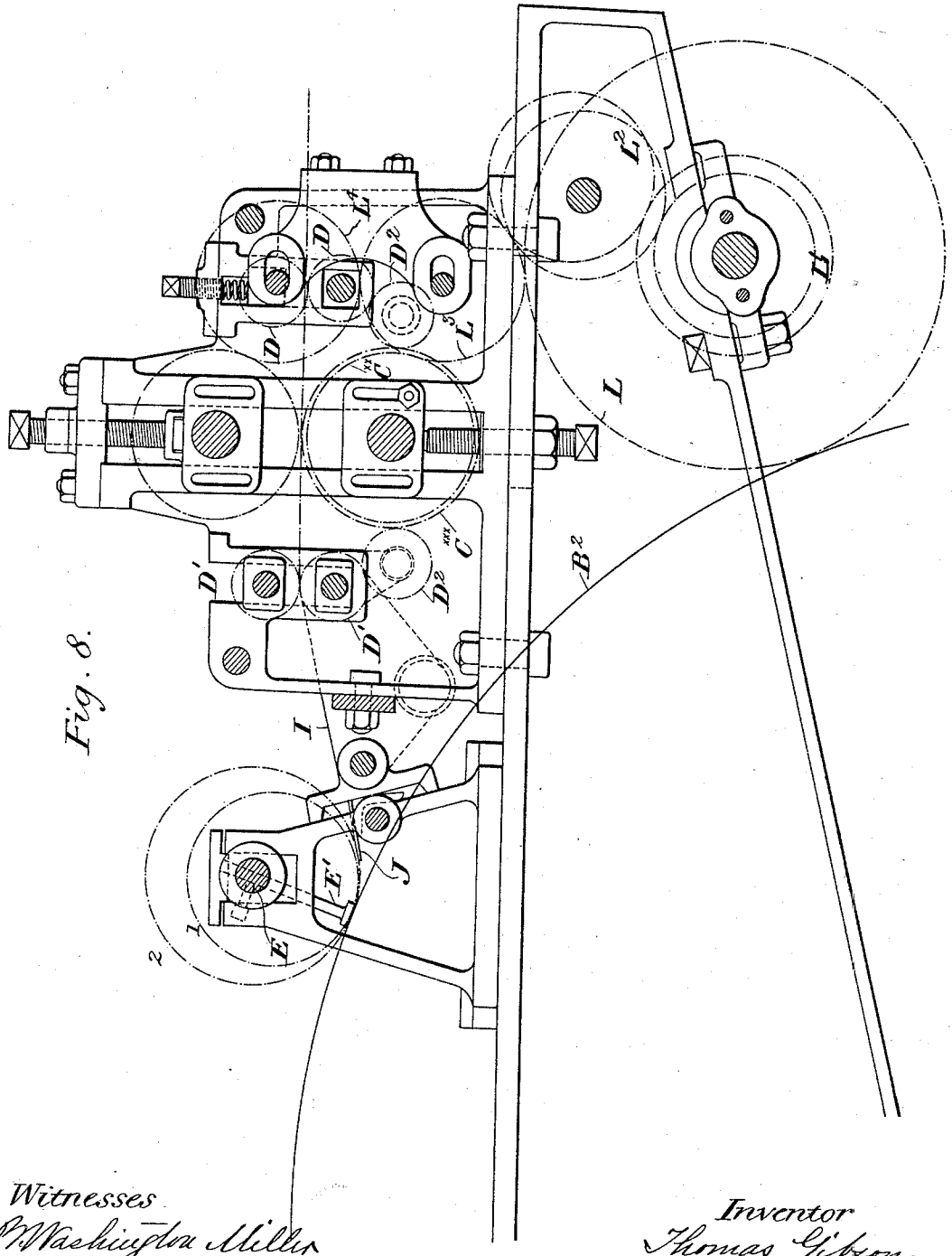


Fig. 8.

Witnesses
W. Washington Miller.
C. W. Brooke.

Inventor
Thomas Gibson,
By his Attorneys,
Baldwin, Davidson & Wright.

(No Model.)

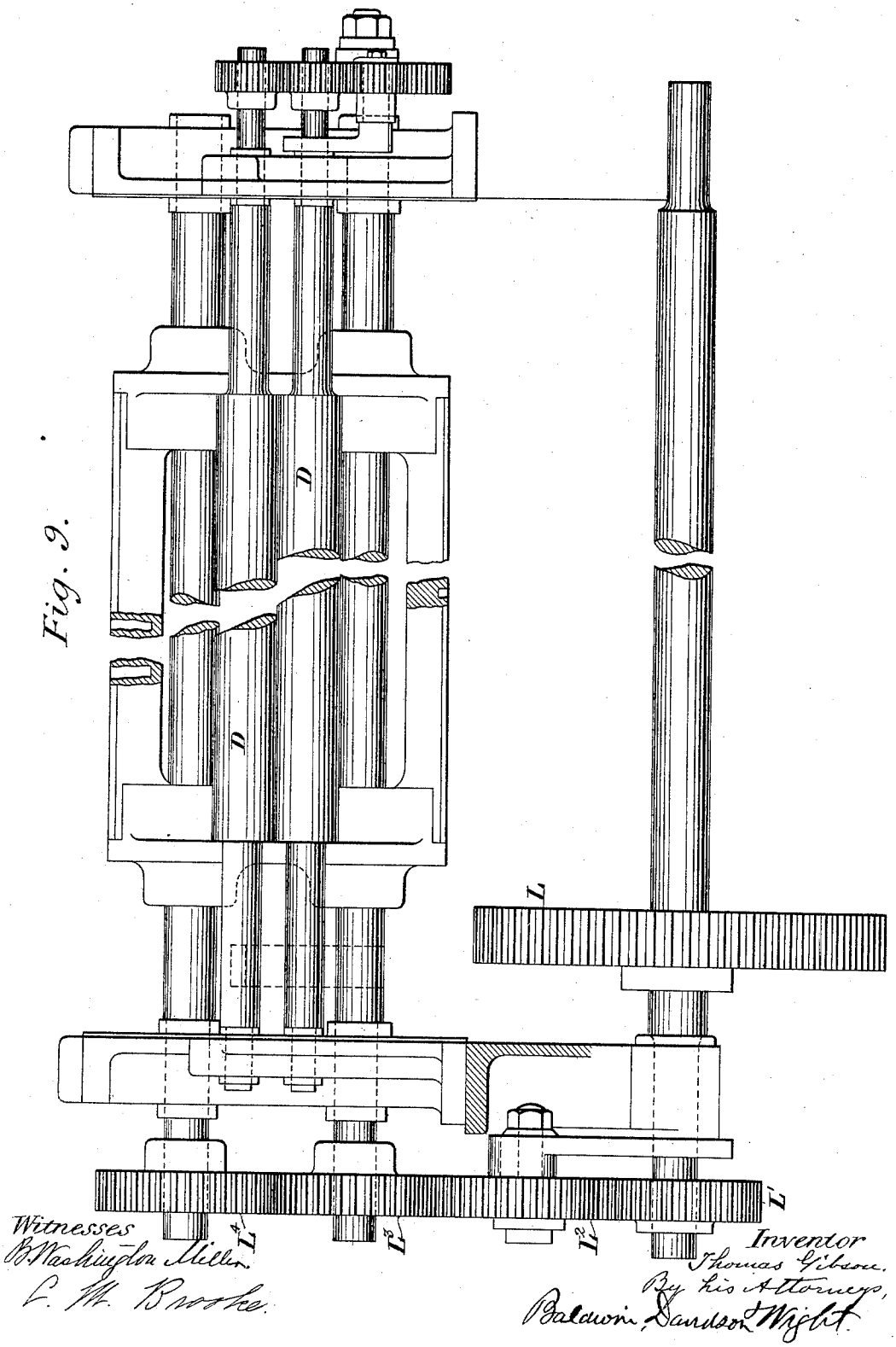
11 Sheets—Sheet 5.

