

P. F. COX.
PRINTING PRESS.
APPLICATION FILED NOV. 17, 1906.

3 SHEETS—SHEET 1.

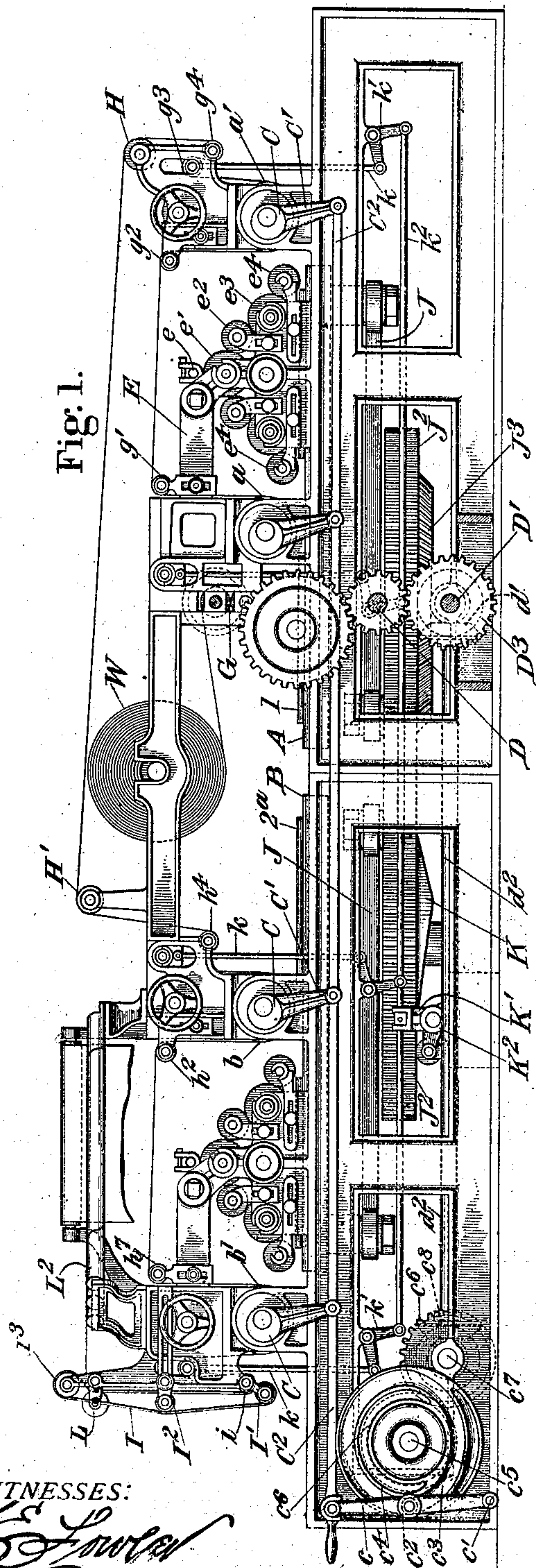
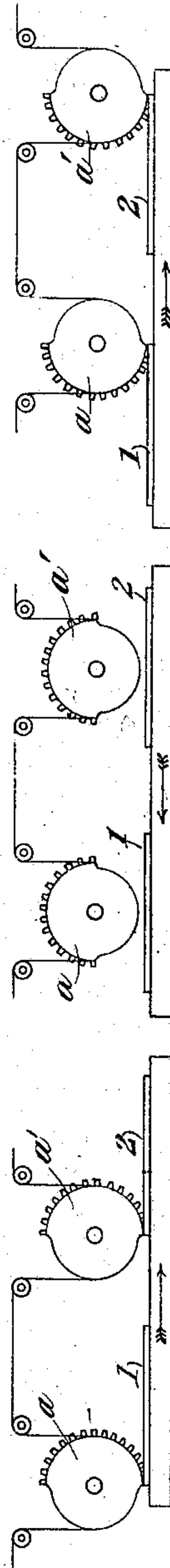


Fig. 1.

Fig. 14.

Fig. 13.

Fig. 12.



WITNESSES:

James D. Mansfield
James D. Mansfield

INVENTOR:

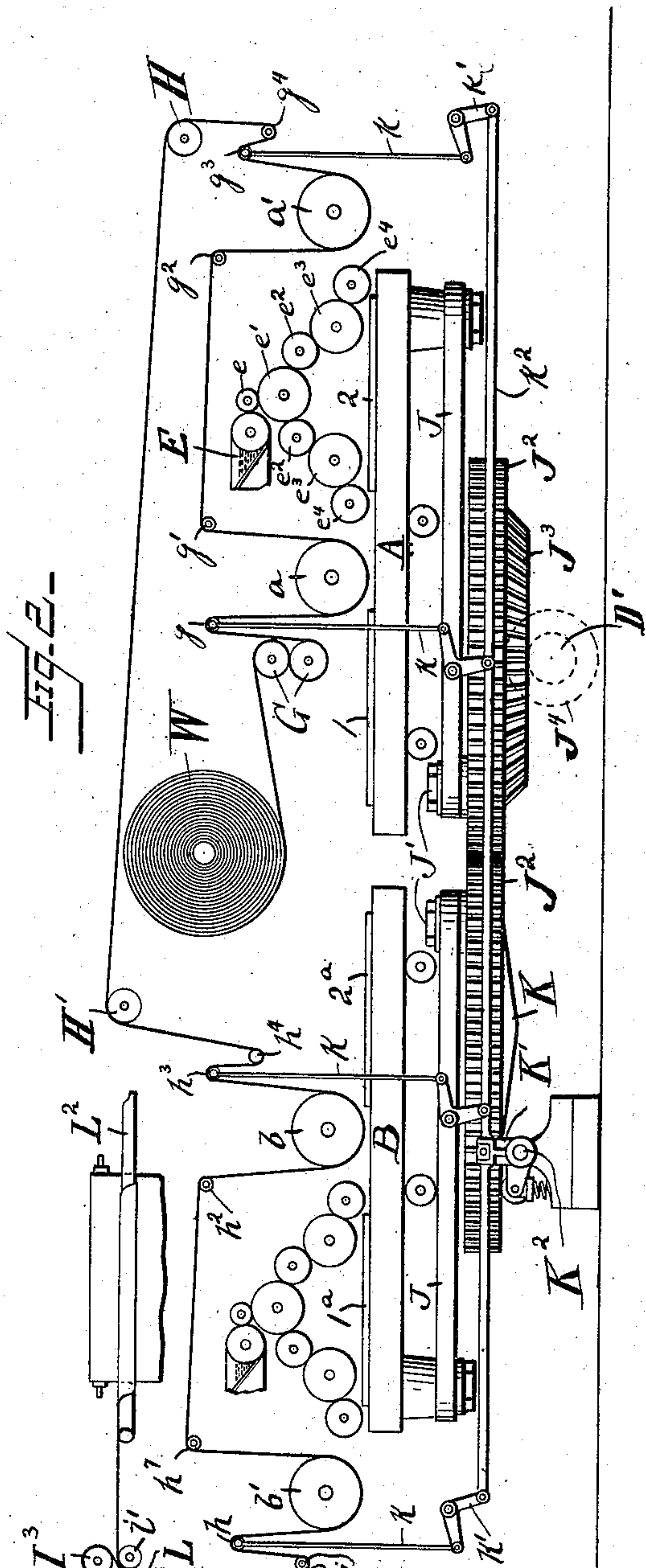
Paul F. Cox
Paul F. Cox
Attorneys

P. F. COX.

PRINTING PRESS.

