(No Model.) 7 Sheets—Sheet 1.

A. CAMPBELL.

PRINTING MACHINE.

No. 297,111. Patented Apr. 22, 1884.

Fig. 1.

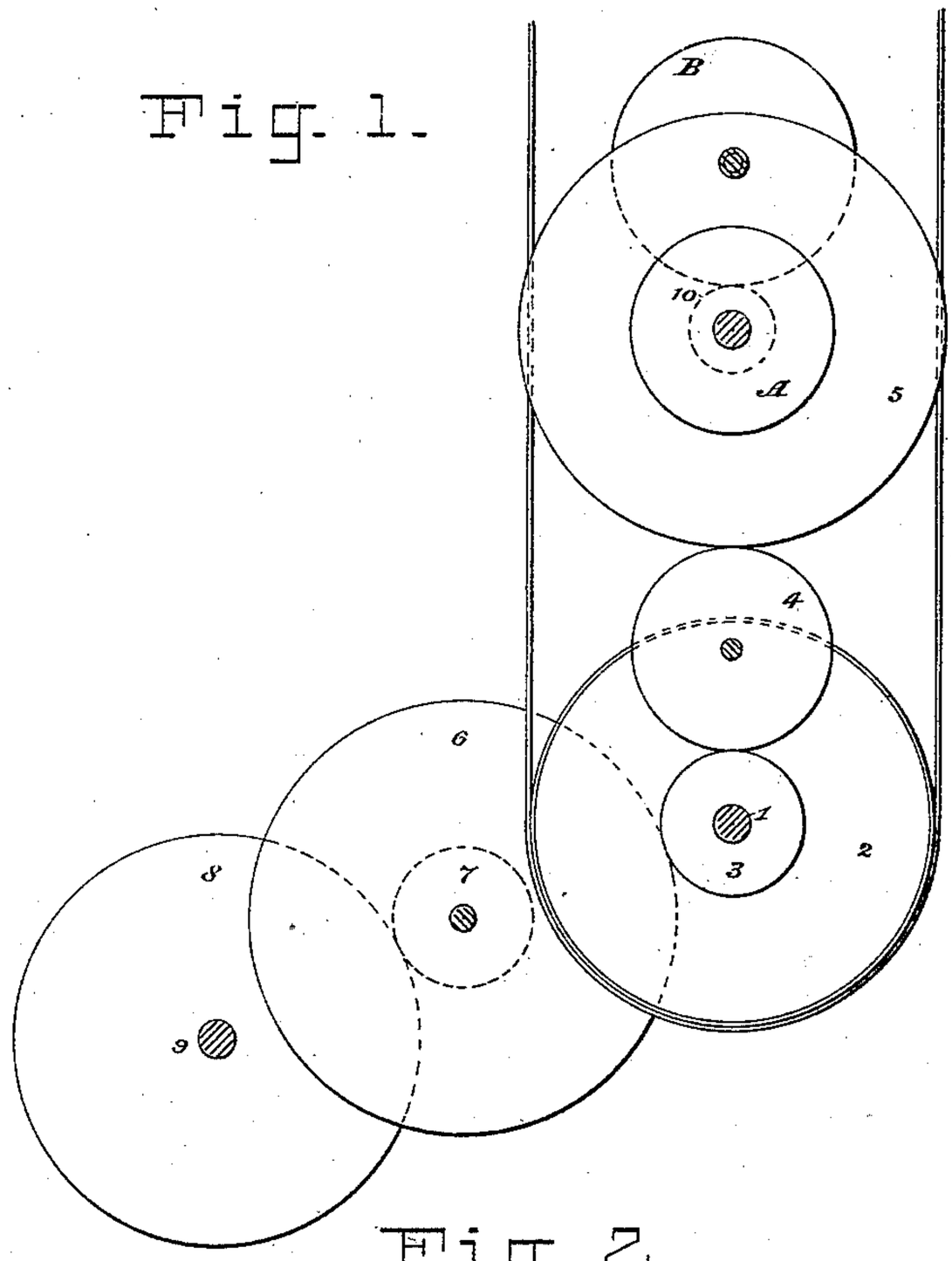
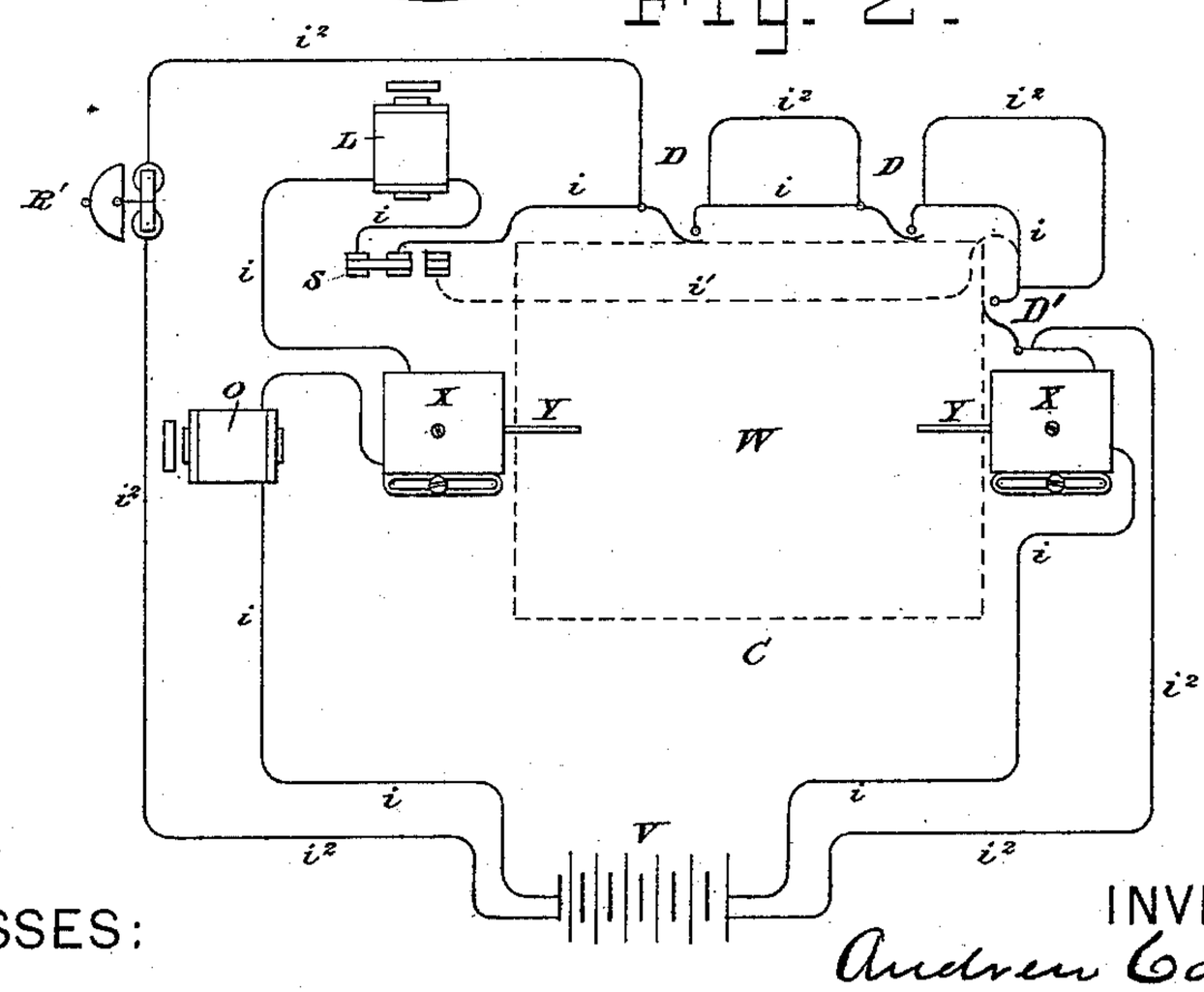


Fig. 2.



WITNESSES:

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N. PETERS. Photo-Lithographer. Washington, D. C.