T. GIBSON.

PRINTING MACHINE.

No. 482,733. Patented Sept. 20, 1892.

Fig. 9.



Witnesses
B. Washington Miller.
C. W. Brooke.

Inventor
Thomas Gibson.
By his Attorneys,
Baldwin, Davidson & Wright.

(No Model.)

11 Sheets—Sheet 6.

T. GIBSON.

PRINTING MACHINE.

No. 482,733. Patented Sept. 20, 1892.

Fig. 11.

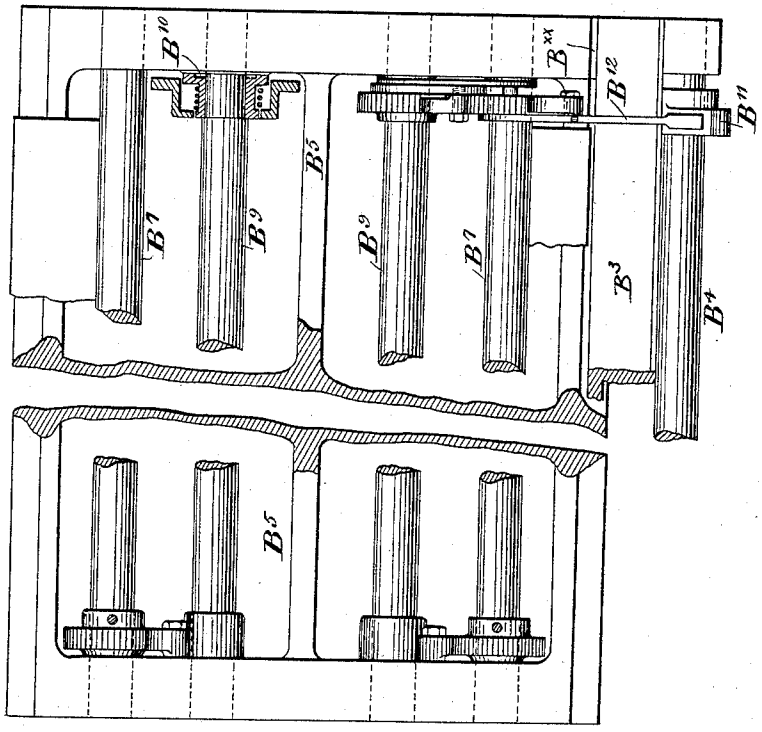
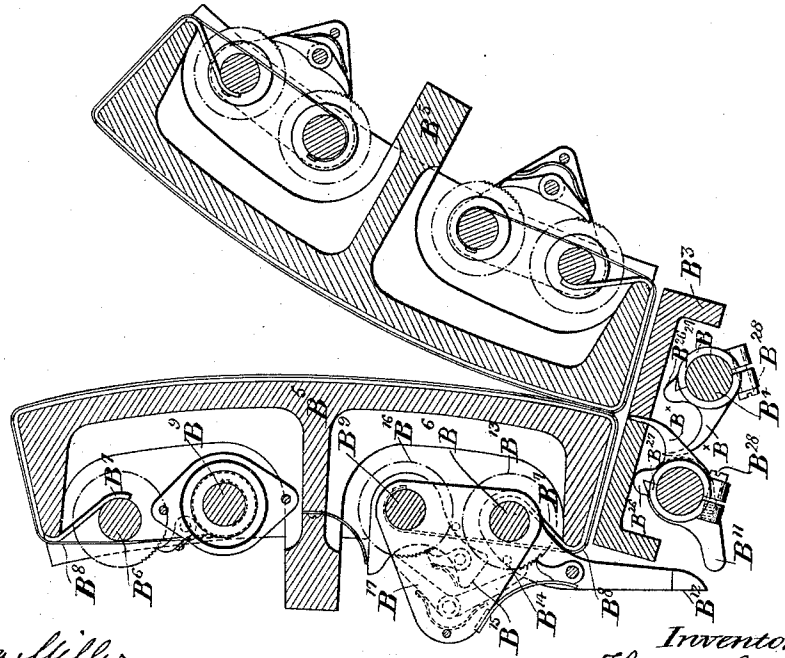


Fig. 10.



Witnesses.
A. Washington Miller.
C. W. Brooke.

Inventor:
Thomas Gibson.
By his Attorneys,
Baldwin, Davidson & Wright.

(No Model.)