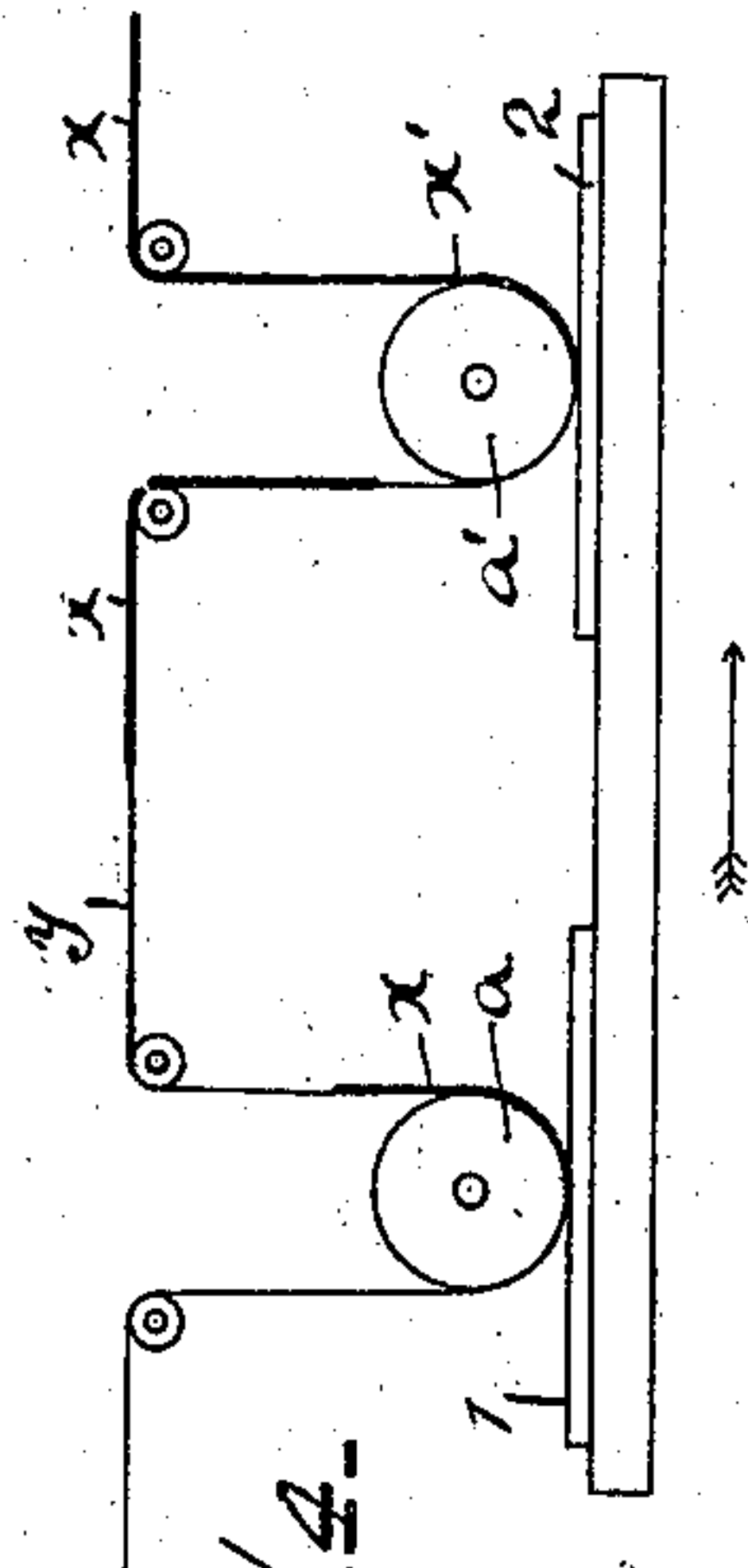
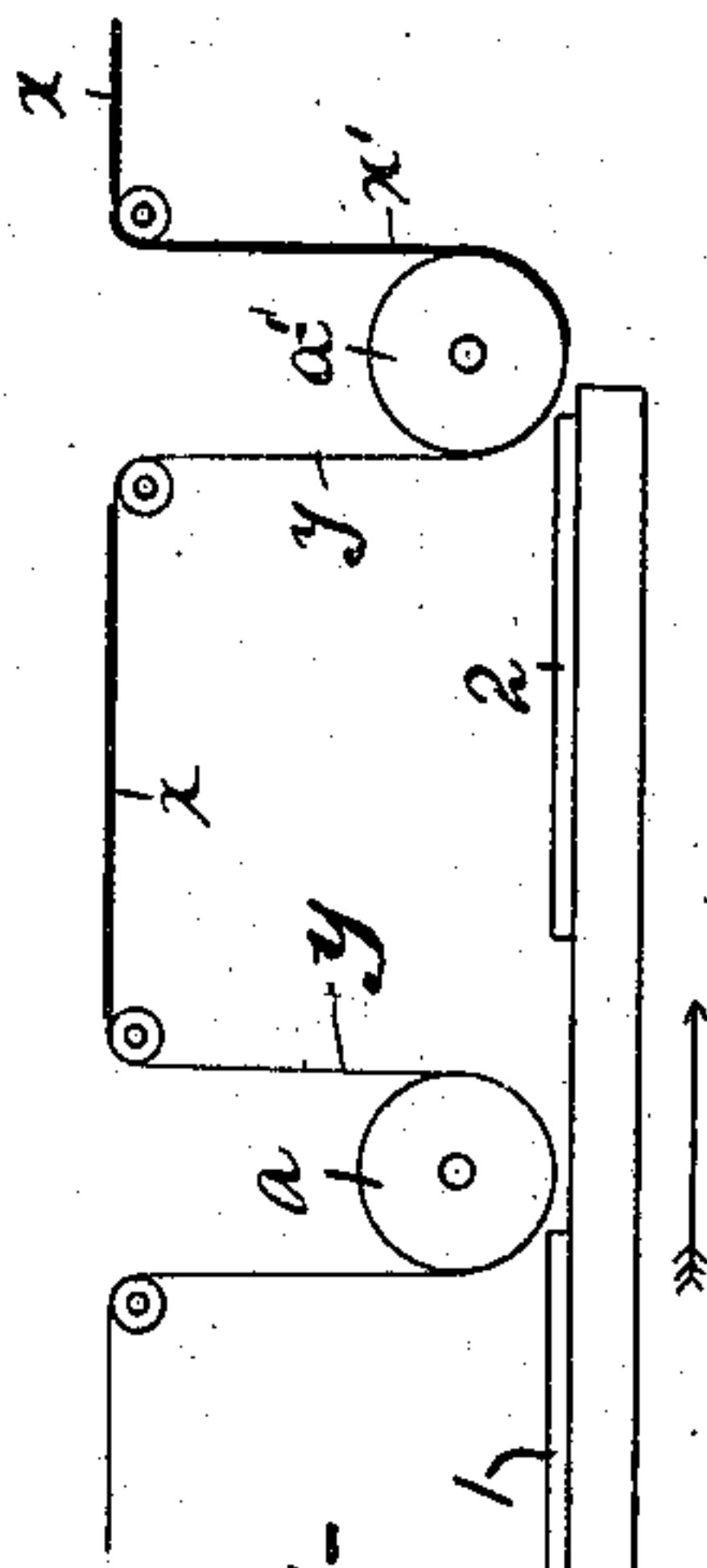