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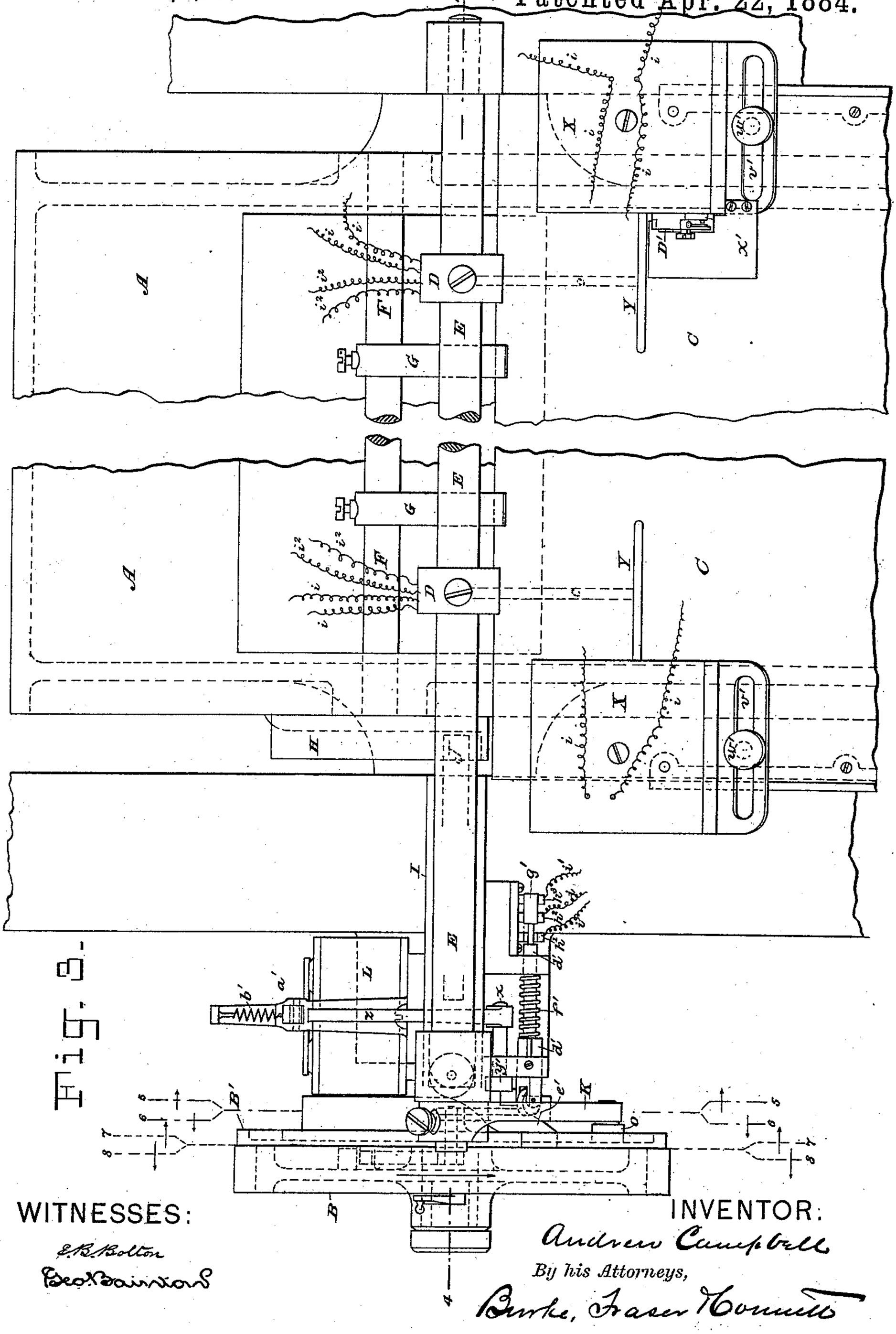

Fig. 5.

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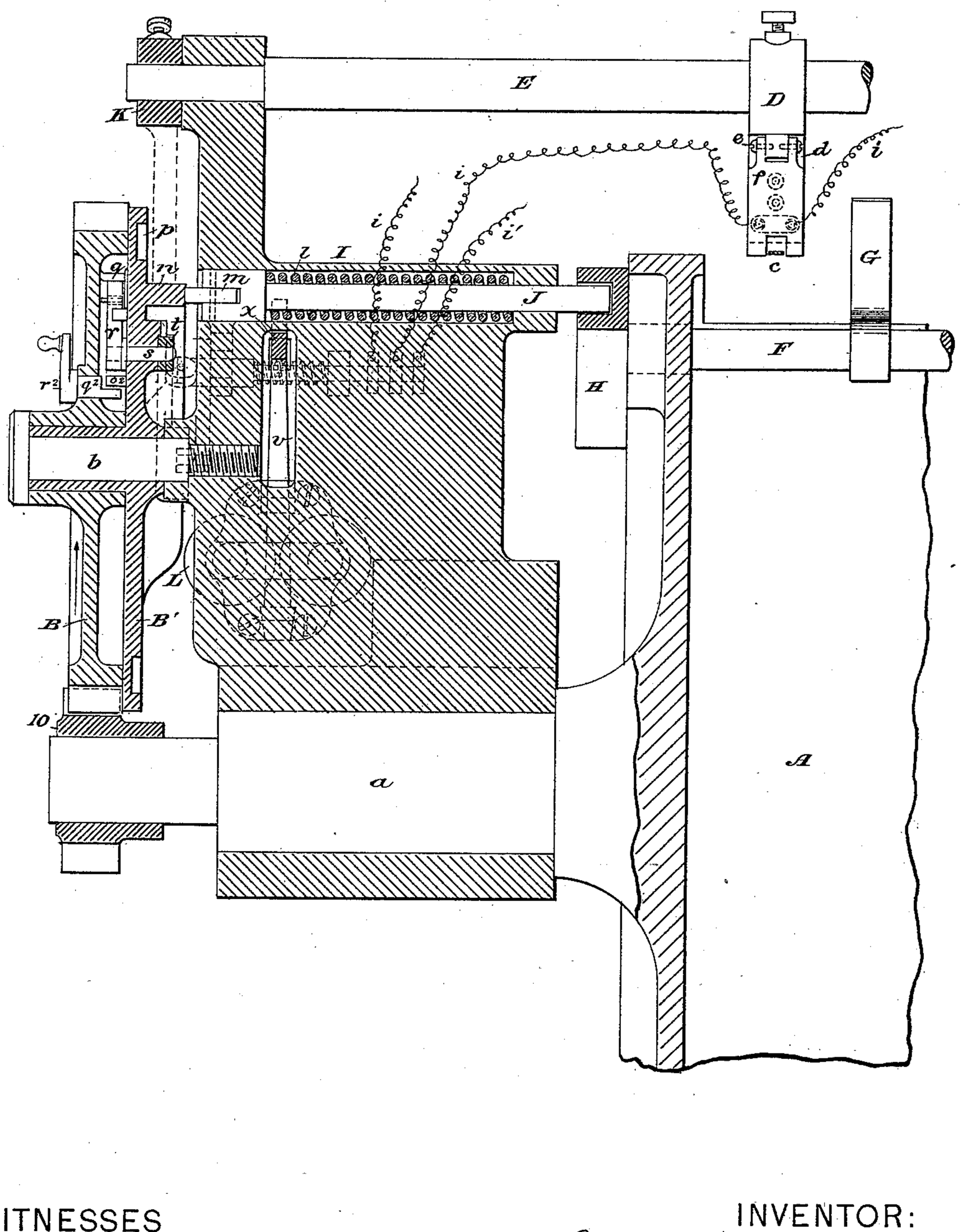
Fig. 4.



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(No Model.)

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A. CAMPBELL.

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No. 297,111. Patented Apr. 22, 1884.

Fig. 5.