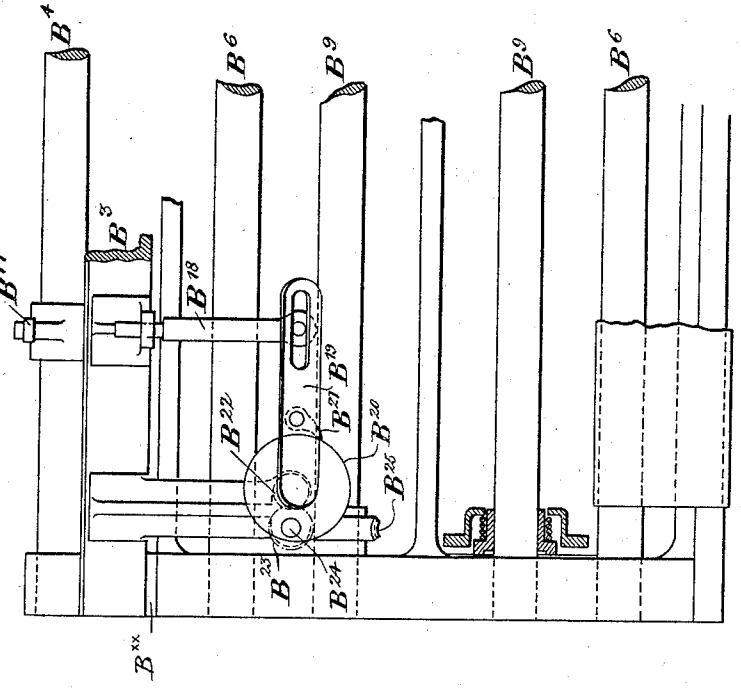
11 Sheets—Sheet 7.

T. GIBSON.

PRINTING MACHINE.

No. 482,733. Patented Sept. 20, 1892.

Fig. 15.



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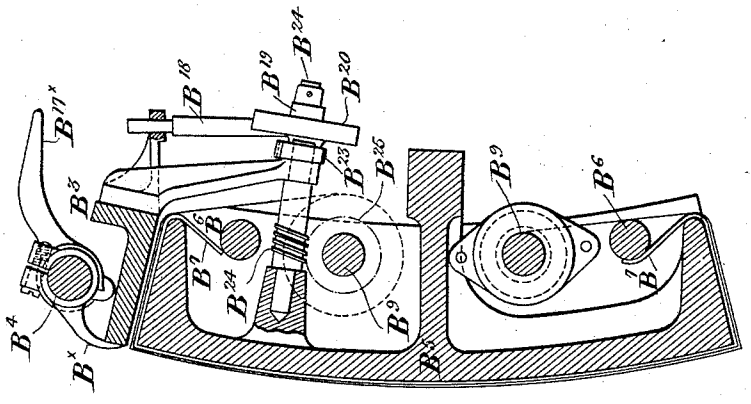


Witnesses.
P. Washington Miller.
C. W. Brooke.

Inventor.
Thomas Gibson,
By his Attorneys.
Baldwin, Dawson & Wight.

(No Model.) 11 Sheets—Sheet 8.

T. GIBSON.

PRINTING MACHINE.

No. 482,733. Patented Sept. 20, 1892.

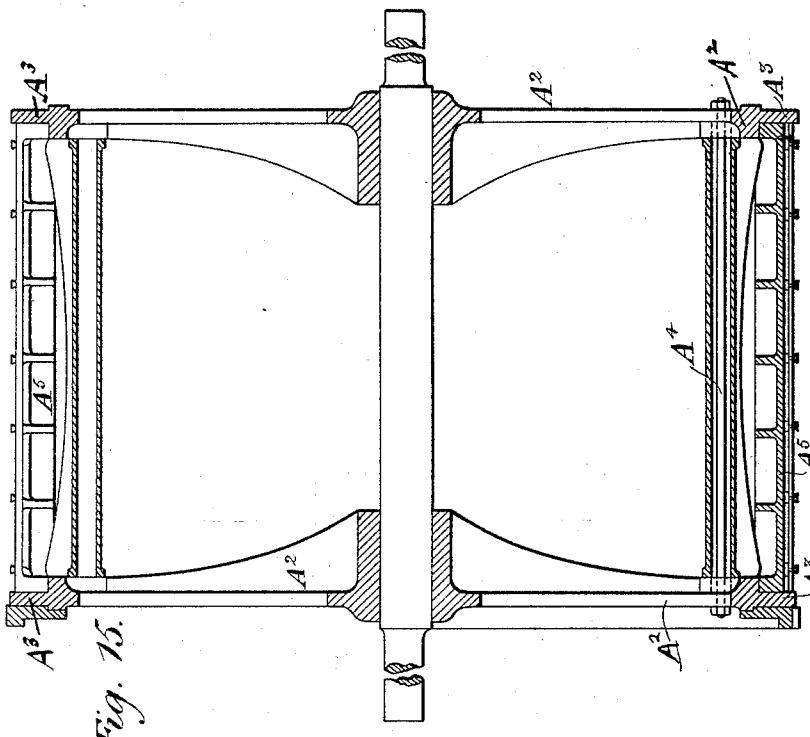
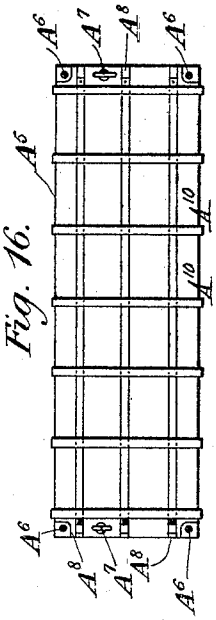


Fig. 15.



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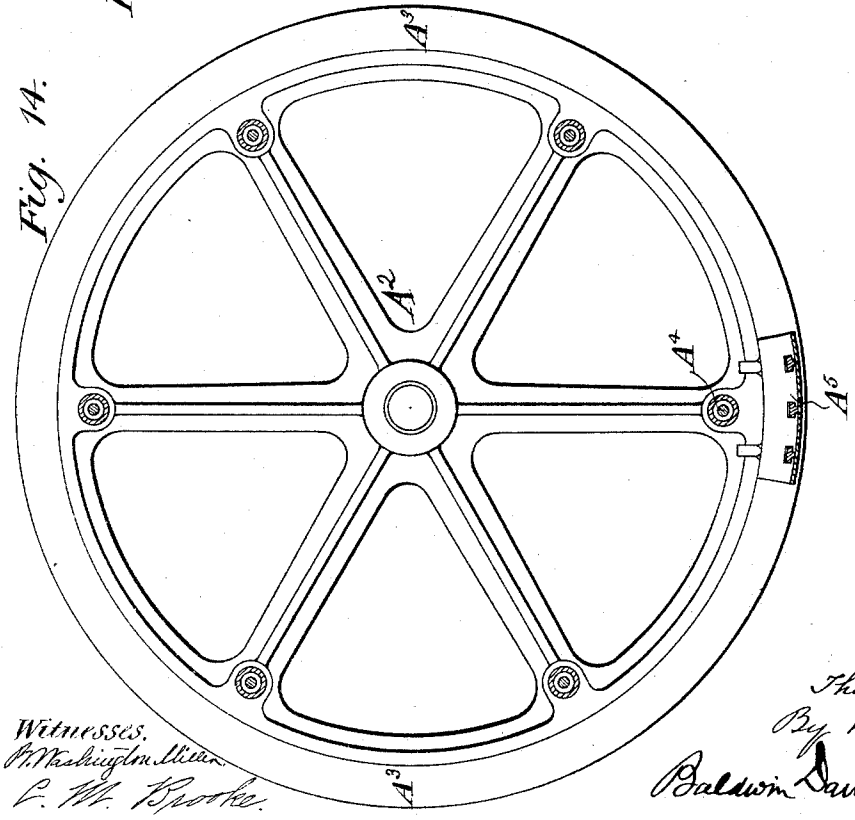


Fig. 14.