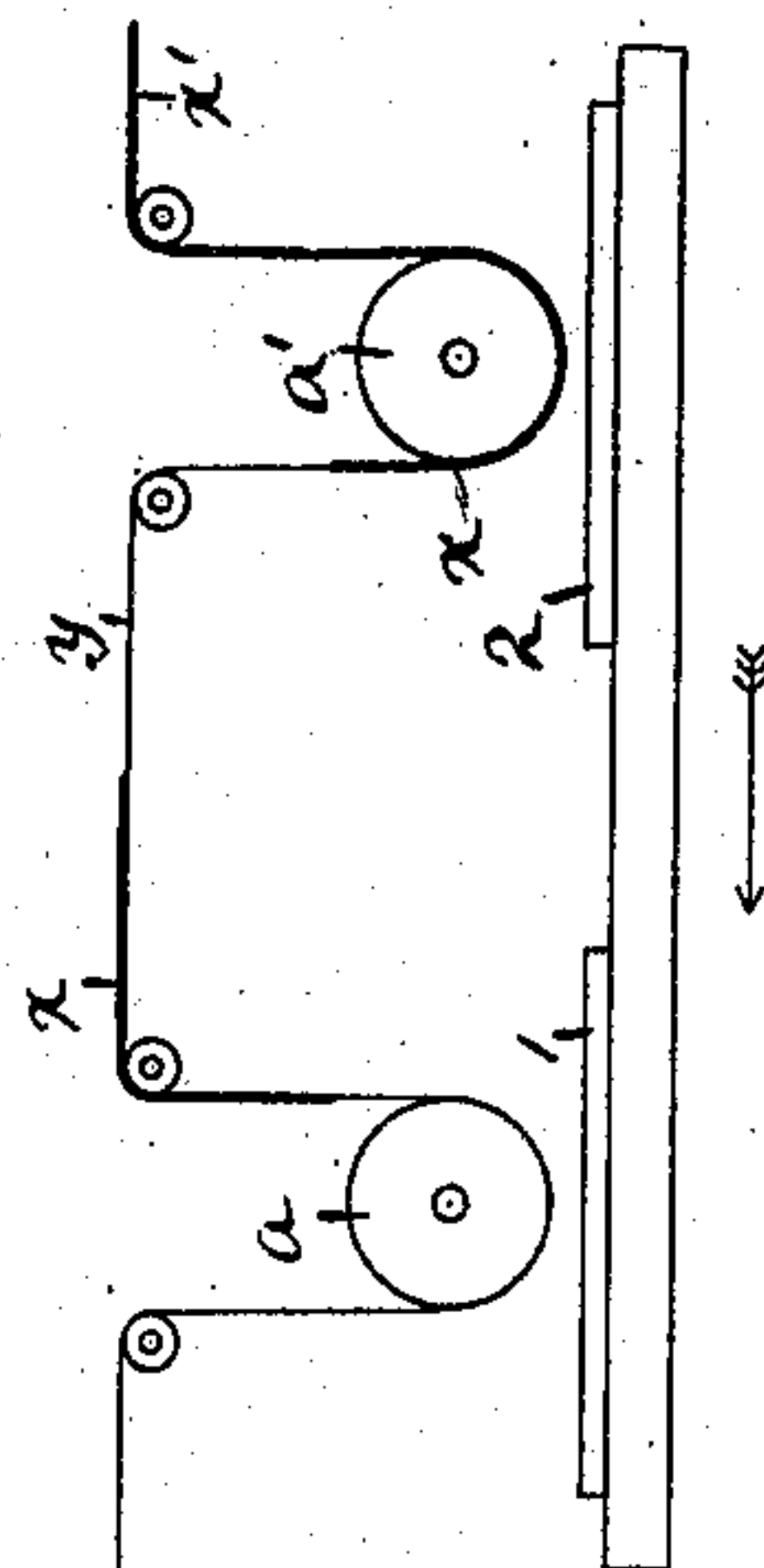
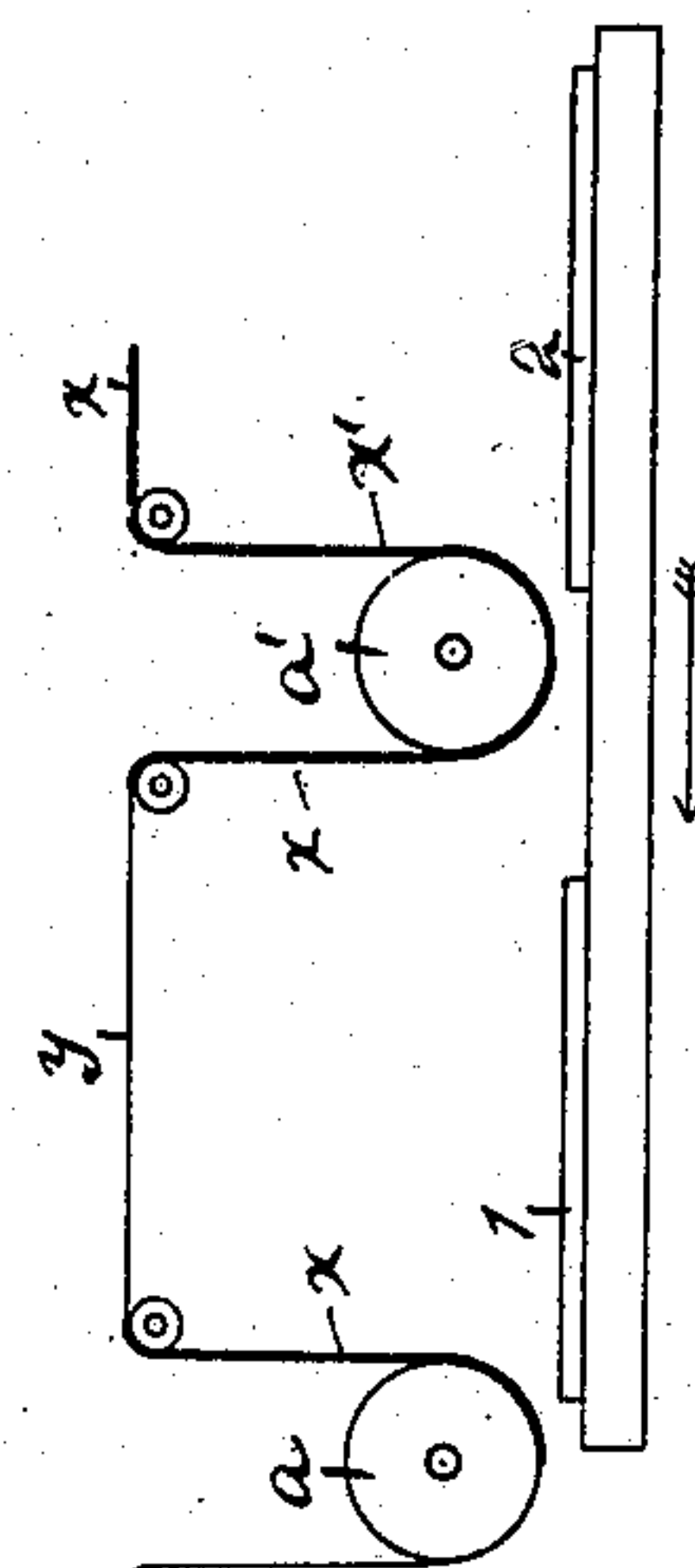
APPLICATION FILED NOV. 17, 1906.