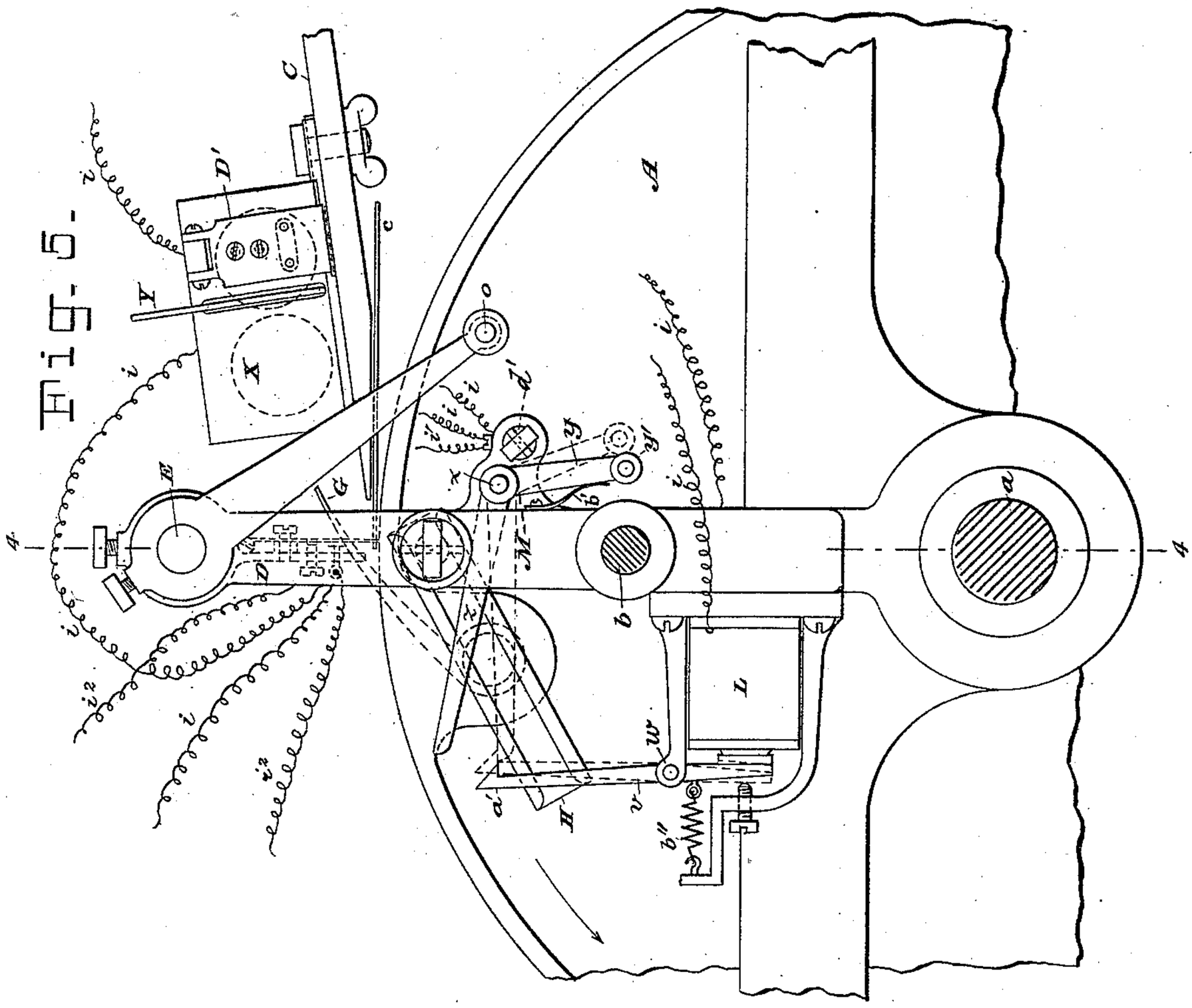
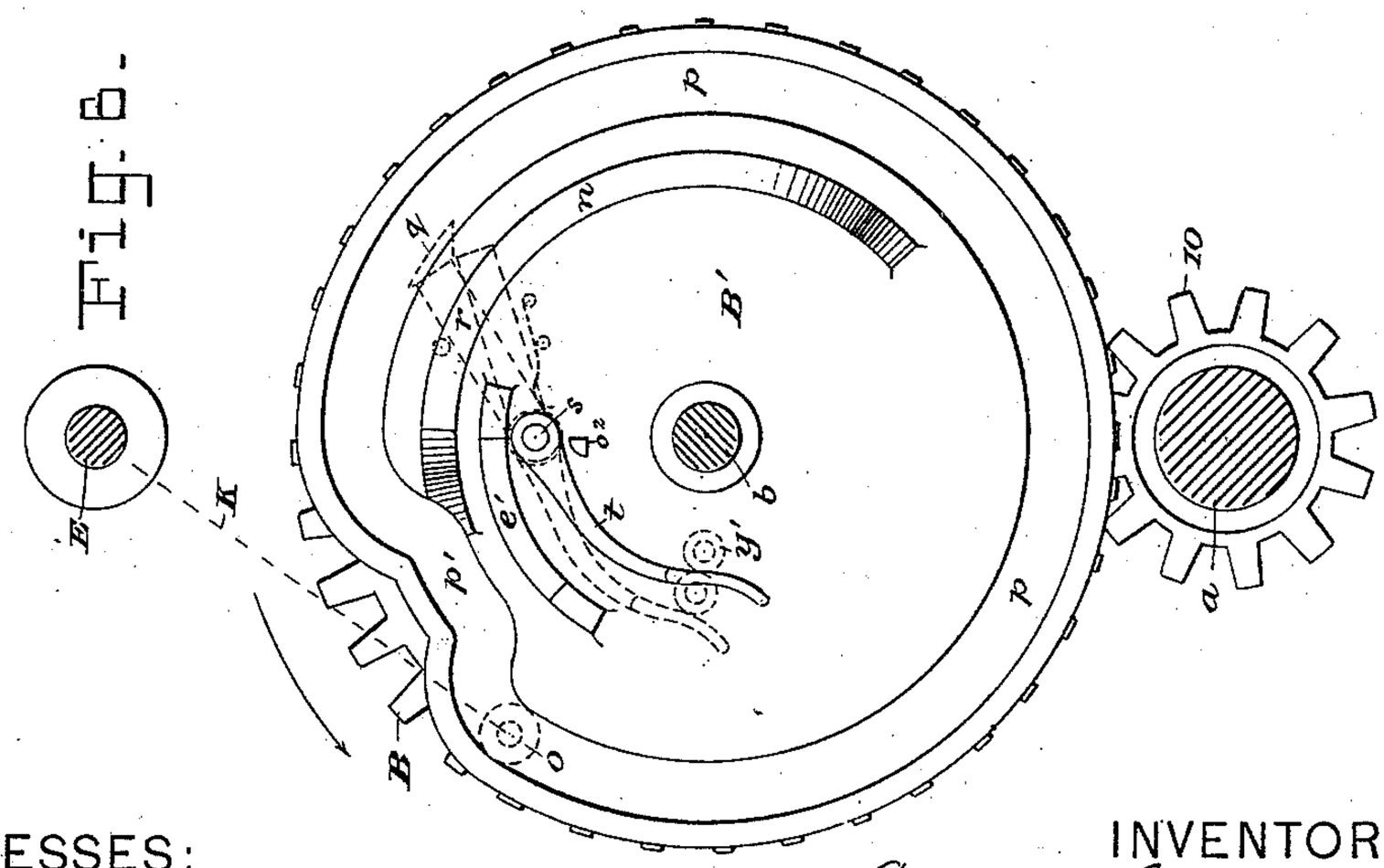


Fig. 6.



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(No Model.)

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Fig. 7.