Witnesses,
H. Washington Allen
C. W. Brooke.

Inventor:
Thomas Gibson,
By his Attorneys,
Baldwin Davidson & Wight

(No Model.)

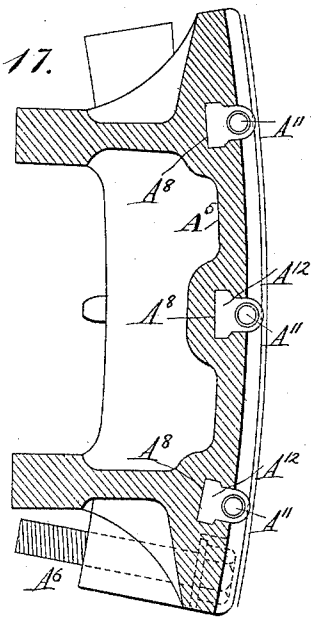
11 Sheets—Sheet 9.

T. GIBSON.

PRINTING MACHINE.

No. 482,733. Patented Sept. 20, 1892.

Fig. 17.



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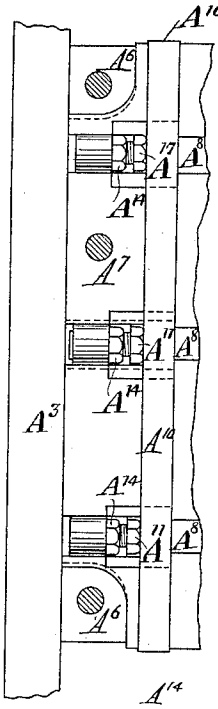
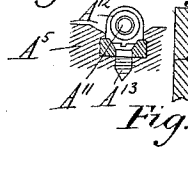


Fig. 19a



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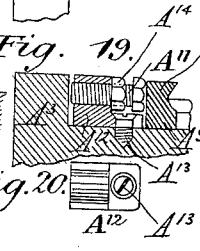


Fig. 19b

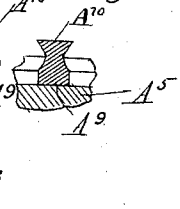


Fig. 20.

Witnesses
R. Washington Miller.
L. W. Brooke.

Inventor.
Thomas Gibson
By his Attorneys,
Baldwin, Davidson & Wright.

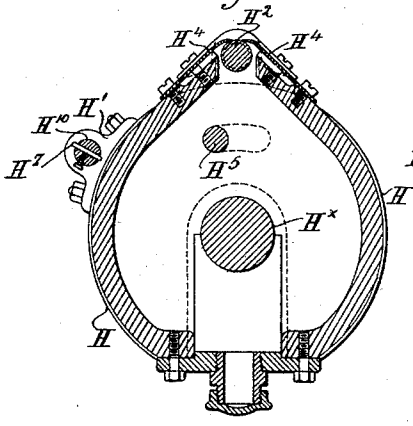
(No Model.) 11 Sheets—Sheet 10.

T. GIBSON.

PRINTING MACHINE.

No. 482,733. Patented Sept. 20, 1892.

Fig. 21.



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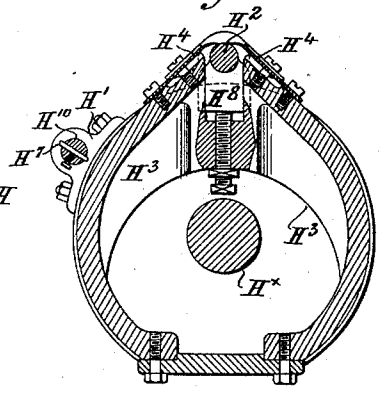

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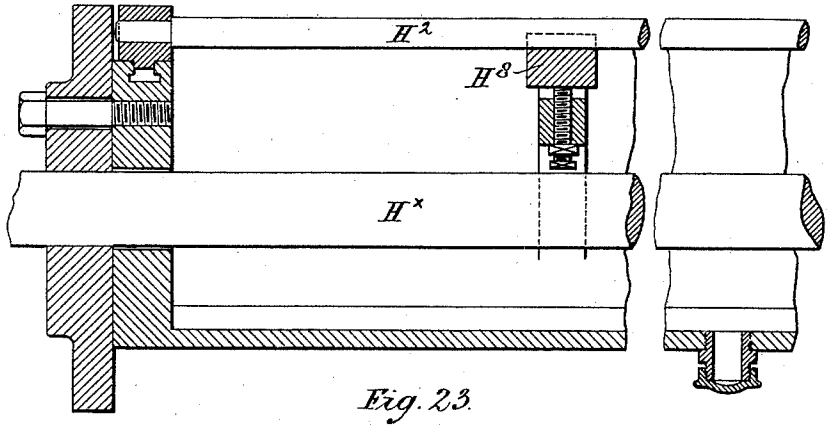
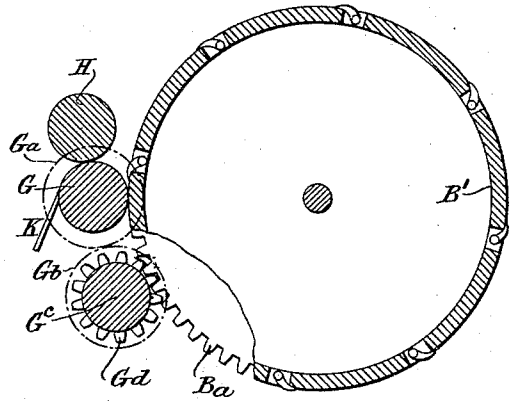


Fig. 23.



Witnesses.
B. W. Miller
Baltus D. Long.

Inventor:
Thomas Gibson,
By his Attorneys,
Baldwin Davidson & Wright.

(No Model.) 11 Sheets—Sheet 11.

T. GIBSON.

PRINTING MACHINE.

No. 482,733. Patented Sept. 20, 1892.