3 SHEETS—SHEET 2.



WITNESSES

W. F. Hoyle
James Mansfield



INVENTOR

Paul F. Cox.

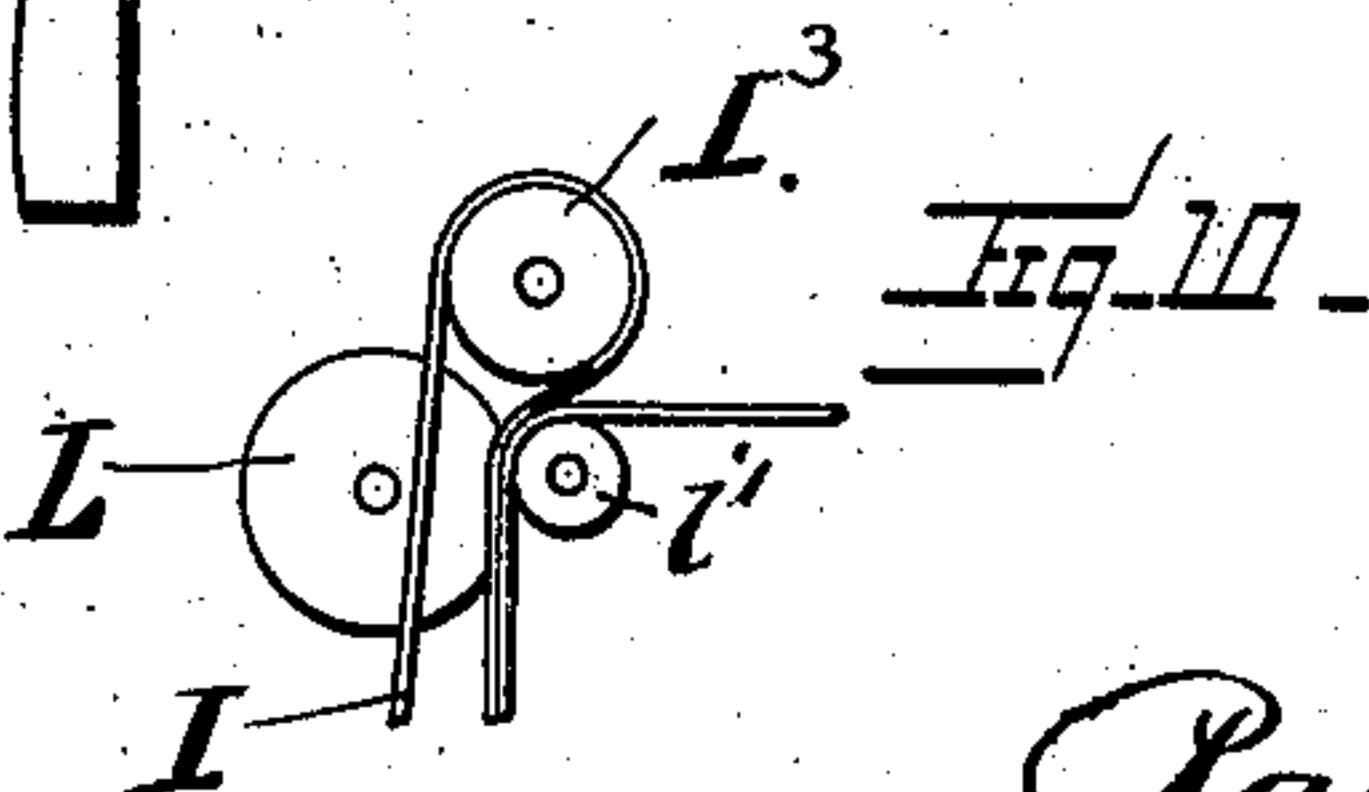
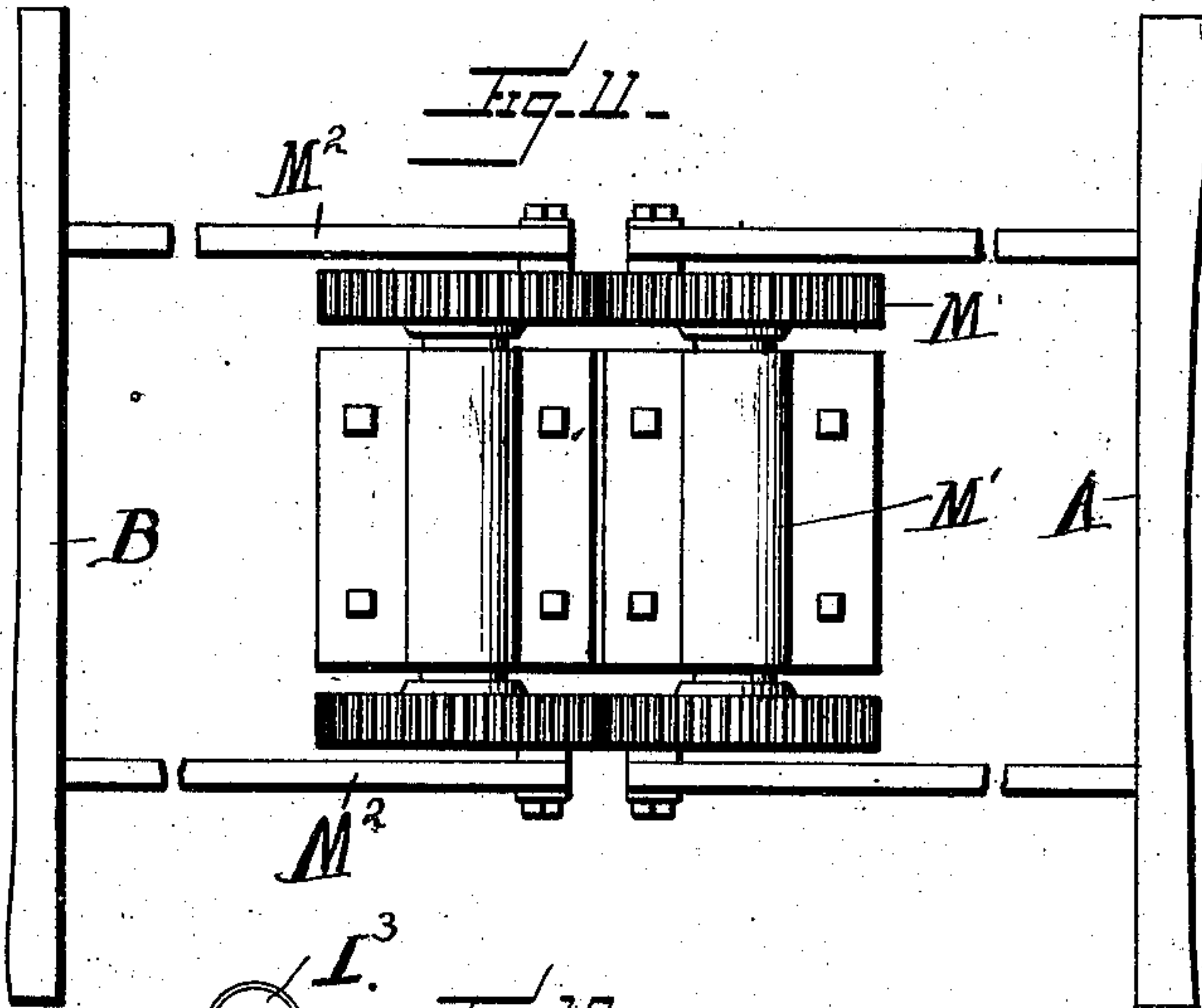
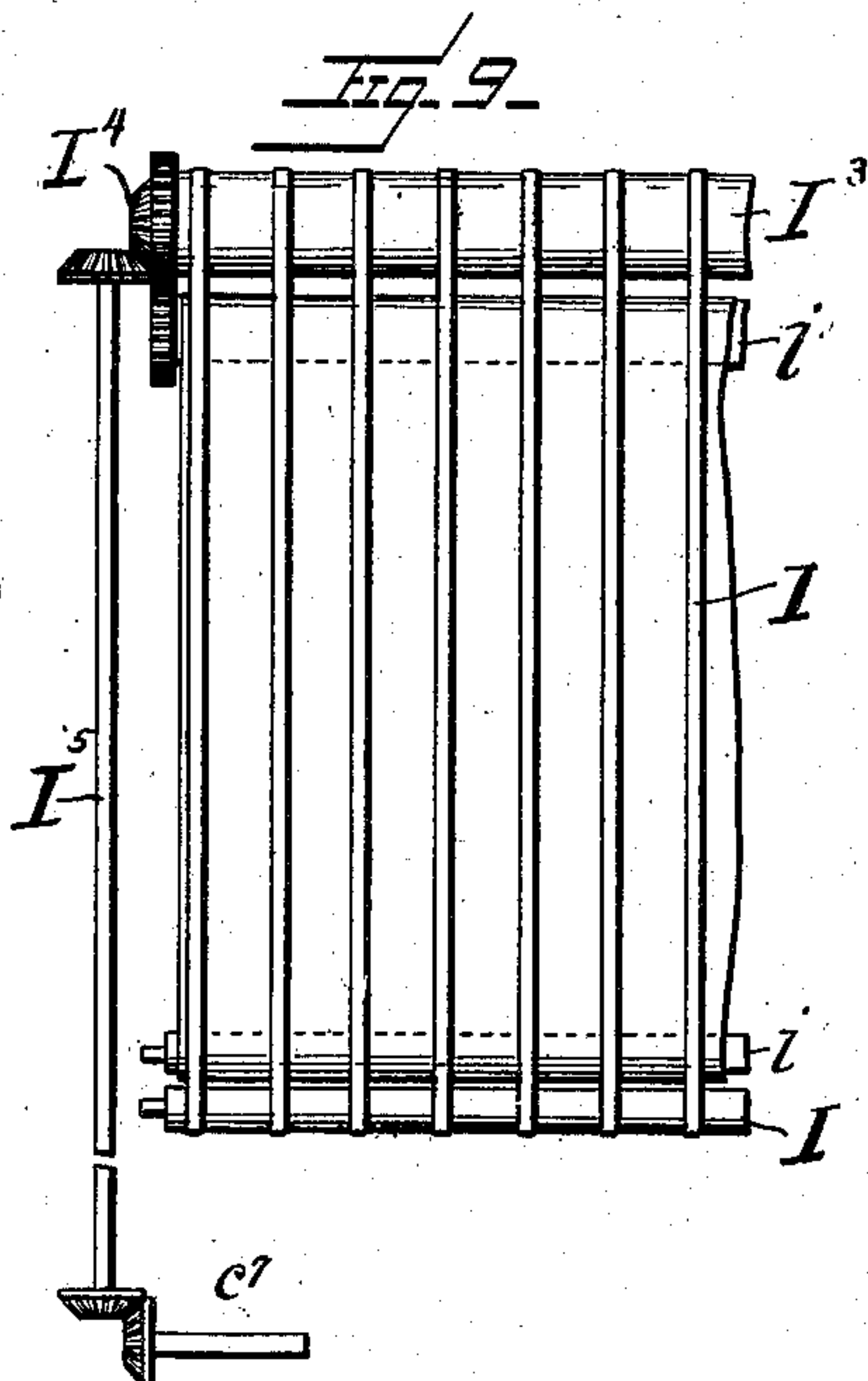
