

(No Model.)

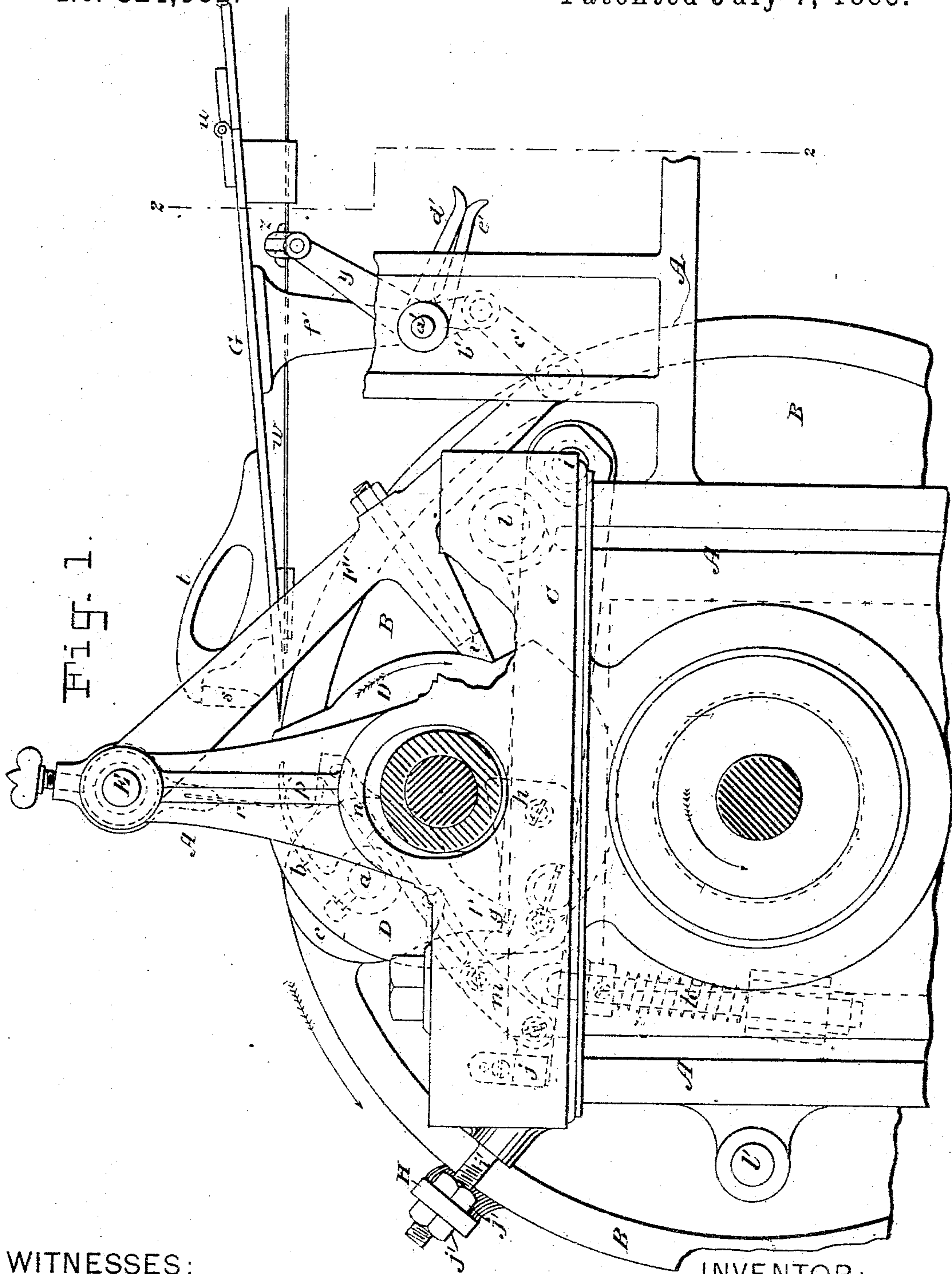
4 Sheets—Sheet 1.

A. CAMPBELL.

GRIPPER MOTION FOR PRINTING MACHINES.

No. 321,682.

Patented July 7, 1885.



WITNESSES:

E. B. Bolton

Geo. Burton?

INVENTOR:

Andrew Campbell

By his Attorneys,

Binks, Fraser Kenneth

(No Model.)