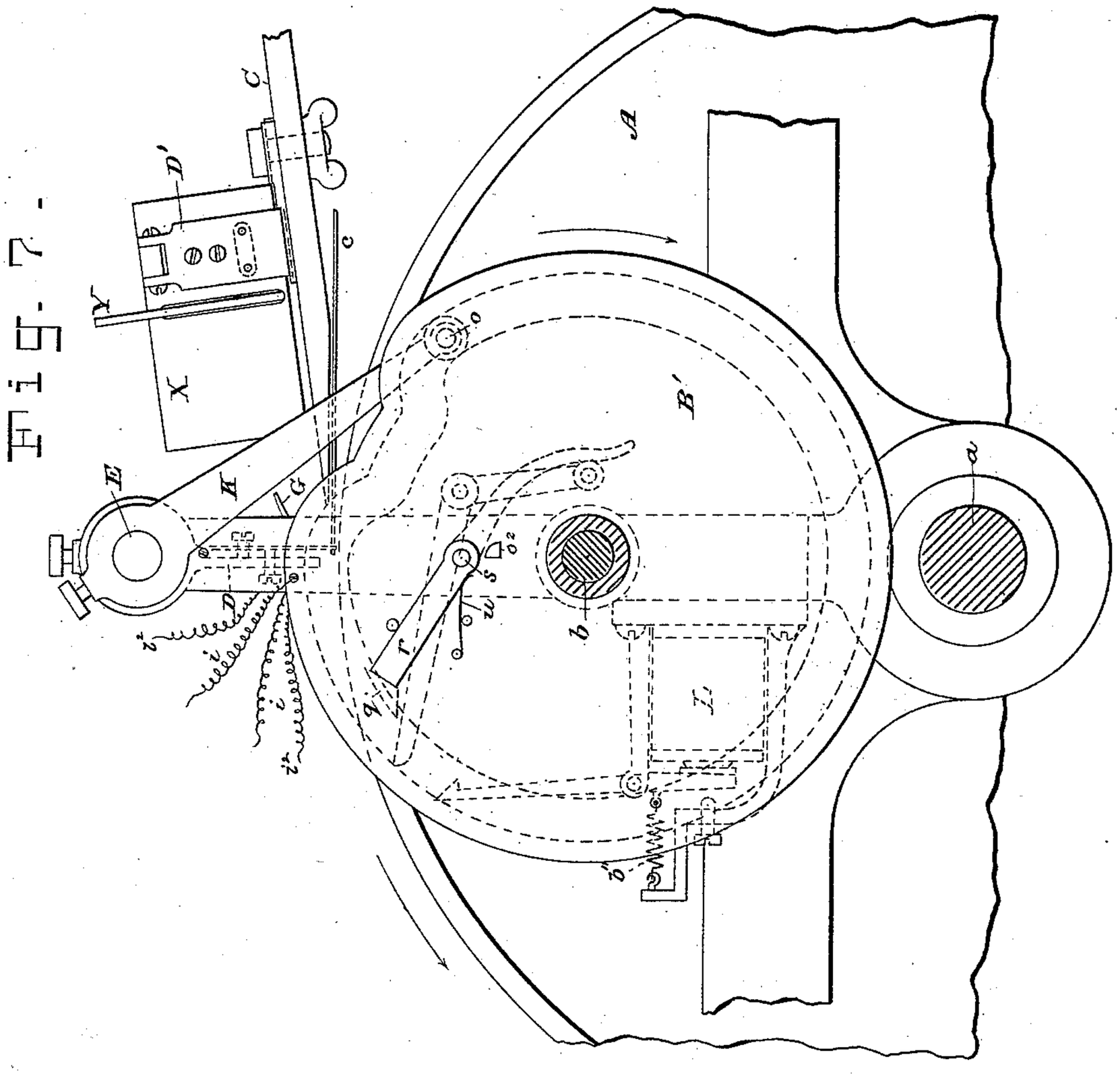
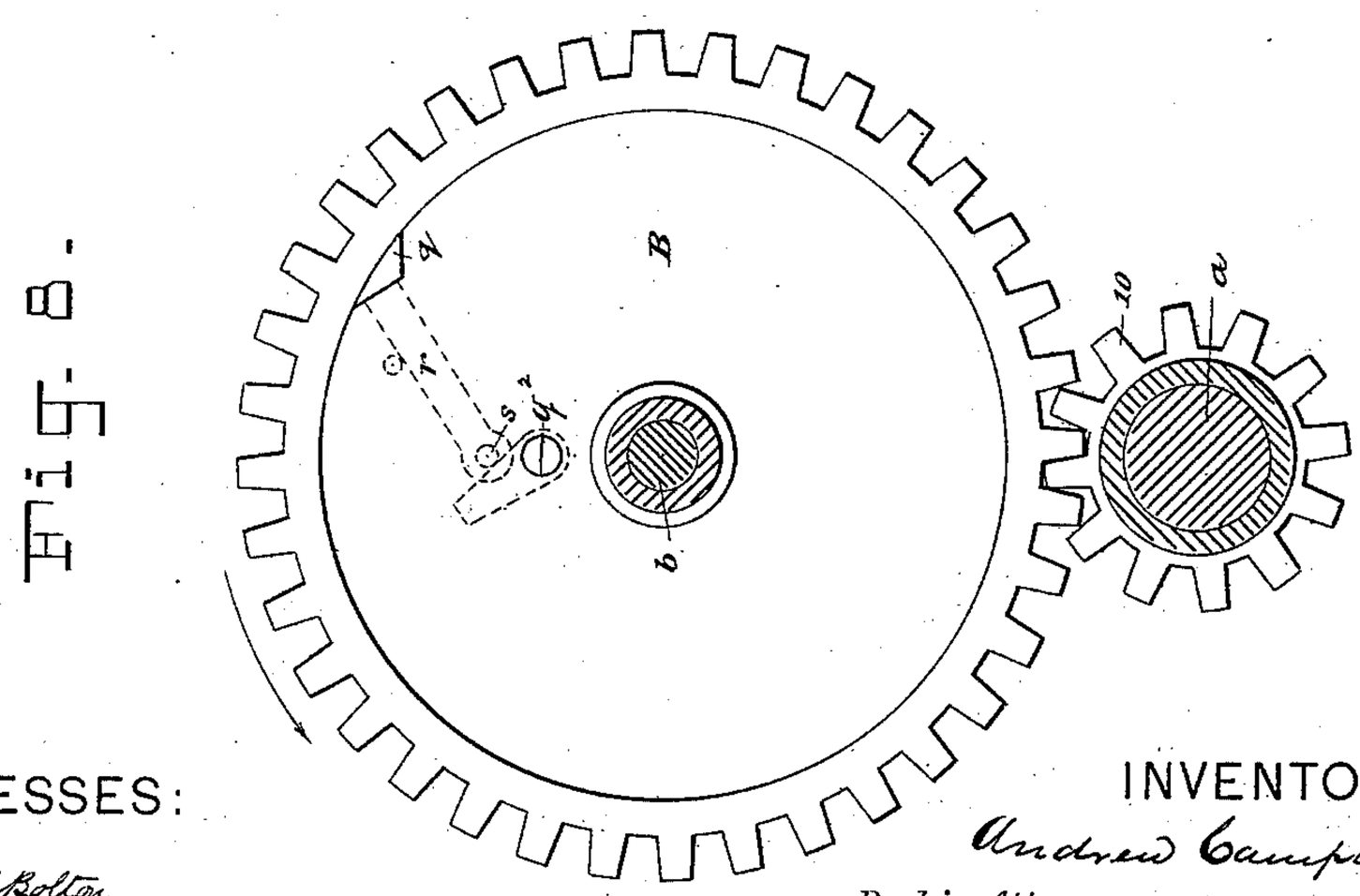


Fig. 8.



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No. 297,111. Patented Apr. 22, 1884.

Fig. 9.

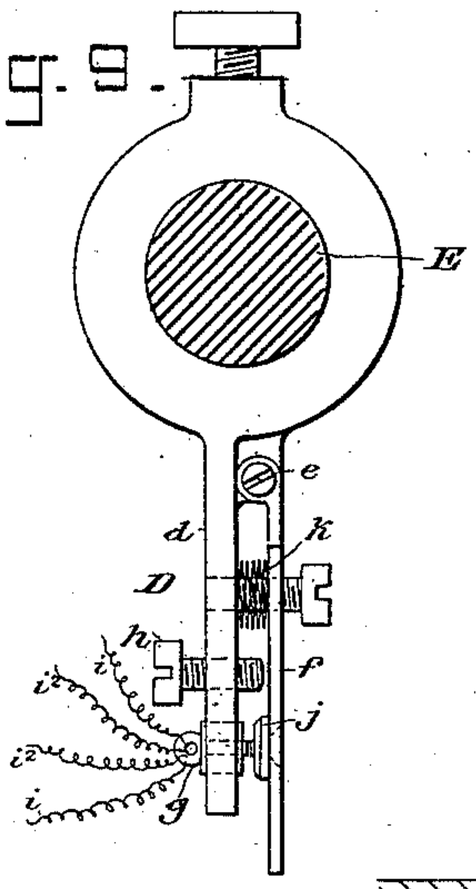


Fig. 10.

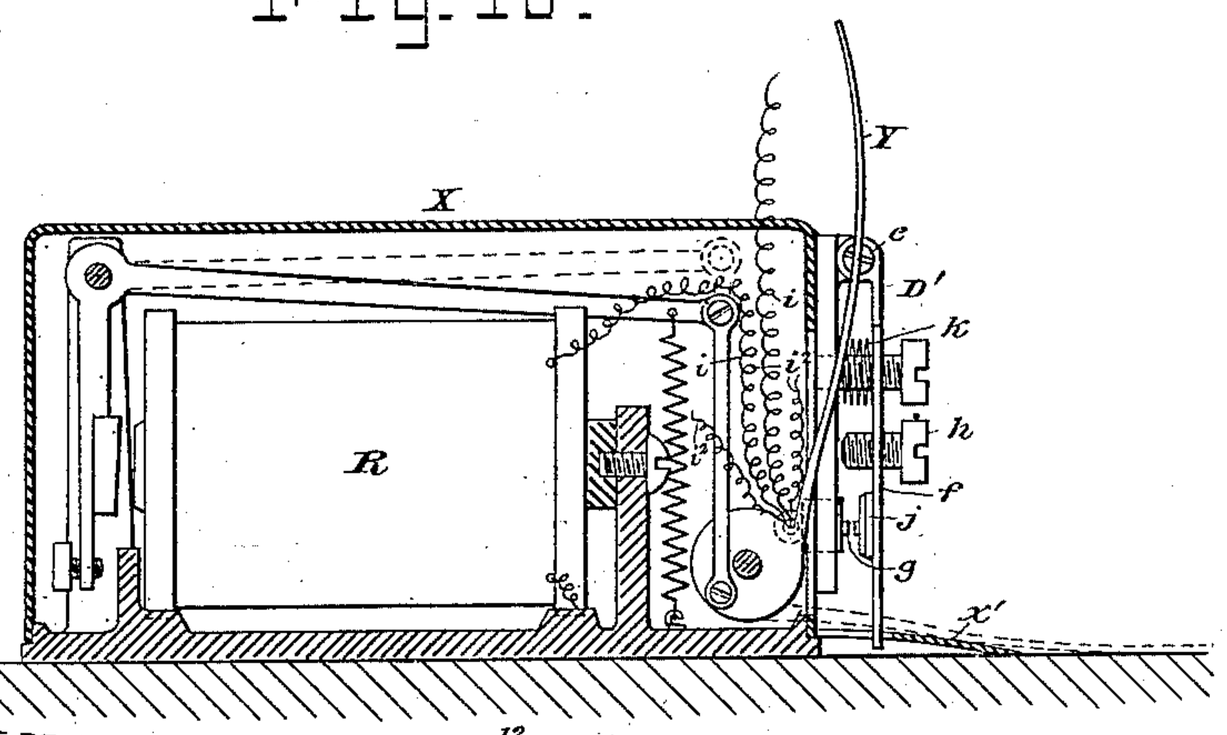


Fig. 11.