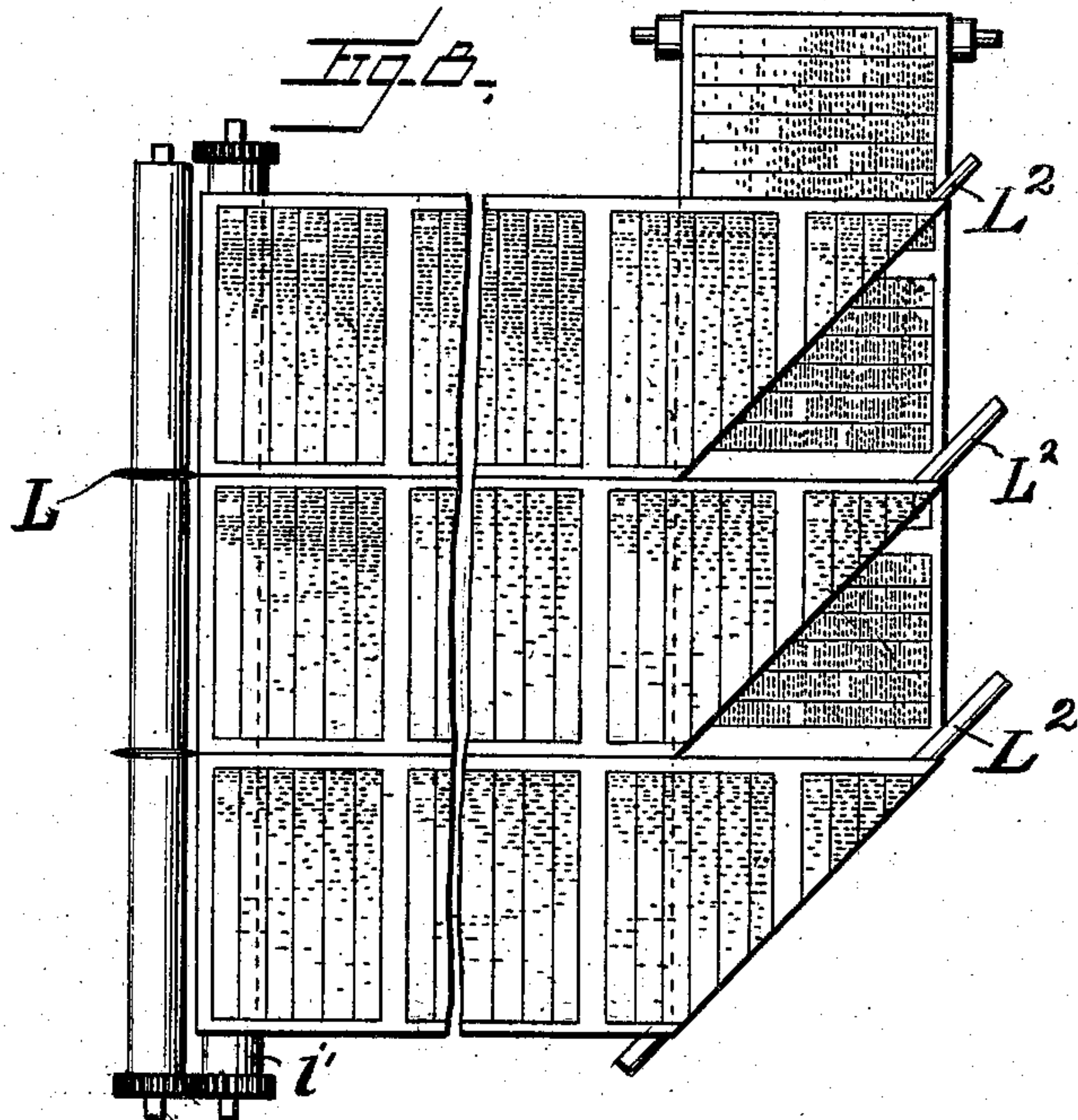
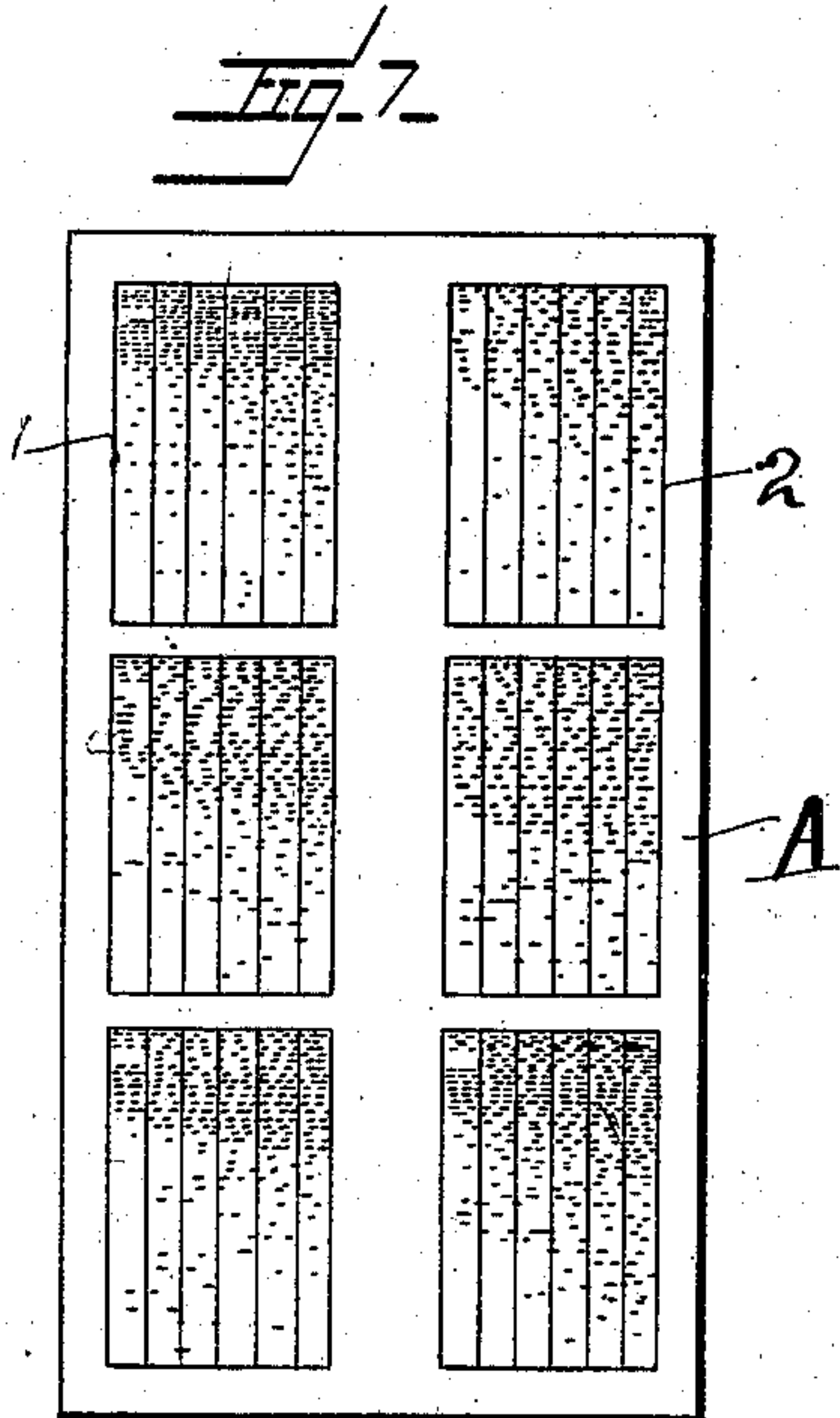
BY
Alexander Swell
Attorneys