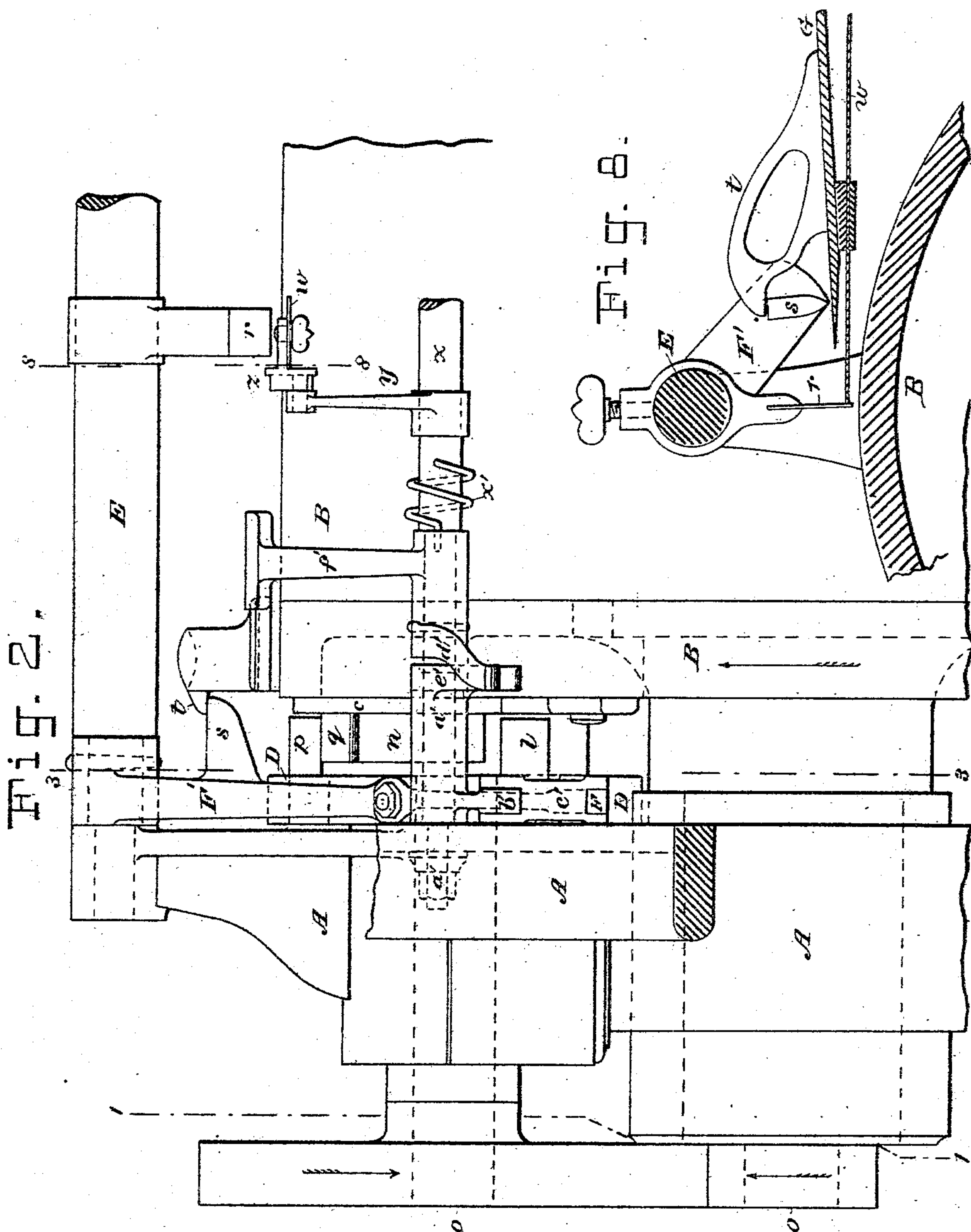
4 Sheets—Sheet 2.