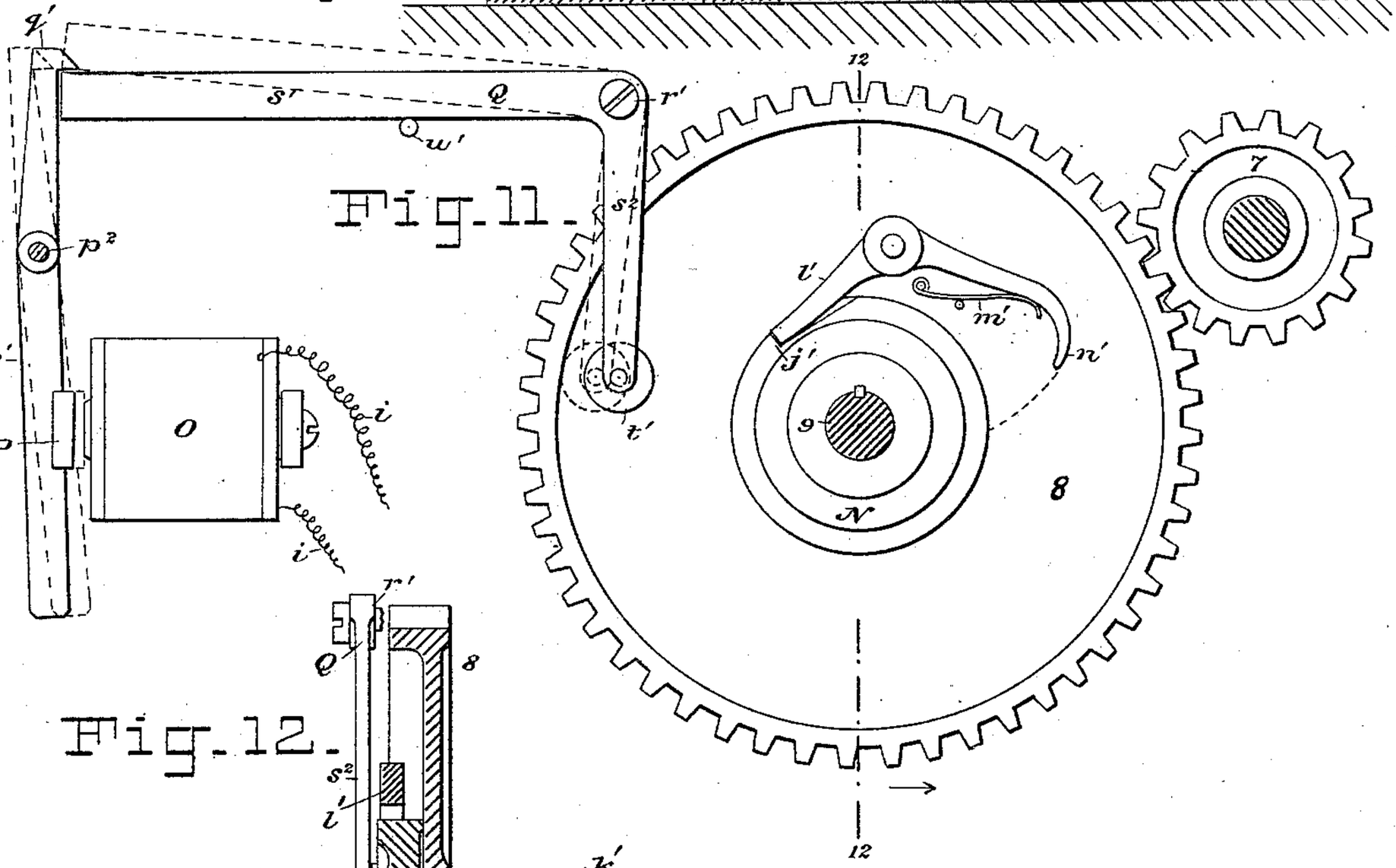
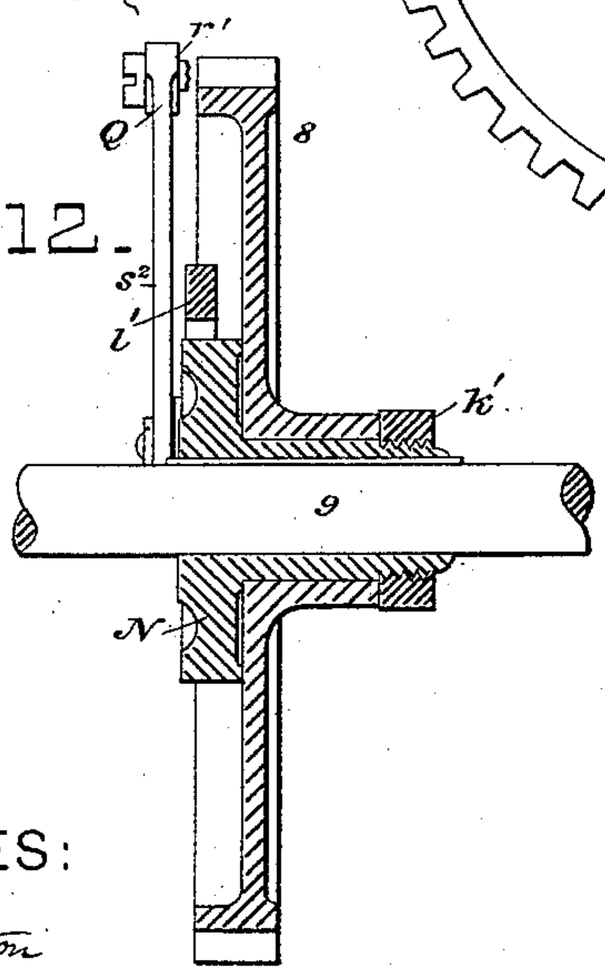


Fig. 12.



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(No Model.)

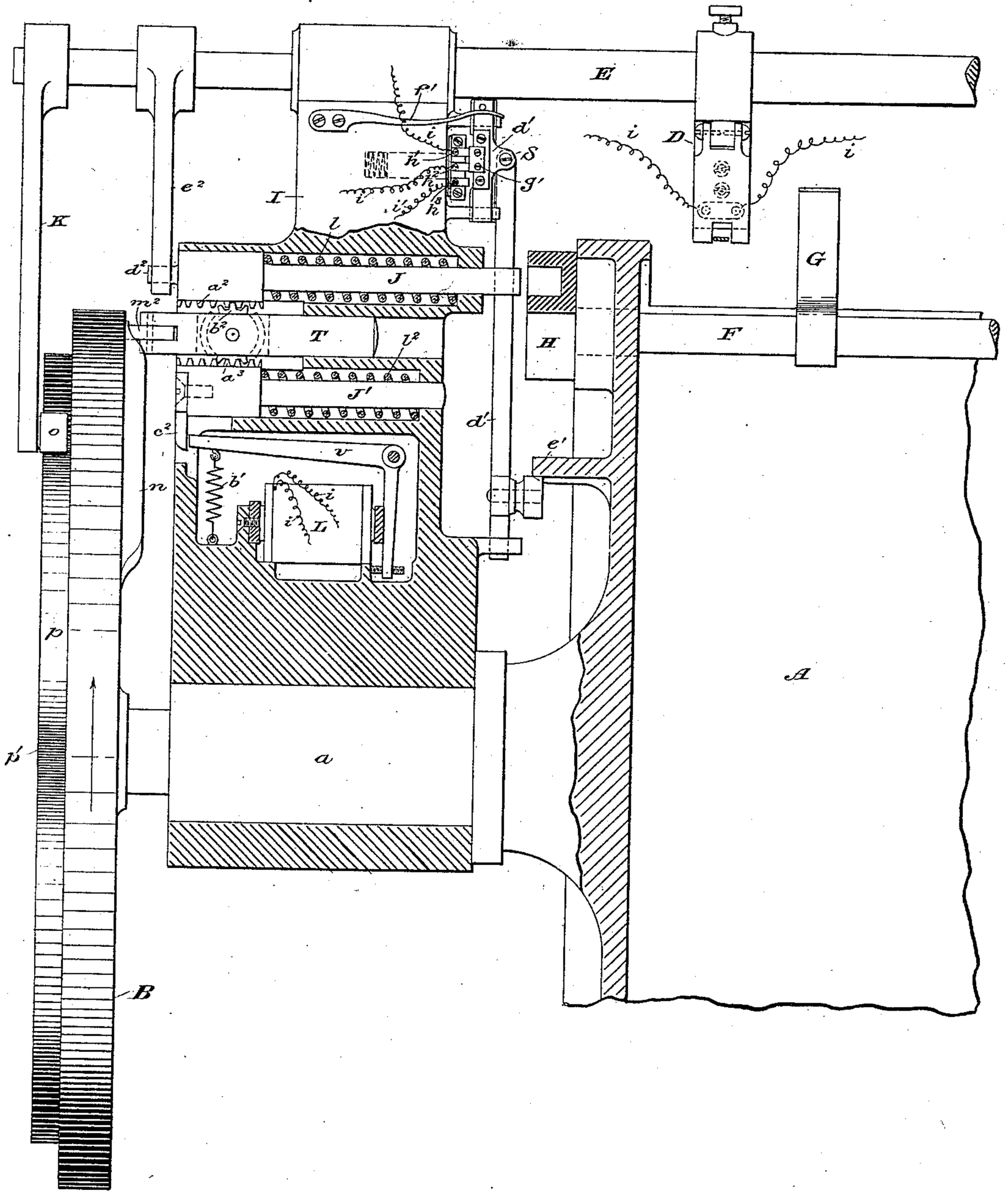
7 Sheets—Sheet 7.

A. CAMPBELL.

PRINTING MACHINE.

No. 297,111. Patented Apr. 22, 1884.

Fig. 18.



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UNITED STATES PATENT OFFICE.