No. 847,912.

PATENTED MAR. 19, 1907.

P. F. COX.
PRINTING PRESS.
APPLICATION FILED NOV. 17, 1906.

3 SHEETS—SHEET 3.



WITNESSES:

W. F. Hoyle.
James B. Mansfield

INVENTOR

Paul F. Cox.

BY

Alexander Fowell
Attorneys

UNITED STATES PATENT OFFICE.

PAUL FLEMMING COX, OF BATTLE CREEK, MICHIGAN.

PRINTING-PRESS.

No. 847,912.

Specification of Letters Patent.

Patented March 19, 1907.

Application filed November 17, 1906. Serial No. 343,922.

To all whom it may concern:

Be it known that I, PAUL FLEMMING COX, of Battle Creek, in the county of Calhoun and State of Michigan, have invented certain new and useful Improvements in Printing-Presses; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is an improvement in flat-bed and cylinder web-perfecting presses; and its object is to produce a press of simple construction and high speed, capable of printing newspapers of various sizes up to twelve pages, and which can be constructed to print even larger papers, if desired.

One subsidiary object of the invention is to shorten the travel of the press-beds by providing two cylinders to cooperate with each bed, thereby greatly shortening the travel of the bed, say, one-half, as impressions from one-half of the forms on the bed can be printed by one cylinder, and impressions from the remainder of the forms can be printed by the other cylinder.

Another object of the invention is to keep the parts low down, so that the beds and all parts of the press will be easily accessible from the floor, and the pressman can easily place and make up the forms on the beds, and this low-down construction enables the weight to be kept very close to the base of the press, thereby lessening shock and vibration of parts.

Another object is to enable both sets of forms upon the beds to be inked from one inking mechanism, the complete press requiring but two ink-fountains instead of four or six. In the complete press one inking mechanism is arranged above each bed and between the cylinders coacting therewith, so that although the press has four impression-cylinders only two sets of inking mechanism are required.

One of the main features of the invention is the peculiar mode of leading the web through the press, so that impressions will be made simultaneously upon the web from the forms on the bed by the coacting cylinders, but the impressions will be made at different points on the web, and one cylinder in each pair will while coacting with its appropriate form complete the impressions on that side of the web begun by the first cylinder. In other words, instead of printing from all the forms on one bed by one cylinder, I employ

two cylinders cooperating with each bed, and lead the web successively between these cylinders and the bed, and so feed the web that each cylinder prints from half of the forms on the bed during the printing stroke thereof, but during the return stroke a length of web equal to an impression is fed past the cylinders without being printed, so that the first cylinder "skips" alternate spaces of the web, but at the succeeding operation of the press the second cylinder prints in the blank spaces of the web which are left between the impressions produced thereon by the first cylinder. For instance, if the total length of forms on the bed be, say, thirty-five inches the first cylinder will print seventeen and one-half inches, and then between the impressions seventeen and one-half more inches of blank web will be fed past the first cylinder. The second cylinder prints the seventeen and one-half inches of blank web fed past the first cylinder, and during the non-printing periods of the second cylinder the seventeen and one-half inches previously printed by the first cylinder on the web are fed therepast. Thus for each reciprocation of the bed thirty-five inches of web will be printed and fed between the bed and cylinders, although the bed has only, say, seventeen and one-half inches of travel during the impression. By this means and method I am enabled to print as much web by seventeen and one-half inches travel of the bed as could be printed heretofore in an ordinary single bed and cylinder-press by a thirty-five-inch travel of the bed. In other words, in my press the web is printed on one side by one bed and two cylinders cooperating therewith and is perfected on its other side by means of another bed and two cylinders co-operating therewith. The first cylinder in each pair prints half the length of the paper and then skips an equal length of web, while the second cylinder in each pair skips the length of the web printed by the first cylinder in each pair and takes impressions upon the blank spaces left untouched by the first cylinder.

Another object of the invention is to keep the web in continual forward motion in the same direction through the press at all times without any reversing or stopping of the web at any time, although reciprocating beds are used, and this is accomplished by reason of the hit and miss or skip method of printing upon the web above described and using two

cylinders with each bed and the fact that the cylinders print only upon one stroke of the bed; and during the return stroke of the bed the web is fed forward sufficiently to bring the unprinted or "skipped" portions of the web passing the first cylinder of each pair into position to be printed by the second cylinder of each pair at the next succeeding operation of the press.

By reason of the fact that the web is continuously in motion at all times, both during and after printing, and is always moving in the same direction I am enabled to travel it through the press at high speed, and by reason of the shortness of the travel of the beds—say but seventeen and one-half inches for thirty-five inches of impression or feed of the web—I am enabled to reciprocate the beds at unusually high speed with safety, and thus I produce a high-speed single-acting printing-press.

Furthermore, in this press the web is so led that no portion of it is carried beneath the beds or under inking mechanisms. All the web-guides are accessible from the floor, so the press can be readily threaded, and all parts thereof are open to inspection at all times during the running of the press.