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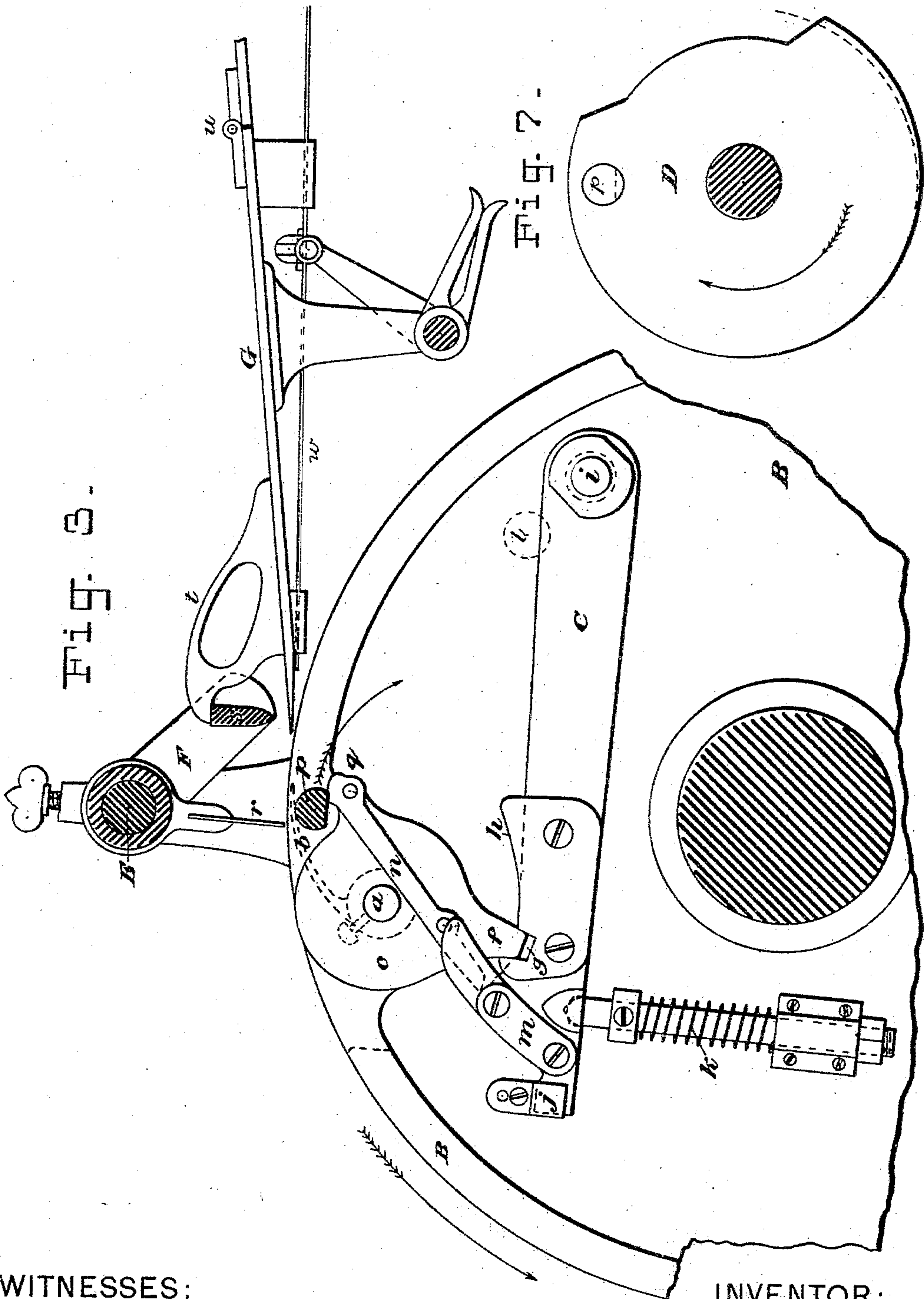
4 Sheets—Sheet 3.

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WITNESSES:

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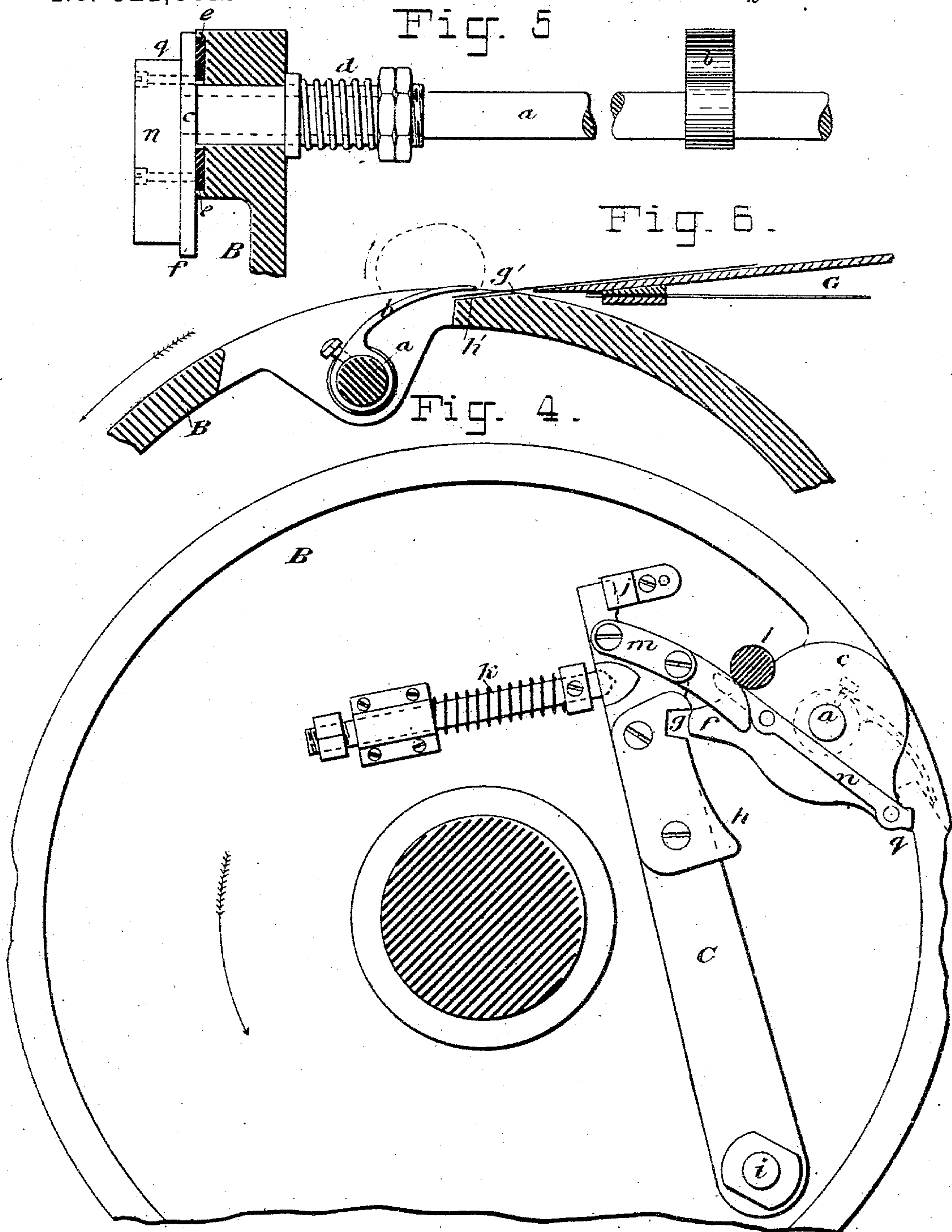
4 Sheets—Sheet 4.

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GRIPPER MOTION FOR PRINTING MACHINES.

No. 321,682.

Patented July 7, 1885.



WITNESSES:

E. B. Bolton

Geo. Dainton

INVENTOR:

Andrew Campbell

By his Attorneys,

Bruce, Thayer & Bennett

UNITED STATES PATENT OFFICE.

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

GRIPPER-MOTION FOR PRINTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 321,682, dated July 7, 1885.

Application filed August 8, 1882. (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 Gripper-Motions for Printing-Machines, of which the following is a specification.

My invention relates to a locking finger-motion, whereby the grippers are firmly locked and held when closed in a predetermined position with respect to the clamping-face on the cylinder, so that they cannot rebound after being once brought into contact with the sheet to be printed, and is an improvement on a finger-motion invented by myself, and now in general use, known as the "Campbell finger-motion." It consists of the ordinary grippers and shaft, the latter bearing a slotted head on its outer end. The grippers are opened and closed by means of fixed studs set within and without the path in which the gripper-shaft moves, and arranged at the proper intervals to close and open the grippers. The grippers are held both open and closed by means of a spring arranged to bring the parts up to a fixed stop at both ends of the opening and closing movement. When set and adjusted with absolute accuracy, this finger-motion will produce a perfect register; but I find that in practical use the adjustment of the grippers to hold the sheet will destroy its efficiency unless accomplished by a skilled workman. The printing-blanket is slightly elastic, and as each gripper is set up tightly to it (by pressing on the gripper with the thumb) the first gripper adjusted will be slightly raised when released by the elastic spring of the blanket. Thus when all the grippers are set it will be found that they are in "wind," or form a spiral, and will not hold the sheet. They must be reset, and in doing this the slotted head on the shaft is apt to be lifted from the registering-stop, so that the grippers press upon the blanket with the whole force of the closing-spring. This packs the blanket down at these points, and practically the grippers close at different points as the printing progresses, thus producing a constantly varying register. This is a defect inherent in all finger-motions where the grippers are held up to the sheet by a spring, either directly or indirectly, and the princi-

pal object of my present invention is to correct said defects by providing an absolute lock for the grippers when closed, and avoiding all reliance upon springs or other elastic mediums for the purpose. I also provide means for presenting the sheets to the grippers with perfect uniformity, and arrange the mechanism for effecting the closing of the grippers to bring the latter down suddenly upon the sheet at the moment of closing, so that the sheet may be gripped between the beveled face on the cylinder and the grippers before the cylinder shall have had time to move an appreciable distance. A brush is also provided for smoothing the sheet down upon the cylinder.