Fig. 25.

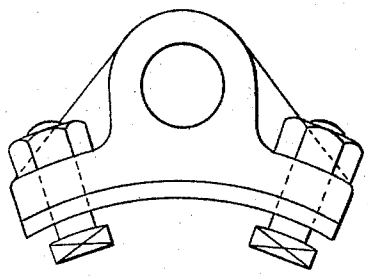


Fig. 26.

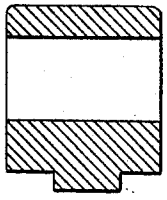
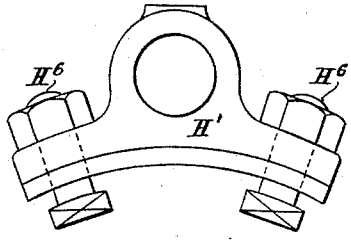


Fig. 27.



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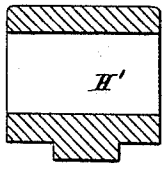


Fig. 29.

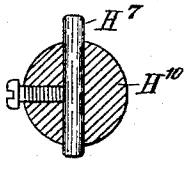
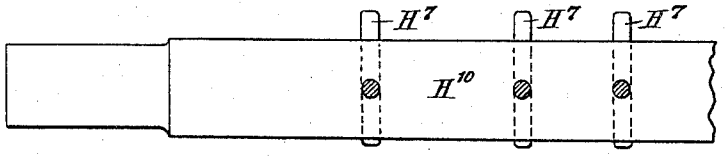


Fig. 30.



Witnesses
B. W. Miller.
Baltus D. Long.

Inventor
Thomas Gibson,
By his Attorneys
Baldwin, Davidson & Wright.

UNITED STATES PATENT OFFICE.

THOMAS GIBSON, OF LONDON, ENGLAND.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 482,733, dated September 20, 1892.

Application filed September 4, 1891. Serial No. 404,736. (No model.)

To all whom it may concern:

Be it known that I, THOMAS GIBSON, of the Feister Printing Co., No. 35 Snow Hill, in the city of London, England, and a subject of the Queen of Great Britain, have invented certain new and useful Improvements in Printing-Machines, of which the following is a specification.

My invention relates particularly to printing and bookbinding machinery of the kind or class described in Letters Patent of the United States granted to Henry P. Feister, numbered and dated as follows: No. 256,662, dated April 18, 1882; No. 323,925, dated August 11, 1885, and No. 452,933, dated May 26, 1891. Some of my improvements are, however, also applicable to other printing-machines.

In my machine I employ two form-cylinders mounted at a convenient distance apart and so arrange two impression-cylinders in combination therewith that the paper or other material is first delivered to one impression-cylinder and printed upon one side thereof by one form-cylinder and subsequently delivered to the other impression-cylinder and printed upon the other side thereof by the other form-cylinder. I secure segmental pieces to the circumference of the form-cylinder by means of set-screws, bolts, or by any other convenient means, so that they may be readily removable therefrom, or I make so much of the periphery of the cylinder as may be desired of segmental pieces, supported on two end plates. The printing-plates are secured in position upon the segmental pieces by means of clamp-bars, and I cause these clamp-bars to grip the edges of the plates in the manner hereinafter described. At one end of the form-cylinder is a spur-wheel, attached to the end of the cylinder by means of bolts passing through circular slots in the wheel. By this means the wheel is adjustable upon its axis in relation to the cylinder. At each end of the cylinder is a ring or bearer, raised above the level of the part on which the type is fixed. These bearers may be part of the cylinder itself or be fitted so as to revolve on the axle. The impression-cylinders I similarly form with readily-removable segments, and construct these segments in the manner hereinafter described. The cutting or perforating device I construct of segments, each of which is mounted upon a shaft or arbor in such a manner as to be adjustable radially to or from the axis thereof, as has before been proposed. The cutting or perforating device partially severs the paper. The completion of the severance I effect in the manner hereinafter described.

It has been found with practice that the paste-fountain as at present constructed is liable to spread the line of paste and cause it to run into the printed matter. Moreover, owing to the construction of the paste-fountain it is only capable of being used for books of a limited size, thus necessitating the employment of a different paste-fountain for books of widely-different dimensions. According to my invention, I provide an improved paste-fountain which will not spread the line of paste and which can be readily altered or adjusted for books of varying dimensions. My improved paste-fountain is capable, moreover, of containing a much larger supply of paste than those heretofore in use in the said Feister machine.

In carrying this part of my invention into practice I place the adjustable plates or blades for regulating the slit or aperture through which the paste is delivered at a much acuter angle with each other than has hitherto been done, thereby avoiding the rolling contact which occurs when they are placed at a more acute angle or flatter, and which tends to spread the line of paste into the printed matter. Moreover, I form the body of the said paste-fountain circular or approximately circular in transverse section instead of square, as heretofore. By forming the ends of the said paste-fountain circular and providing a T-groove around the circumference I am enabled to secure the bar carrying the fingers or projections for holding or gripping the sheet while it is being transferred from the collecting to the retaining grippers in such a manner that it can be adjusted around the circumference of the said paste-fountain and thus brought as close as may be desirable to the slit or aperture through which the paste is delivered, thus rendering one paste-fountain suitable for books of widely-different dimensions. By making the segments of the form and impression cylinders readily removable, so that segments of one size may be

substituted for segments of another size, and by constructing the cutting mechanism in such manner as to sever the endless web of paper into sheets of different lengths, and by giving motion to this cutting apparatus and to the other parts of the machine by change speed-gear the machine can readily be adapted for printing, say, eight sheets at each revolution and at another time, say, ten sheets.

Although I have more particularly described my said improvements as applied to a printing-machine of the kind or class hereinbefore referred to, it is obvious that the said improvements or some of them are also advantageously applicable to other printing-machines.