ANDREW CAMPBELL, OF BROOKLYN, ASSIGNOR TO JOHN AND EDMUND McLOUGHLIN, BOTH OF NEW YORK, N. Y.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 297,111, dated April 22, 1884.

Application filed July 27, 1883. (No model.)

To all whom it may concern:

Be it known that I, ANDREW CAMPBELL, a citizen of the United States, residing at Brooklyn, Kings county, New York, have invented certain Improvements in Printing-Machines, of which the following is a specification.

My invention is particularly adapted to cylinder-printing machines or presses; and the purpose is to effect a perfect or nearly perfect register.

The invention relates to means for electrically controlling the movements of the press or machine, whereby the feeding of the sheet up to the front and side guides determines or governs the operation of the several parts—that is to say, if the sheet be not properly fed to the said guides, all the movements of the press except the rotation of the cylinder and the reciprocation of the bed will cease. Thus a sheet cannot be taken into the press except it be first placed in perfect register. The feeding of the sheet up to the front and side guides closes breaks in an electric circuit at these points, if the sheet be correctly fed. This, however, does not complete the circuit. There is a break which is closed mechanically by the movement of the time-wheel of the press. The circuit is now complete, and certain electro-magnets are excited, which act, through the attraction of their armatures, to remove obstacles which would otherwise prevent the proper operation of the front guides, the grippers, the cam-shaft which draws down the cylinder, and through the latter, the ink-fountain. If the sheet be properly fed, another and independent circuit in which is placed a bell or annunciator is instantly completed, which announces to the operator that the sheet is properly placed. If the bell does not sound, the sheet must be readjusted until it does. In the main circuit are placed electrically-actuated fingers, which press upon the sheet and prevent it from being disturbed by the tremor or jar of the press until it is seized by the grippers. The mechanical circuit-closer also serves to switch or shunt the circuit, so as to cut out the front guides an instant before they swing back; otherwise their movement would break the circuit, which should be maintained intact at this moment.

In the drawings which serve to illustrate my invention, I have shown the same in the principal figures as applied to an ordinary cylinder-printing press or machine wherein the cylinder makes three revolutions to one impression; and as such presses are well understood I have not deemed it necessary to show all of the mechanism; but as the mechanism for drawing down the cylinder of the press is widely separated from the front guides and gripper-actuating mechanism, I have deemed it best to give an illustrative diagram showing the train of gears connecting the parts, and also an illustrative diagram showing the circuits and the breaks therein.

Figure 1 is the diagram above referred to, showing the train of gears, &c.; and Fig. 2 is the diagram showing the arrangement of the circuits, the breaks therein, the electric generators, and the electro-magnets. Fig. 3 is a plan of a part of the press or machine, showing the cylinder, the feed-board, and the mechanism for actuating the grippers and front guides. Fig. 4 is a vertical section taken along the axis of the cylinder on line 4 4 in Figs. 3 and 5. Fig. 5 is a section, substantially on line 5 5 in Fig. 3, and looking toward the cylinders; and Fig. 6 is a view in the same plane, but looking in the opposite direction. Fig. 7 is a section taken substantially on line 7 7 in Fig. 3, and looking toward the cylinder. Fig. 8 shows the inner face of the time-wheel. Fig. 9 is an edge view of the front guide, drawn to a large scale. Fig. 10 is a sectional view showing the mechanism for operating the detent or finger, and also an edge view of the side guide. Figs. 11 and 12 are detached views illustrating the mechanism for controlling the rotation of the cam-shaft. Fig. 13 illustrates a modification adapted to a press wherein the cylinder makes one revolution to each impression.

Referring first to Fig. 1, A is the printing-cylinder. 1 is the main driving-shaft; 2, the driving-pulleys; 3, a wheel with thirty-four teeth; 4, an intermediate wheel of any size; and 5, a spur-wheel with one hundred and two teeth on the cylinder-axis. 6 is a spur-wheel with one hundred and two teeth, and 7 is a pinion with thirty-three teeth, on the same shaft

with wheel 6. 8 is a spur-wheel with ninety-nine teeth on the cam-shaft or time-shaft 9. This wheel 8 meshes with pinion 7, and on shaft 9 is the usual cam which draws down the cylinder, so that it may make the impression. From this shaft is also driven the mechanism controlling the ink-supplying mechanism and the sheet-delivery mechanism. These mechanisms are well known and will require no further reference here. I give the number of teeth in the gear-wheels simply to show their relative proportions. Of course the number of teeth is not important so long as their proper proportions are maintained. The cam-shaft 9, which is commonly called the "time-shaft," makes one revolution to each impression and to three revolutions of the cylinder. On the cylinder-axis is fixed a pinion, 10, which meshes with a wheel, B, which I will call a "time-wheel," and which makes one revolution to three of the cylinder. With this brief explanation of the ordinary arrangement of the gearing of the press I will now proceed to describe my improvements.

Referring particularly to Figs. 3 to 10, A is the press-cylinder; *a*, its axis mounted in the usual way in the frame of the press. 10 is a pinion on the cylinder-axis, and B is the time-wheel mounted rotatively on a stud, *b*, in the main frame. These have been before referred to with reference to Fig. 1.

C is the feed-board, *c* the bottom-guides, and D D two or more front guides set on a rock-shaft, E, mounted in bearings on the press-frame. At one side of the feed-board is mounted a side guide, D′, which is or may be constructed the same as the front guides. Therefore a description of the details of one of these will serve for all. These front and side guides are so constructed that the pressure of the sheet of paper against them in feeding makes certain contacts which close breaks in an electric circuit.

Referring particularly to Figs. 4 and 9, *d* is a back plate fixed to the shaft E, and to this is hinged at *e* a front plate, *f*. *g g* are two insulated metallic points in *d*, put into the main electric circuit by the wires *i i*, forming the same. On the back of the plate *f* is a metallic plate, *j*, which, when the plate *f* is pressed back by the sheet of paper being fed, is made to contact simultaneously with the points *g g*. *k* is a light spring which holds the plate *j* normally out of contact with the points *g g*, and thus makes a break in the circuit at this point. *h* is an adjusting-screw. The plate *f* might be made of metal and the plate *j* be omitted; but I prefer to employ a plate, *j*, and to insulate it from *f*. The points *g g* may be tipped with iridium or not, as desired.

The side guide, D′, as before stated, may be constructed like the front guide just described. Its points *g g* are also in the main circuit formed by wires *i i*. This guide D′ is, by preference, and for convenience, mounted on the case which contains the electrically-actuated finger, which is also in the main circuit. This will be referred to more particularly hereinafter.

I will now describe the means employed whereby a magnet in the main electric circuit is made to control the swinging movements of the front guides and the mechanism which actuates the grippers.

I have said that the time-wheel B is mounted on the stud *b*, and it may be so mounted; but in practice I prefer to mount it as I will now describe. On the stud *b* is mounted a disk, B′, with a long boss, and on this boss is loosely mounted the wheel B. (See Fig. 4.) As the wheel B is driven from the cylinder through pinion 10, said wheel will rotate as long as the cylinder rotates; and if the disk B′ be connected to it both will, of course, turn together. I provide B′ with cams for actuating the front guides, for actuating the grippers, and for mechanically closing a break in the main electric circuit; and I also provide means whereby the electric circuit controls the connections of wheel B to disk B′. Now, if B and B′ be not connected, B′ will stand still, and consequently the mechanism before referred to will not be operated.

F is the gripper-shaft mounted rotatively in the cylinder. G G are the grippers mounted on shaft F; and H is the cross-grooved cam on the end of the shaft F, which is engaged by the closing pin or stud to close the grippers on the sheet. These parts may be arranged in the usual way.

I represents a tubular socket in a provision on the main frame, in which socket is mounted the closing-stud J. This stud is provided with a retracting-spring, *l*, which tends normally to withdraw the stud, so that its operative end will not engage the groove in H, but by pressure on the outer end of the stud the spring *l* is compressed and the stud protruded, as in Fig. 4. In the outer end of stud J is mounted a friction-roller, *m*, and on the inner face of disk B′ is a cam, *n*, (see Fig. 6,) which, when said disk rotates, acts on roller *m* to protrude the stud at the proper time, and to keep it protruded long enough to close the grippers.

On the shaft E is secured an arm, K, (see Fig. 7,) which bears a cam-roller, *o*, arranged to engage a cam-groove, *p*, in the face of disk B′. When this roller engages the depressed or operative part *p′* of the cam-groove, the front guides, D, are caused to swing back so as to free the sheet and permit the grippers to seize it.

The means I employ for compelling disk B′ to move with wheel B, and for controlling this device or means electrically, so as to release disk B′ from B, I will now describe.

On the inner face of wheel B (see Fig. 8) is a projecting lug, *q*, and mounted on the outer face of disk B′ (adjacent to B) is a dog, *r*, which stands, normally, with its free end in the path of lug *q*, so that when B rotates, said lug will engage the dog, and thus drive B′. On the

shaft *s*, which bears the dog *r*, and which rotates in a bearing in the web of disk B′, is secured an arm, *t*, (best seen in Fig. 6,) with a curved tail. This arm is on the inner side of disk B′, the shaft *s* extending through said disk. A spring, *u*, Fig. 7, keeps the dog *r* normally uplifted.