In the drawings, which serve to illustrate my invention, I have omitted all those parts of the printing-press which have no immediate connection with my present invention.

Figure 1 is a side elevation of a press provided with my locking finger-motion, the view being limited to that part provided with my improvements. Fig. 2 is a rear view taken from a point back of the cylinder. This view may be considered as a sectional elevation on line 2 2 in Fig. 1. Fig. 3 is a sectional elevation taken on line 3 3 in Fig. 2. Fig. 4 is a sectional elevation taken in the same plane as Fig. 3, but showing the unlocking-pin in the act of releasing the fingers or grippers. Figs. 5, 6, 7, and 8 are detached explanatory views, which will be referred to more particularly hereinafter.

Before proceeding to describe my invention minutely I will say that the grippers I employ are, or may be, of the usual pattern, and they are mounted in the usual way on a shaft which has bearings in the ends of the cylinder. The grippers close down upon a beveled or chamfered clamping-face on the margin of the opening in the cylinder, which clamping-face is inclined, so as to stand at the same angle as the sheet on the feed-board, and in nearly the same plane as the sheet when the grippers close. The grippers are closed by a pin which moves in a direction opposite to that of the cylinder, and are unlocked and opened by a stud set in the main frame of the press.

A is a part of the press-frame, and B is the printing-cylinder. *a* is the gripper-shaft,

mounted rotatively in the ends of the cylinder, and bearing the grippers *b b*. Mounted on the end of the shaft *a*, outside of the cylinder, is a disk or plate, *c*. This disk has a prolonged sleeve-like boss, which extends along the shaft into the cylinder, and is encircled by a spiral spring, *d*. This spring abuts against nuts on the screw-threaded boss of the disk and a loose washer on the boss, and by this means the disk *c* is drawn up tightly against a bed-washer, *e*, of leather or other similar material, recessed in the face of the cylinder end. This construction is fully shown in the detached sectional view, Fig. 5, taken in the axis of the gripper-shaft. The purpose of this is to provide a frictional contact to prevent the accidental movement of the grippers when they have been thrown open, and to compel the gripper-shifting studs to move and not throw the grippers over. In other words, the momentum of the grippers is destroyed by this device, and they will stand at any point, open or part way open, and will not be moved by the tremor or jarring of the press when unlocked. The disk *c* is provided with a locking-tail, *f*, which is arranged to engage a notch or recess, *g*, in a plate, *h*, on a locking-lever *C*, when the grippers are closed down, as in Figs. 1 and 3. The lever *C* is pivoted to the cylinder end at *i*, and its free end engages a fixed keeper, *j*. It is normally upheld in the position shown in Fig. 3 by means of a spring-rod, *k*, or other equivalent arrangement. The upper edge of the plate *h* is curved, so that as the disk *c* is turned in closing the grippers the tail *f* wipes into the recess *g*, when the grippers will be locked fast and cannot recoil. In a socket in the main frame is placed the unlocking and opening pin or stud *l*. As the cylinder nears the point in its revolution (see Fig. 4) where the grippers are to be opened and the printed sheet freed, a cam-plate, *m*, on the lever *C*, engages the pin *l*, which depresses said lever until the tail *f* is freed from notch *g*. At this moment the pin *l* strikes the end of a tripping-bar, *n*, affixed to the face of disk *c*, and the said disk, now free to turn, is revolved by pin *l*, and the grippers thrown back.

I will now describe the gripper-closing mechanism. *D* is a disk-cam, mounted rotatively on the main frame in a plane a little in front of the disk *c*. This cam-disk is driven (at a speed of one to three) from the cylinder axis by means of gear-wheels *o o* in an opposite direction from the cylinder, and with less velocity, making one revolution to three of the cylinder. In this disk is a closing pin or stud, *p*, which is arranged to move in the path of the tripping-bar *n*. As the said bar advances rapidly, and the stud *p* comes on slowly to meet it, the cam-like end *q* of the bar strikes the pin, and the gripper-bar is quickly rotated, the gripping being effected at the instant the stud *p* reaches the position shown in Fig. 3. The dotted line in Fig. 6 shows the path of the gripper-point in closing. In order

to provide an immediate clearance for the stud *p* as soon as the grippers are closed down, I cut away its lower side to provide a passage for the cam end *q* of the bar *n*, as shown. The parts are so set that at the instant the grippers are closed the tail *f* on disk *c* engages the notch *g* in plate *h*, and thus locks the grippers fast.