Figure 1 is a diagram longitudinal section of the machine, showing the position of most of its parts. Fig. 2 is a transverse section of the cylinder that carries the cutting-blades. Fig. 2^a is a cross-section of the cutting-blade and the bar which carries it. Fig. 2^b is an elevation of part of the same. Fig. 2^c is a cross-section of one of the segment-bars C and the cutting-blade and the presser-bars C^8 carried within it. Fig. 3 is a longitudinal section of one end of the same. Fig. 4 is a transverse section of the female cutting-cylinder. Fig. 5 is an elevation of a portion of one end of one of the segments. Fig. 6 is a side view, and Fig. 7 an edge view, of the gage used for setting the cutting-segments at the required distance from the shafts of the cutting-cylinders. Fig. 8 is a longitudinal section, on a larger scale than Fig. 1, of a portion of the machine, showing the cutting-cylinders, the rollers for feeding forward the web of paper, and the mechanism for detaching one sheet from the next. Fig. 8^a shows a portion of the gearing for driving these feed-rollers and the cutting-cylinders. Fig 8^b is a side elevation, and Fig. 8^c an edge view, of the arm L^b with the stud L^a carried by it in one of its positions. Figs. 8^d and 8^e are similar views of the arm with the stud in its proper position. Fig. 9 is a front elevation of the same. Fig. 10 is a section showing one of the segments of each of the two impression-cylinders. Fig. 11 is a back view of one of the segments. Fig. 12 is a section of one of the segments, showing a modified way of giving a slow traveling movement to its canvas covering. Fig. 13 is a back view of a portion of this segment. Fig. 14 is a cross-section; Fig. 15, a longitudinal section of one of the form-cylinders. Fig. 16 is a face view of one of its removable segments. Fig. 17 is a cross-section, on a larger scale, of one of the segments. Fig. 18 is a face view of one end of the same. Figs. 19, 19^a, and 19^b are detail views in section of the clamping devices employed for securing the printing-plates to the cylinders. Fig. 20 is a plan of the nut. Figs. 21 and 22 are cross-sections of the pasting-cylinder. Fig. 23 shows the train of gearing by which the collecting-roller is driven. Fig. 24 is a longitudinal section of one end of the pasting-cylinder. Fig. 25 is a side elevation, and Fig. 26 a longitudinal section, of one of the bearings which carry the ends of the paste-roller. Fig. 27 is a side elevation, and Fig. 28 a longitudinal section, of one of the bearings of the pin-bar. Fig. 29 is a cross-section of the pin-bar, and Fig. 30 a side view of a portion of the same.

A A′ are two form-cylinders to which the printing-plates are attached.

B B′ are two impression-cylinders.

C C are the cutting-cylinders.

D D and D′ D′ are pairs of rolls for feeding forward the web of paper, one pair D D in front of the cutting-segments and the other pair D′ D′ in rear of them.

E is the axis, which carries a series of radial detacher-pins, which serve to nip the paper between their own forward ends and the circumference of the impression-cylinder B, and as they and the impression-cylinder travel faster than the paper is fed forward they then detach from the end of the web of paper the sheet which has been partially severed off by the cutting-blade of the cutting-cylinders.

F are the inking-rollers for inking the plates on the form-cylinder A, and F′ the rollers for inking the plates on the form-cylinder A′.

G is the roller on which the several sheets printed at each revolution of the form-cylinders are collected one above the other.

H is the paste-roller for applying a line of paste across the center of each sheet as it is being carried round by the collecting-roller G.

The construction of the cutting-cylinders is shown at Figs. 2 to 5. There are two segment-bars C, parallel with and on opposite sides of the axis C′, by which they are carried. At each end the bars are secured to collars C^2, fixed on the axis C′. Each bar at its end is for this purpose formed with an arm $C^\times$, extending from it. Each collar has projecting from its face two straight parallel projections C^3. The arm $C^\times$ of one bar C is bolted by a bolt C^4 to one of these projections, and the arm of the other bar C is bolted by another bolt to the other projection. The heads of the bolts are received in T-headed slots formed lengthwise of the arms, so that the bars C can be moved toward or away from the axis C′ and locked at any desired distance from them.

To facilitate the setting of the two bars at equal distances from the axis C′, a gage (shown at Figs. 6 and 7) is used. At its center the gage-bar is formed to fit to the axis C′, as shown. Each end carries a sliding block which can be slid along and set to any desired line of a scale marked upon the bar and then clamped to the bar by a clamping-screw. Each bar C near each of its ends has a pin C^5 projecting from it, as shown at Fig. 5. To set the ends of the segment-bars C at the desired distance from their axis C′, the gage-bar is held against the axis C′ and the bars are moved outward until the pins C^5 come against the blocks of the gage-bar. The segment-bars C have each a longitudinal groove formed in them. The groove of each female

cutting-segment receives and has fixed within it the wearing portion, as shown at Fig. 4. The groove in each male cutting-segment has fixed within it a T-shaped bar C^6, to the stem of which the cutting-blade C^7 is secured. On each side of the blade is a sliding bar C^8, pressed outward by coiled spring C^9. Each spring C^9 surrounds a screw-pin C^{10}, which serves not only to hold the bar C^6 to the bottom of the groove in the bar C, but also to restrain the bars C^8 from being pressed outward too far from the groove in the bar C. Both bars C^8 are pressed outward and restrained in the same way, separate springs C^9 and restraining-screw stop-pins C^{10} being provided for each bar.