L is an electro-magnet arranged in the main circuit, and *v* is its armature-lever, pivoted at *w*.

M is a bent or elbow lever, mounted on a fulcrum-screw, *x*, in the main frame, and provided with an arm, *y*, which bears a roller, *y′*, and an arm, *z*. The roller *y′* projects into the path of the curved tail on arm *t*, and the free end of arm *z* swings into the path of a hook, *a′*, on the end of armature-lever *v*. A light spring, *b′*, holds the arm *z* of lever M depressed to the position indicated in dotted lines in Fig. 5 normally; and the retracting-spring *b″* holds the armature-lever *v* in such a position that its hook takes over or stands over the end of arm *z*, as indicated in the dotted lines.

Now, if the electro-magnet L be not excited by the closure of the circuit, as it will fail to be if the sheet be not properly fed to the front and side guides, when the rotation of the disk B′ carries the arm *t* around far enough the curved tail of same will wipe over roller *y′* on lever M. This roller cannot yield, however, by reason of the engagement of hook *a′* with arm *z;* consequently arm *t* will be lifted, and this will free dog *r* from the lug *q* on the wheel B, and the latter wheel will continue to rotate, while disk B′ will stop. As this disk bears the cams which operate the front guide and grippers, these of course will not be operated. Suppose, however, that the sheet be properly placed and the circuit properly completed, then the electro-magnet L will be excited and will attract its armature. The hook *a′* on the armature-lever will be drawn back so as to clear arm *z*, and when the tail of arm *t* wipes over roller *y′*, the latter will be free to yield, and the dog *r* will remain in contact with lug *q*. B and B′ will then continue to rotate together, and the operations of the press will go on properly.

In order to avoid a spark at the front and side guides contacts, and also in order to switch out the front guides from the circuit a moment before they fall back, I employ a mechanical circuit-breaking and switching device, which I will now describe with especial reference to Fig. 3.

In the machine-frame, (see Fig. 3,) at some suitable point, is mounted a slide, *d′*, carrying a roller at its end to bear on a cam, *e′*, on the disk B′. This I will call a "switch-cam." This cam moves the slide in one direction, and a spring, *f′*, moves it back. On the end of the slide is a metal contact-piece, *g′*, which plays through apertures in three conductors, h' h^2 h^3, to which are attached the main wires of the circuit and the switch or shunt wire *i′*. The latter connects with the conductor h^3 at one end, and, passing the front guides, connects with wire *i*, between them and the electric generator. The ends of cam *e′* are inclined, and when the forward end of said cam engages the end of slide *d′* the contact-piece *g′* is moved along or in far enough to first close a break in the main circuit by connecting *h′* and h^2, and then by the continued movement of the cam h^2 and h^3 are connected, thus cutting out the front guides, so that they may move back without breaking the circuit. The contact with h^3 is made an instant before the contact with *h′* is broken, in order to prevent any break in the circuit while switching.

It may be necessary to explain here that the dog *r* on wheel B′ stands normally in the path of the lug *q* on wheel B, and the latter wheel will drive the former until the point is reached where the dog is tripped, whether the breaks in the circuit at the guides be closed or not. Before this tripping-point is reached cam *e′* will have closed the break in the circuit at S, so that if the sheet has been properly placed to the guides the magnet L may be excited.

I will now describe the means for controlling the movements of the cam-shaft 9 with especial reference to Figs. 11 and 12, premising that the means here employed for connecting and disconnecting the cam-shaft from the driver is substantially the same as that employed for disconnecting the time-wheel B from the disk B′. Indeed, they may be identical.

Mounted fixedly on the cam-shaft is a disk, N, which has a single notch, *j′*, in its periphery, and mounted rotatively on the cam-shaft 9 is the wheel 8, driven from pinion 7. I prefer to mount wheel 8 on the prolonged boss of disk N, as shown in Fig. 12, and to keep it up to the latter by a nut or set-collar, *k′;* but this is not essential. The wheel 8 bears a pawl, *l′*, arranged to engage the notch *j′* and to be held in engagement therewith normally by a spring, *m′*. This pawl has a bent or curved tail, *n′*, the purpose of which will be set forth.

O is an electro-magnet in the main circuit with magnet L, and capable of being excited simultaneously therewith. This magnet has a gravity-armature, P, the lever *o′* of which is fulcrumed at p^2, and provided at its upper end with a hook, *q′*.

Q is an elbow-lever, pivoted or fulcrumed at *r′*, and provided with two arms, *s′* s^2. The pendent arm s^2 is provided with, or may be provided with, a friction-roller, *t′*, at its free end, arranged in the path of the tail *n′* on the pawl *l′*, and the arm *s′* rests normally on a pin, *u′*, with its end under the hook *q′* on the armature-lever. If the circuit be not closed when the tail *n′* of the pawl comes to engage roller *t′*, the hook *q′* will prevent the said roller from yielding, and the pressure of same on the tail of the pawl will lift the latter free from notch *j′*. The cam-shaft 9 will then cease to revolve, and all the mechanism it drives will of course cease to operate; but if the circuit be com-

pleted the magnet O will attract its armature P, the hook q' will be withdrawn, so as to free the end of lever or arm s', and when the tail of the pawl contacts with roller t' the latter will be brushed aside and the pawl will remain in engagement with notch j'.

In Figs. 11 and 12 I have omitted all extraneous parts; but it must be understood that all of the parts shown are properly mounted on the main frame of the press.

The device just described may also be employed in what are termed "drum-cylinder" presses, wherein the cylinder makes but one revolution to each impression. In this case the cylinder does not rise to permit the form to pass in return, but one portion of the cylinder is less in diameter than that portion which makes the impression. Therefore, to secure the same result, as above described, I mount the main cylinder loosely on the cylinder-shaft, and employ a mechanism similar to that last described for making it fast or loose on its shaft, whereby I am enabled to stop the rotation of the cylinder itself, and consequently all of the mechanism driven from it. This stoppage should be effected just before the closing of the grippers and after the printing or impression surface has passed the form. In this case no devices are needed to control the grippers and front guides other than those in common use, because the cylinder is itself the medium which controls and operates them; and indeed it controls all of the functions of the press except the movement of the bed. Therefore, if the cylinder is stopped from rotating, as before stated, all the movements of the press must cease except those of the bed. I thus obtain in a press of this character the same general results as those hereinbefore described for a press of a different kind.

Referring now to Figs. 3 and 10, X shows the cases containing the magnets R, which actuate the stop fingers Y. As these fingers are embodied in a pending application, it will not be necessary for me to describe them fully here. I will say, however, that the magnets R are in the main circuit with the other magnets L and O. In order to adjust the side guide and the fingers out and in on the feed-board, I provide the flange on base of the case X with a slot, v', and employ an attaching-screw, w', as shown in Fig. 3. In order to prevent the sheet from being slipped under the free lower end of plate f of guide D′ when the sheet is fed, I attach to the base of case X, or it may be fastened to any part to which f is hinged, a thin plate, x', (see Fig. 10,) slotted to let the end of f pass through and play freely. This plate is bent down at its outer free edge, so as to rest and press elastically on the feed-board C. The edge of the plate x' may be ground thin, so as to oppose no obstacle to the sheet when fed, and the fact that the pendent end of f extends below the plate will prevent the sheet getting under it.

Before explaining the operation of my device as a whole, I will call attention to Fig. 2, wherein are shown the generator and the circuits. In this view V represents the electric generator, which may be a battery or dynamo, i i, the wires forming the main circuit; D D, the front guides; D′, the side guide; L and O, electro-magnets in the main circuit; i', the switch wire which cuts out the front guides; W, the sheet of paper on the feed-board C; X X, the cases containing the magnets R R, which actuate the fingers Y Y; i^2 i^2, the wires which form the alarm-circuit, which is independent of the main circuit, and broken only at the front and side guides; and R′ is an ordinary electric bell arranged in this circuit. I have in this view designated the mechanical circuit-closing and switch device in the main circuit by the letter S, arbitrarily. The alarm-circuit i^2 i^2 may connect with generator V, or with a separate generator, as desired. For simplicity, I have shown it connected with V. This illustrative view shows all the parts clearly, and from it the arrangement will be readily understood.

I will now describe the operation.

The pressman feeds a sheet, W, up to the front and side guides, D D D′. If properly placed, the breaks in both electric circuits will be closed at these points, and as this completes the alarm-circuit i^2 i^2, the bell R′ will sound, and the pressman will know that the sheet is properly placed. The cam e' now advances and closes the break in the main circuit (at S in Fig. 2,) which completes this circuit and excites magnets L, O, and R. The functions performed by magnets L and O have been before described. The magnets R throw down the fingers Y on the sheet and steady it in its position. The grippers G close down on the sheet; but before they grasp it the contact-piece g' moves over far enough to switch the front guides out of the main circuit, and they move back. When, by the continued movement of cam e, the contact-piece g' is drawn back far enough to break the circuit, the fingers Y rise to their upright positions. The bell R continues to ring until the front guides are switched out, at which time the alarm-circuit i^2 i^2 is, of course, broken.