I will now describe the means employed for regulating the admission of the sheet to the grippers. *E* is a rock-shaft, mounted rotatively in the main frame of the press over the cylinder, and to this shaft are fixed the pendient front guides, *r r*, against which the front or advancing edges of the sheets rest in feeding. At the ends of shaft *E* are fixed arms *F F'*—one at each end of the cylinder. On these arms are formed projections *s s*, upon which rest lugs *t t* on the feed-board or table *G*, which is hinged at *u*. On the arm *F'* is fixed a steel toe, *v*, which rests on the edge of cam-disk *D*, this cam and arm *F'* being in the same plane. The disk *D* is of such a contour that the toe *v* rides on its highest part and keeps the feed-board raised during the feeding operation, but drops onto the lower part when the sheet is to be taken by the grippers. The shape of the disk is fully illustrated in Fig. 7, where it is shown detached. The cam-like edge of the disk is given the form of a volute, as indicated in said figure, for reasons that will be explained. It will be seen that as the feed-board falls to deliver the sheet to the grippers the front guides, *r*, are caused to swing away or move back from the edge of the sheet by the oscillation of the shaft *E*, and after the sheet is delivered and the board rises these guides return again to their position, so that the next sheet may rest against them. Therefore, by making the cam-disk of a volute form, these guides will first move back nearly to position, and then will be kept moving up slowly against the edge of the sheet during the latter part of the interval between the feeding of the sheets, and thus prevent the jarring or tremor of the press from moving the sheet away from the guides, as it is apt to do if the guides remain stationary during this period. There may be two or more front guides, *r*, arranged at intervals along the shaft *E*, and opposite each of these I arrange a bottom guide or rest, *w*. These are arranged to play lengthwise for a limited distance in bearings under and on the feed-board. The means employed for protruding and retracting them will now be described. Fixed to the under side of the feed-board are suitable hangers, *f'*, in which is rotatively mounted a shaft, *x*, on which are arms *y*, which have wrists or pins that engage vertical slots in clips *z* on the guides *w*. When the shaft *x* is oscillated, these wrists, by engaging the clips *z*, cause the guides to move back and forth endwise. The slots in the clips allow the necessary play in converting rotary into reciprocating motion. Aligned with shaft *x* is another shaft, *x'*, which is rotatively mounted in the side frame of the

press. This shaft has an arm, b' , which is coupled by a link, c' , to the free end of the arm F. On shaft x is fixed a toe, d' , and on shaft a is fixed a toe, e' , one toe being formed to override the other, as shown, with the toe d' over toe e' . Thus it will be seen that when lever F is raised by the action of cam-disk D on its toes v , not only is the feed-board G raised and the front guides, r , brought forward against the edge of the sheet, but the said lever F acts through link c' , shaft a' , arm b' , toes e' and d' , shaft x , and arms y to protrude the bottom guides, w , until they touch or nearly touch the front guides, r . This position of the feed-board and guides is shown in Fig. 8. When the toe v falls onto the lower part of cam disk D, a spring, x' , on shaft x , is permitted to turn said shaft and retract the guides w .

In Fig. 2 I have omitted the feed-board G to avoid obscuring the figure, but have shown the lug t and a bracket, f' , for supporting shaft x , in their proper positions.

I have described the mechanism and the details of its operation, and I will now briefly describe the general operation, starting at the moment the sheet has left the feed-board. At this moment the cam-disk D begins to raise the feed-board, to bring forward the front guides, r , and to protrude the bottom guides, w , to meet them. When these movements are completed, the parts remain stationary (as in Fig. 8) for a time. As the printing-cylinder continues to revolve, the pin l engages cam-plate m and unlocks the grippers or fingers b , and then engages the tripping-bar n and pushes open the grippers by turning shaft a . The locking-stud p on disk D is now slowly advancing to meet the end q of bar n . The cam on disk D, however, first permits the feed-board to fall to its lower position, as in Fig. 6, the front guides, r , and bottom guides, w , withdraw, and this leaves the edge of the sheet g' in Fig. 6 projecting. As the cylinder advances its beveled clamping-face h' in Fig. 6 approaches and strikes the paper at a somewhat obtuse angle. In the mean time, however, the cam-shaped end q of the tripping-bar n has met the moving pin p , and the grippers are by this means pushed suddenly over, their ends descending upon the sheet at the same instant the clamping-face h' touches it from below. Thus these parts serve to grasp the sheet as between the jaws of a vise, and the disarrangement of the sheet by dragging or slipping is avoided. By giving the pin p a motion opposite to that of the tripping-bar n , I effect a rapid closing of the grippers at the right instant and before the cylinder has time to move far.