The way in which the cutting-cylinders are driven is shown at Fig. 8. This figure also shows how the bearings of the axes of the cutting-cylinders can be moved toward or away from one another, according as the distance of the segments from their axes is increased or diminished. A spur-wheel B^2 on the shaft of the impression-cylinder B and of the same diameter as this cylinder drives a toothed wheel L. A change-wheel L′ on the axis of this wheel gives motion to a pinion L^2, which gears with a pinion L^3, that drives a pinion $C^{\times\times}$ on the axis of the lower cutting-cylinder C. The upper cutting-cylinder is similarly driven from the pinion L^3 through an intermediate pinion L^4. Two change-wheels L′ are provided of different diameters. With the smaller one the cutting-cylinder is driven at a ratio of four to one of impression-cylinder. With the larger one the ratio is five to one, and as the cutting-cylinders cut twice for each revolution one would furnish eight cut sheets for each revolution of the impression-cylinder and the other ten sheets. The lower roller of each pair of feed-rollers D D′ is driven by a pinion D^2, which gears into a change-wheel $C^{\times\times\times}$ on the axis of the lower cutting-cylinder. The upper and lower rollers of each pair gear together, so that they always revolve at the same speed. The size of each of the eight or ten sheets cut at each revolution of the impression-cylinder will depend upon the diameter of the cutting-cylinders. They can be set to any diameter required. The surface speed of the feed-rollers has to be the same as that of the cutting-cylinders. A number of wheels $C^{\times\times\times}$ of different diameters are therefore provided, one for each of the several speeds required. The partially-severed web of paper as it passes from the feed-rollers D′ is conveyed by tapes I onto a guide-plate J, which conducts it onto the surface of the impression-cylinder. Just as the foremost end of the web passes beyond the end of this guide-plate the ends of detacher-rods E′, carried by the axis E, come against the paper and nip it between themselves and one of the rigid cross-bars B^3 of the impression-cylinder (see Figs. 10 to 13) and drag away the foremost sheet, completing its severance from the remainder of the web, the partial line of severance previously formed across the sheet being then at some point between the feed-rollers D′ and guide-plate J. At the same time grippers $B^{\times}$, carried by a gripper-bar B^4, (see Figs. 10 to 13,) are allowed to close down onto the foremost edge of the paper and nip it between themselves and the bar B^3 and so carry forward the severed sheet on the impression-cylinder. The grippers are closed by springs acting against arms on the bar B^3 and are opened at the required times by an arm on the bar coming against a fixed cam projection in the ordinary manner. As it is necessary that the line of partial severance across the paper shall have passed the feed-rollers D′ before the severance is made complete and that whatever be the size of sheet that is being printed there shall only be one such partial line of severance between the feed-rollers D′ and the detacher-rods E′, the whole of the feed and cutting rollers and the gearing which drives them are carried by a frame which can be moved toward or away from the detacher and fixed to the main frame in any desired position. The axis E of the detacher-rods has secured to it two pinions 1 and 2, having, respectively, sixteen and twenty teeth. One is used when eight sheets are being printed, the other when ten sheets are printed at each revolution. To allow this being done without interfering with the mesh of gears L^2 L^3, the stud L^a, upon which gear L^2 turns, is carried by an arm L^b, (see Figs. 8^a, 8^b, 8^c, 8^d, and 8^e,) which can be turned around the axis of the gear-wheel L′ and locked to the bearing of this axis in any desired position by lock-bolts L^c. To allow of one of the change-wheels L′ being removed and changed for one of the other diameter, so as to alter the rate at which the cutting-cylinders are to be driven, according as eight or ten beds are used on the impression and printing cylinders, the stud L^a, upon which gear L^2 turns, can be set into either of two positions, one nearer to the axis of the gear-wheel L′ than the other, so that whichever size of gear-wheel L′ is used the gear-wheel L^2 may be set into gear with it. Figs. 8^b and 8^c show the stud in one position. Figs. 8^d and 8^e show it in the other.

The construction of the impression-cylinder is shown at Figs. 10 and 11. A modification is shown at Figs. 12 and 13. When eight sheets are being printed, the circumference of each impression-cylinder has affixed to it parallel with its axis and at equal distances apart around its circumference eight metal segments B^5. These beds at their ends rest against and are bolted to the periphery of disks or wheels on the axis of the impression-cylinder. Each metal segment has also bolted to it near the ends of its foremost side a bar B^3, distance-pieces $B^{\times\times}$ being interposed between them at the ends, so that in the center there is a narrow space between the side of the segment and the bar. The object of this construction is that the blanket and linen

used to cover the segments may pass through this space to the back and not be touched by the grippers. The bars carry bearings for the finger or gripper bars B^4, and the fingers themselves close down onto the bars' outer edges. Each metal segment B^5 carries on its inner side four rollers. Two of these B^6 have secured to them the ends of a thick sheet or blanket B^7, of elastic material, which is led over the outer surface of the segment. The rollers can be turned from their ends in opposite directions and the blanket so stretched over the segment and can be retained in its stretched condition by pawls engaging with ratchet-wheels fast on the rollers. Outside the blanket is a canvas sheet B^8, similarly secured at its ends to rollers B^9.

On the first impression-cylinder B there are ratchet-wheels on the rollers and pawls to retain these wheels from turning back after they have been turned to wind the canvas onto themselves and so keep the canvas taut. The rollers B^6 are turned by hand, as required, holes being made in the flanges A^3 opposite to the ends of B^6, through which a suitable key for turning them can be inserted.

On the second impression-cylinder B′ means are provided for slowly and continuously winding the canvas off from one roller and onto the other, so that the canvas coverings of the blankets on this cylinder, which receive more or less "set-off" from the printed sides of the sheets which rest against them, may gradually and continuously be replaced by fresh clean canvas coverings. In the construction shown at Figs. 10 and 11 this is effected by impeding one roller from turning too freely by a spring friction-brake B^{10} and by turning the other a short distance each time that the fingers $B^\times$ open. An arm B^{11} on the gripper-bar B^4, which carries the fingers, is at each movement of the fingers caused to strike against a lever B^{12} and rock this lever. The lever carries a pawl which engages with a ratchet-wheel B^{13}, that can turn loosely around the roller B^6. In this way a slow revolving movement is given to the ratchet-wheel. As the ratchet-wheel is revolved a pin B^{14}, which projects out from its side, comes against and rocks a lever B^{15}, which by another pawl gives a slow revolving motion to a ratchet-wheel B^{16}, which is fast on the roller B^9. Another pawl B^{17}, engaging with the ratchet-wheel, prevents it turning in the opposite direction.

In the modification shown at Figs. 12 and 13 an arm $B^{17\times}$ on the gripper-bar B^4 is each time that the grippers are opened caused to strike against one end of a rod B^{18} and move it endwise. The other end of the rod is jointed to a lever B^{19}, which is free to turn round the axis of a ratchet-wheel B^{20}. The lever carries a pawl B^2, which engages with the ratchet-wheel and gives to this axis a slow-revolving motion as the lever is rocked to and fro. On the axis of the ratchet-wheel is a pinion B^{22}, which engages with a pinion B^{23} on the axis of a worm B^{24}. The worm B^{24} is made to gear with a worm-wheel B^{25} on the roller B^9 and so gives a slow-revolving motion to this roller and causes it to wind the canvas onto itself and to unwind it from the other roller B^9.

The way in which provision is made for removing any one or other of the several grippers on any gripper-bar is shown at Figs. 10 and 12. The boss of each gripper is made in two halves, with projections standing out from each on opposite sides of the finger-bar. On one side a projection B^{26} on one half of the boss is made to fit to and overhang a projection B^{27} on the other half. On the other side of the axis the projections on the two halves are drawn together by a screw-bolt B^{28} and the two halves are so made to grip the bar between them and are thereby locked to it. By taking out the bolt B^{28} and slipping the two halves of the boss endwise in opposite directions the gripper can readily be removed from the bar and be as readily replaced by a fresh one.