It is possible to vary the construction of the mechanism I employ almost indefinitely, and therefore I do not wish to limit myself to the precise construction shown. In Fig. 13 I have illustrated a modification adapted to a press wherein there is an impression at each revolution of the cylinder. In this construction my invention is modified only so far as relates to the control of the mechanism for actuating the front guides and the grippers.

The time-wheel B is mounted directly on the cylinder-axis a, and bears on its outer face the cam p p', for actuating the front guides, and on its inner face the cam n, which protrudes the closing-stud J. The latter stud is mounted in a manner similar to that shown in Fig. 4, but has a cog-rack, a^2, on the un-

der side of its head. J′ is a similar stud, mounted similar to J, except that its retracting-spring l^2 is weaker than spring l, and its rack a^3 is on the upper side of its head. T is a slide arranged in a socket between studs J and J′, and provided with a cog-wheel, b^2, that meshes with the racks on said studs. This slide is also provided with a roller, m^2, which bears on cam n. Now, if stud J′ be free to move when cam n strikes roller m^2, slide T will be driven in a distance equal to the throw of the cam, and stud J′ will be driven in twice as far, through the medium of the cog-wheel b^2, because the spring l^2 is weaker than l, and stud J will remain stationary; but if J′ be stopped from moving, then the action will be reversed, and the closing-stud J will be protruded far enough to act upon and close the grippers.

In order that the proper feeding of the sheet to the front and side guides shall control the movements of the grippers, I provide an electro-magnet, L, provided with an armature-lever, v, which, when the magnet is excited by the completion of the circuit, is raised until its end stands in front of a projection, c^2, on the stud J′. This will prevent J′ from being moved as long as magnet L is excited. In order to control the movement of the front guides, I provide the stud J with a pin or prolongation, d^2, which, when the said stud is not protruded, projects into the path of an arm, e^2, on the shaft E. Now, if the sheet be not properly placed and the stud J not protruded, when the roller o on arm K falls into recess p' of cam p, the arm e^2 will catch on the pin d^2 and prevent the front guides from receding.

The mechanical device (lettered S as a whole) for closing and switching the circuit is in substance the same as that before described, and will require no further description, as the letters of reference are the same.

It is in some cases desirable, particularly in "making ready," to render all the controlling mechanism herein described inoperative. This I accomplish by means of a simple device I will now describe with reference to Figs. 4, 7, and 8.

On the exterior face of the disk B′—that is, the face adjacent to wheel B—is a stud, o^2, with a flat face. I have shown it as quadrant-shaped in cross-section; and mounted rotatively in the web of wheel B is a shaft or rotating arbor, q^2, which is cut away or halved at its inner end, while on its outer end it bears, or may bear, a crank, r^2, for rotating it. When the arbor q^2 is turned, as in Fig. 4, it will not, in the rotation of wheel B, touch the stud o^2; but if it be turned a quarter of the way round on its axis, its projecting inner end will be in the path of o^2, and it will engage with the latter, and thus compel the wheel and disk to rotate together. This device, then, is only a means for temporarily securing B and B′ together regardless of the controlling mechanism described; and any suitable mechanism may be employed for the purpose—as, for example, a pin passed through holes in the webs of the said wheel and disk. The disk N and wheel 8 may be provided with a similar device to compel these parts to rotate together, even when pawl l' is disengaged from notch j'.

Having thus described my invention, I claim—

1. In a printing machine or press, means, substantially as described, whereby the proper placing of the sheet up to the front guides closes breaks in an electric circuit, which excites an electro-magnet, which controls the mechanism that closes the grippers, substantially as set forth.

2. In a printing machine or press, a front guide constructed in the form of a circuit closer and breaker, and arranged in an electric circuit, substantially as described, whereby the proper placing of the sheet closes the circuit thereat, for the purposes specified.

3. In a printing machine or press, the combination of mechanism, substantially as described, for actuating the grippers, means, substantially as described, for electrically controlling the operation of said mechanism for actuating the grippers, an electric generator, wires forming the electric circuit, and front guides constructed in the form of circuit closers and breakers, substantially as described, whereby the proper placing of the sheet to the guides closes breaks in the electric circuit, and thus controls the operation of the mechanism for actuating the grippers, all arranged substantially as set forth.

4. In a printing machine or press, the combination of mechanism, substantially as described, for actuating the front guides, means, substantially as described, for electrically controlling the operation of said mechanism for actuating the front guides, an electric generator, wires forming an electric circuit, and front guides constructed in the form of circuit closers and breakers, substantially as described, whereby the proper placing of the sheet to the guides closes breaks in the electric circuit, and thus controls the operation of the front guides, substantially as and for the purposes set forth.

5. In a printing machine or press, the combination of means, substantially as described, for rotating the cam-shaft 9, means, substantially as described, for electrically controlling the operation of said mechanism for rotating the cam-shaft, an electric generator, wires forming the electric circuit, and front guides constructed in the form of circuit closers and breakers, substantially as described, whereby the proper placing of the sheet to the guides closes breaks in the electric circuit, and thus controls the mechanism for operating cam-shaft 9, substantially as and for the purposes set forth.

6. In a printing machine or press wherein the proper placing of the sheets to the front and side guides electrically controls the grip-

per-actuating mechanism, each front and side guide constructed in the form of a circuit closer and breaker, substantially as described, whereby the proper placing of the sheet up to all of the guides is necessary in order to close the breaks in the circuit at the guides, substantially as and for the purposes set forth.

7. In a printing machine or press wherein the proper placing of the sheet to the front guides electrically controls the operation of the press mechanism, and wherein there is a break in the electric circuit at each front guide adapted to be closed by the proper placing of the sheet, the combination of a circuit breaking and closing device, substantially as described, arranged at some point in the circuit, and mechanism, substantially as described, arranged to close said break in the circuit after the breaks at the front guides are closed, and switch or shunt the current before the circuit is broken at said guides by their backward movement, whereby a spark at the front guides is avoided, substantially as set forth.

8. In a printing machine or press wherein the proper placing of the sheet to the front guides electrically controls the mechanism for actuating the front guides, an electrical switch constructed and operated by mechanism, substantially as described, arranged to switch the front guides out of the electric circuit a moment before they withdraw, whereby the breaking of the circuit consequent on their withdrawal will not affect the electrical control of the mechanism, substantially as described.

9. A front or side guide of a printing machine or press, comprising a plate, *d*, provided with contacts *g g*, a plate, *f*, hinged thereto, and provided with a contact, *j*, and a spring, *k*, to keep the contacts separate normally, substantially as set forth.

10. The combination, with the side guide, D′, constructed substantially as shown, of the plate *x*′, provided with a recess to receive the free end of the plate *f* of the guide, substantially as set forth.

11. The mechanism for actuating the grippers, comprising the closing-stud and its spring, the disk B′, provided with the cam *n*, the wheel B, provided with the lug *q*, the shaft *s*, bearing arms *r* and *t*, the lever M, with arms *y* and *z*, the magnet L, its lever *v*, provided with hook *a*′, and its retracting-spring, and the gripper-shaft provided with cam H, all combined and arranged to operate substantially as set forth.

12. The mechanism for actuating the grippers, constructed substantially as described, in combination with the front and side guides, constructed substantially as described, the electric generator, and the circuit-wires *i i*, all constructed and arranged to operate substantially as set forth.

13. The combination of the front guides constructed substantially as described, the generator, the circuit-wires *i i* and *i*′, disk B′, provided with cam *e*′, the slide *d*′, contact-piece *g*′, conductors *h*′ *h*² *h*³, and the spring *f*′, all arranged to operate substantially as set forth.

14. A printing machine or press provided with front and side guides constructed to form circuit-closers and breakers, substantially as described, and with an electric annunciator-circuit containing an electric annunciator and generator, and arranged to be broken and closed at the said guides, substantially as set forth.

15. The combination, in a printing-press, of the front and side guides, constructed substantially as shown, the generator, the electric annunciator and its circuit having breaks at said guides, the main circuit with breaks also at said guides, the switch device S, constructed substantially as described, the switch-wire *i*′, the electro-magnet L and its armature-lever, the disk B′, bearing the operating-cams and levers *r t*, the said levers and cams, the lever M, the electro-magnet O and its armature-lever, the lever Q, the disk N, and the wheel S, provided with a pawl, *j*, all constructed and arranged to operate substantially as set forth.

16. In a printing machine or press, the front and side guides, D D D′, constructed substantially as shown, the electric generator and the wires of the main circuit, a mechanical circuit-closing device, S, and the fingers Y Y, and their operating mechanism, the magnets which actuate said fingers being in the main circuit, whereby, when said circuit is completed, the fingers will be thrown down, substantially as set forth.

17. In a printing machine or press, the combination of the time-wheel B and the disk B′, the latter provided with the cams for actuating the grippers and front guides, with mechanism, substantially as described, controlled by the proper feeding of the sheet to the guides, for compelling the said disk to rotate with the time-wheel, whereby the said disk is compelled to rotate and perform its functions only when the sheet is properly fed, all constructed and arranged to operate substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ANDREW CAMPBELL.

Witnesses:
A. G. LOOMIS,
S. C. BROWNELL.