Although I have been compelled to separately describe the movements of the parts as the edge of the sheet is seized, I will say that these movements are substantially simultaneous—that is, the feed-board descends and the guides withdraw almost at the same instant

that the grippers close on the sheet, the focus of the movements being at the gripping-point.

In cylinder-presses which deliver under the feed-board in the usual way it is often desirable in "making ready," as it is technically called, to deliver the first sheets in front, as it is very difficult to get under the rear portion of the press to remove them. I therefore provide a socket, l' , in the frame of the press, adapted to receive an unlocking-stud similar to the stud l , and this stud is made to slip easily into the socket. The operator may then slip said stud into socket l' at the proper moment, and cause the grippers to be unlocked at a point different from the ordinary or normal unlocking-point.

In order to prevent the stud l from interfering with the operation, this latter stud is made readily removable, and is drawn out when the stud is inserted in socket l' . Indeed, this stud l may be employed for the socket l' in lieu of having two studs, as only one is employed at a time.

The object in arranging the mechanism for raising the feed-board and reciprocating the bottom guides, as herein shown, is to enable the said feed-board to be readily raised and thrown back without interfering with the operating mechanism mounted on the press-frame. It is often desirable to raise the feed-board, or even to remove it entirely, in order to get at the mechanism underneath it conveniently. Therefore I arrange the lugs t to simply rest on projections s , and the toes d' to simply rest on toes e' .

My object in arranging the feed-board to rise after each sheet has been taken from the board is to remove the sheet from the influence of the electrical action of the rapidly-rotating cylinder; and my object in arranging the bottom guides to be withdrawn at the moment the sheet is seized is to avoid the inevitable wrinkling or cockling of the edge of the sheet produced by gripping it on each side of these bottom guides or rests. When the sheet rests on these guides, its weight causes it to sag slightly between them, and when the grippers close and draw the sheet away a slight cockle is produced at each guide. By withdrawing the guides an instant before the grippers close this is avoided. When the sheet is seized by the grippers and drawn from the feed-board, it is apt to curve upward and stand off from the cylinder, especially near the grippers, and when the free end of the sheet leaves the feed-board it will not adhere to the cylinder. To smooth the sheet down to the printing-surface of the cylinder, and remove all the air from beneath it, I employ a brush, H, or other similar yielding device, arranged to press the sheet up to the printing-surface and expel the air from beneath it, when it will adhere closely without further trouble.

Referring to Fig. 1, wherein this brush is shown, i' are screw-threaded studs projecting from the press-frame A on both sides of the

press, and preferably radially from the cylinder-axis. The brush H, which may be made of bristles or stiff hair, has a hole in each end of its stock, and the stock is slipped down over the studs *i'*, as shown. On the studs are adjusting and securing nuts *j'*, by means of which the brush may be adjusted to or from the cylinder and be secured firmly in the desired position. This brush smooths and presses the sheets down to the cylinder as they pass under it, and the sheets then adhere during the printing operation. In lieu of a "brush," properly so called, I may employ a yielding rubber of some suitable material, as vulcanized rubber or leather.

I do not wish to be understood as broadly claiming a brush arranged to smooth the sheet down on the cylinder, nor the hinged feed-board arranged to move toward and from the cylinder. These features have been proposed before in printing-presses, and are not new with me.

I do not wish to confine myself strictly to the construction and arrangement of parts as herein shown, as these may be varied somewhat without departing from my invention, the leading features of which are the mechanism for locking the fingers when closed, so that they cannot rebound, as when springs are employed, and the shifting or reciprocating front and bottom guides, together with their operative mechanism.

Having thus described my invention, I claim—

1. In a cylinder printing-press, a finger-motion comprising a gripper-shaft and grippers, a tripping-bar mounted on the said gripper-shaft and arranged to be tripped by the closing-stud, the said stud, a square-ended locking-tail mounted on the gripper-shaft and arranged to engage a square recess in the locking-bar, the said locking-bar provided with a supporting-spring or cam-plate on the locking-bar, and the unlocking-stud arranged in the path of the said cam-plate and of one end of the tripping-bar, whereby the grippers are brought down to the point of closing wholly by the action of the closing-stud on the tripping-bar, and whereby the unlocking of the grippers is and must be effected by the unlocking-stud before the grippers can be opened, as set forth.