The construction of the form-cylinder is shown at Figs. 14 to 20. The cylinder is composed of two end wheels A^2, which have each a circumferential flange A^3 projecting outward around them and are stayed together at intervals near their circumference by stays A^4. The remainder of the circumference of the cylinder is composed of removable segments A^5. These at their ends rest upon the circumference of the wheels A^2 and are secured to it by bolts A^6. Each segment is provided with removable eyebolts A^7, by which it can be lifted from the cylinder. Each segment has parallel undercut grooves A^8 formed along it into which fit projections A^9 on a series of clamp-bars A^{10}, which are at right angles to the grooves A^8. The sides of the clamp-bars are undercut. The printing-plates formed with correspondingly-sloping sides are placed between the clamp-bars and are held to the cylinder by the clamp-bars overlapping their edges and are clamped and held tightly by the last clamp-bar at one end of the segment, being forced toward the opposite end of the segment by the head of a bolt A^{11} being made to bear against it. This bolt, as shown at Fig. 19, screws into a nut A^{12}. The nut is fixed in the required position to the circumference of the cylinder by a screw A^{13}. A^{14} is a lock-nut on the bolt A^{11} to lock it when it has been screwed up.

The way in which the several sheets printed at each revolution of the form and impression cylinders are collected one above the other on the collecting-roller G and then all simultaneously delivered from this roller is the same as described in the specification of Feister's patent, No. 452,933, of May 26, 1891. The collecting-roller is driven by a pinion on its axis gearing into an intermediate pinion driven by a toothed wheel on the axis of the impression-cylinder B′. The collecting-roller G is, as shown at Fig. 23, driven by a pinion G^a at one end of its axis gearing into a pin-

ion G^b on an axis G^c, which has upon it another pinion G^d, that gears with a toothed wheel B^a, fast on the shaft of the impression-cylinder B'. By changing the relative sizes of the pinions G^a G^b the collecting-roller can either be caused to make ten revolutions for each revolution of the impression-cylinder when ten sheets are being printed at each revolution, or it can be caused to make eight revolutions when eight sheets are being printed. The fly or detacher K may be driven in the usual way. The paste-cylinder always revolves at the same speed as the collecting-cylinder.

The way in which I now construct the pasting-cylinder H is shown at Figs. 21, 22, and 24. As will be seen, I make the paste-reservoir in such manner as to surround the shaft $H^\times$ which carries it. The bearings H', in which the pin-bar H^{10} is carried, are secured to the exterior of the reservoir by bolts H^6. Around the ends of the exterior of this reservoir are T-grooves, in which are received the heads of these bolts, so that the pin-bar H^5 may be set nearer to or farther from the mouth of the reservoir, according to the size of sheet that is being printed, or the pin-bar may, if so desired, be adjusted in circular grooves made in the sides of the bearers at the ends of the paste-fountain. The pins H^7 on the bar are, as heretofore, for holding or gripping the sheet as the grippers of the collecting-cylinder momentarily release their hold of the sheets in substantially the same way as that described in Feister's patent, No. 452,933, above referred to. The paste-roller H^2 is made of smaller diameter than heretofore. This I am able to do by supporting it at intervals by bearing-blocks H^8, pressed outward from fixed cross-ribs or bearers H^3, extending across the paste-delivery opening of the reservoir. At its ends the roller is carried in bearings V, which can be adjusted toward or from the axis of the paste-reservoir, as may be desired. The roller being of smaller diameter, the scrapers H^4, which prevent too much paste being carried out by the paste-roller, can be set at a much acuter angle to one another than heretofore.

What I claim is—

1. The combination of cutting apparatus having cutting-blades radially adjustable to cut sheets of different lengths, change-speed gear for the cutting apparatus to drive it at different speeds to make the proper number of cuts for each revolution of the impression-cylinder, the form and impression cylinders, the segments thereof readily removable, so that segments of one size can quickly be changed for segments of another size, a roller on which the sheets printed at each revolution are collected, and change-speed gear for regulating its speed.

2. The cutting apparatus consisting of the combination of the two shafts and the collars secured thereto, the segmental bars connected with the collars and radially adjustable relatively to the shafts, a plate carried by one of the segmental bars, and the pins C^5 on the bars, for the purpose specified.

3. The combination of an impression-cylinder having across it at equal distances apart around its circumference lines of grippers, two pairs of feed-rollers for feeding forward a continuous web of paper to this cylinder, pairs of cutting-segments adjustable radially on the axes which carry them, situated between the pairs of feed-rolls, gearing for driving them from the axis of the impression-cylinder at a slower surface speed than this cylinder, change-gear wheels for enabling the feed-rollers and segments to be always driven at the same surface speed, and detacher-rods carried by a revolving axis near the feed-rolls and close to the impression-cylinder and which nip the forward edge of the paper between themselves and the impression-cylinder at a time when a partial line of severance formed across the paper by the cutting-segment has passed beyond the second pair of feed-rolls.

4. The impression-cylinder herein described carrying at equal distances apart around its circumference removable segments which pass across it from one side to the other, the outer surface of each segment being covered with a thick blanket, which at its ends is secured to two rollers at the back of the segment, and means for turning these rollers to wind up and stretch the blanket and for preventing the rollers from turning back and allowing the blanket to slacken and with canvas covering attached at its end to other rollers at the back of the segment, one impeded by friction from revolving too freely and the other caused to revolve slowly and wind canvas onto itself.

5. An impression-cylinder provided with a series of removable segments arranged at equal distances apart around its circumference and which pass across it from one side to the other, each of said segments having a thick blanket covering provided with means for stretching it, said blanket having a canvas covering provided with means for feeding it across the face of the blanket, substantially as described.

6. The form-cylinder provided with a series of removable beds arranged at equal distances apart around its circumference, each bed having a series of undercut grooves formed longitudinally in its outer face and provided with a series of bars arranged at right angles to said grooves, each of said bars having projections which enter and fit into the undercut grooves and which are adjustable therein, the sides of said bars being undercut to overlap the sides of printing-plates placed on the bed, substantially as described.

7. In a form-cylinder, the combination of a supporting-frame and a series of removable beds, each having a series of longitudinal undercut grooves, a series of bars arranged transversely to said grooves and having projections fitting the undercut grooves, so that

the bars may move laterally across the face of the cylinder, said bars being undercut on their sides to overlap the sides of printing-plates placed on the cylinder, and means for clamping the bars to the plates, substantially as set forth.

8. A pasting-cylinder in which the reservoir is made cylindrical on the exterior, where the bearings which carry the pin-bar are to be secured to it, in combination with a pin-bar carried in bearings secured to the reservoir by radial screw-bolts, substantially as described.

9. A paste-reservoir made curved or cylindrical on the exterior where the bearings which carry the pin-bar are to be secured, in combination with said pin-bar and its bearings, and radial screw-bolts secured to the bearings and adjustable toward and from the mouth of the paste-reservoir, substantially as described.

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