2. In a cylinder printing-press, a finger-motion comprising a gripper-shaft rotatively mounted in the cylinder and provided with frictional appliances, substantially as described, to prevent its too free rotation in its bearings, a tripping-bar mounted on the gripper-shaft, a closing-stud arranged in the path of the cam-shaped end of said tripping-bar, and adapted to turn the grippers over to their final closing on the sheet by the movement of the cylinder alone, and means, substantially as described, for positively locking the grippers when thus closed and for unlocking them and then opening them, whereby the employment of a spring for assisting in the closure of the

grippers is avoided, all arranged to operate substantially as set forth.

3. In a finger-motion for a cylinder printing-press, the mechanism for closing the grippers, which consists of the tripping-bar *n*, connected to the gripper-shaft and provided with a tip, *q*, shaped as shown, the gripper-shaft and grippers, and a stud, *p*, with a flattened lower face arranged in the path of the said tripping-bar, substantially as set forth.

4. In a finger-motion for a cylinder printing-press, the combination with a gripper-shaft provided with a plate, *c*, of the yielding friction-washer *e*, a spring, *d*, arranged to draw the plate *c* up against said washer, and the printing-cylinder, all arranged substantially as set forth, whereby the momentum of the moving grippers may be neutralized, as specified.

5. A cylinder printing-press provided with grippers to close on the front edge of the sheet, a feed-board arranged to be raised and lowered, and moving front and bottom guides, the said moving parts being arranged to act nearly simultaneously at the moment the grippers take the sheet, substantially as set forth.

6. A printing-press provided with front and bottom guides for the sheet to be fed, said guides being arranged to be drawn out of the way at the moment the sheet is taken by the grippers, in order that the edge of the sheet may be fairly taken by the grippers, substantially as set forth.

7. In a printing-press, the under or bottom guide mounted, substantially as shown, and adapted to be reciprocated, whereby it may be drawn back from under the edge of the sheet an instant before the grippers seize the sheet, for the purposes specified.

8. In a printing-press, the combination of the reciprocating bottom guide, *w*, and the swinging front guide, *r*, said guides being arranged to recede from each other at the moment of taking the sheet, substantially as set forth.

9. The combination, in a printing-press, of the shifting front guide and the mechanism for operating the same, constructed substantially as shown and described, whereby the front guide is moved quickly up nearly to its final position to receive the sheet in feeding, and then moved slowly up against the edge of the sheet to its final position at the latter part of the feeding operation, for the purposes specified.

10. The combination, with the cam-disk D, of a swinging arm, F, provided with a toe to ride on said cam, and a projection, *s*, and the hinged feed-board provided with a lug, *t*, substantially as and for the purposes set forth.

11. The combination, with the cam-disk D, of the swinging arm F, provided with a projection, *s*, the hinged feed-board provided with the lug *t*, the bottom guides, *w*, provided with clips *z*, the shaft *x*, mounted in bearings on the feed-board and provided with arms *y*, toe *d'*, and retracting-spring *x'*, the link *e'*, and the

shaft a' , provided with arm b' and lifting-toe e' , all arranged substantially as and for the purposes set forth.

5 12. The combination of the following co-
active elements, namely: the rotating cam-
disk D, the shaft E, front guides, r , arm F, pro-
vided with a toe to rest on the cam and a pro-
jection to take under a lug on the hinged feed-
board, said feed-board, the link c' , shaft a' ,
10 having an arm, b' , and toe e' , shaft x , having
arms y , toe d' , and spring x' , and bottom
guides, w , arranged to play in bearings in the
feed-board and provided with slotted clips z ,
all arranged to operate substantially as set
15 forth.

13. The combination, with the cylinder A,
of the gripper-shaft and grippers, the disk c ,
with locking-tail f and tripping-bar n , the
locking-bar C, provided with recessed plate h ,
20 cam-plate m , and a spring to uphold it nor-
mally, and the unlocking-stud l on the main
frame, all arranged substantially as set forth.

14. The combination of the printing-cyl-
inder provided with a beveled clamping-face, h' ,

the gripper-shaft and grippers mounted in the 25
cylinder, the disk D, provided with a closing-
pin, p , and driven from the cylinder, the in-
termediate gears o , the disk c , provided with
a locking-tail, the tripping-bar n , fixed to disk
 c , the locking-lever C, provided with cam- 30
plates h and m and upheld by a spring, and
the unlocking-stud l in the press-frame, all
arranged to operate substantially as set forth.

15. A cylinder printing-press provided with
a finger-motion arranged and adapted to be 35
unlocked by a stud removably mounted in the
frame of the press at the proper point to de-
liver the sheet under the feed-board, and pro-
vided also with a socket, l' , in the press-frame,
to receive a removable unlocking-stud, sub- 40
stantially as and for the purposes set forth.

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

ANDREW CAMPBELL.

Witnesses:

HENRY CONNETT,
H. M. HAIGH.