Another feature whereby speed is enhanced is the peculiar arrangement of the type-forms on the beds. Instead of arranging them with the columns extending longitudinally of the bed I preferably arrange them with the columns running transversely of the bed and the pages end to end thereon. This not only shortens the travel of the bed, but enables me to print four, eight, or twelve pages from one web and also to split the web while running and assemble the slit portions of the web before reaching the folder by simply giving each part of the web a quarter-turn over an angle-bar, thus dispensing with the necessity of running webs over a cow-catcher or former before entering the folder.

I will now describe the invention with reference to the accompanying drawings, which illustrate a perfecting-press adapted to operate upon and embodying the principles of the invention.

Figure 1 is a side elevation of the complete press. Fig. 2 is a diagrammatical longitudinal vertical section of the press. Figs. 3, 4, 5, and 6 are diagrams illustrating the method of printing with one bed and two cylinders. Fig. 7 is a diagrammatical view illustrating the arrangement of six-page forms upon the bed. Fig. 8 is a diagrammatical plan view illustrating how twelve printed pages may be assembled. Figs. 9 and 10 are detail views of the web-delivery device. Fig. 11 is a detail view of another crank drive for the beds. Figs. 12, 13, and 14 are diagrams showing the drum-cylinders used with one of the beds.

In the drawings, A B represent two horizontal type-beds arranged end to end, prefer-

ably in the same plane, and suitably mounted in the ordinary manner upon ways in the main frames of the press. These beds may be reciprocated by any suitable mechanism, preferably oppositely to each other, for the purpose of obtaining a better balance of the press and as hereinafter described.

Above the bed A and adapted to cooperate with the forms thereon are impression-cylinders a and a' , which are respectively adapted to cooperate with the forms 1 and 2 lying upon the bed A. Similarly, above B bed are journaled impression-cylinders b b' , adapted to respectively cooperate with forms 1^a 2^a on bed B. The impression-cylinders can be rotated in any suitable manner, as by being geared to bed-racks, so as to oscillate in unison with the bed, or they may be geared to the main shaft and rotated in unison with the bed during the printing stroke in any desired manner. Cylinder-driving gears are so common and well understood that a detailed illustration and explanation thereof is unnecessary.

The several impression-cylinders are provided with suitable throw-off mechanism, so that they can be lifted clear of the type during the non-printing stroke of the bed. As shown, they are journaled in eccentric boxes C, which are provided with arms C', connected to a rod or bar C², extending alongside of the press and attached at one end to a lever c , pivoted at c' on the frame and having a roller c^2 engaging a cam-groove c^3 in a cam c^4 , fixed on a shaft c^5 , which is driven by gears c^6 from a transverse shaft c^7 , driven by bevel-gears c^8 from the shaft d^2 , which extends over and is driven by bevel-gears d' from the driven shaft D', driven by gears D³ from the driving-shaft D, these parts being so timed that the cylinders will be thrown off impression during the non-printing or return strokes of the bed and will be thrown on impression during the forward or printing stroke of the beds. The bar C² may be disconnectible from the lever c , so that after the cylinders are thrown off impression the bar may be disconnected from the lever and the web-feeding devices put out of action, and then the beds can be run to ink up the forms without any printing taking place.

Each bed is adapted to carry forms for four or more pages. These forms are placed on each bed in two rows, as shown at 1 and 2 on bed A and at 1^a 2^a on bed B. The cylinder a operates on the forms in row 1, and the cylinder a' operates on the forms in row 2 at each outward or printing stroke of the bed A. Thus two impressions are simultaneously made on the web. On the return stroke impressions are made, as the impression is thrown off.

The forms on each bed are inked from a common fountain and inking system arranged between the impression-cylinders.

Thus the forms on bed A are supplied with ink from a fountain E by means of the ductor-roller e , drum e' , distributing-rollers e^2 e^3 , and form-rollers e^4 e^4 . The form-rollers e^4 lie near the cylinders a a' , respectively, and each respectively supplies ink to one of the forms on bed A. Thus the left-hand form-roller e^4 supplies ink to the left-hand form 1. The right-hand roller e^4 supplies ink to the right-hand form 2. A similar inking mechanism is arranged between cylinders b b' to supply ink to the forms 1^a 2^a on bed B.

In order to prevent the form-rollers reversing while upon the forms, the inking system is constructed so that the form-rollers e^4 are sufficiently far apart to allow them both to clear the forms of type just as the bed comes to the point of reverse, as indicated in Fig. 2 of the drawings, where the forms 2 and 1^a are shown as clear of both form-rollers, and at the completion of the outermost strokes of beds A and B the forms 1 and 2^a would be in the same position between the form-rollers e^4 that the forms 2 and 1^a are shown as occupying. For these reasons the cylinders over each bed are spaced sufficiently far apart to enable the inking mechanism to be inserted therebetween. The forms on each bed are also separated sufficiently to enable the forms to clear the inking-rollers and the cylinders at the time of reverse.

In order to shorten the stroke of the beds, the type-forms are arranged transversely of the beds in two rows. Thus the forms 1 and 2 may be arranged as in Fig. 7. If printing a twelve-page paper, each row of forms 1 2 and 1^a 2^a would contain three pages of matter arranged transversely of the press; and preferably and for further reasons hereinafter explained instead of arranging these forms with the columns running longitudinally of the press I arrange them with the columns running transversely of the press, so that instead of the column-forms being side by side they are end to end, as indicated in Fig. 7, and this enables me to materially shorten the travel of the bed, as the forms are of course narrower than they are long. By this arrangement of forms, furthermore, I am enabled after the web is perfected to slit the web longitudinally and then assemble the papers all together at the folder with a simple quarter-turn of the web, as indicated in Fig. 8. Thus the webs can be slit and pages assembled at the folder without passing them over any former, whereas when the forms are arranged with the columns longitudinally of the press, as is ordinarily done, it is necessary to pass the web over a former before reaching the folder in order to enable them to be properly cut and collected in the folder. This arrangement greatly simplifies the construction of the press and facilitates the assembling of the web.

The web is led in from a roll W, which may

be conveniently supported above the beds intermediate the two printing mechanisms, as shown in the drawings. The web is led first between the continuously-running feeding-rolls G, which are driven by suitable gearing from the main shaft and at a speed sufficient to feed the desired length of web—say thirty-five inches—for each reciprocation of the beds. The web then passes over a guide-roller g , down under cylinder a , then over guide g' above the inking mechanism to a guide-roller g^2 , down under cylinder a' , up over guide g^3 , then down over guide g^4 , up over coaxing-roller H, which may be driven by any suitable means in a direction to coax the web forwardly or assist its forward travel, then passed back to and over a second coaxing-roller H' above the inner end of bed B, then passed under a guide h^4 , up over a guide h^3 , down under cylinder b , then up over guide h^2 , back above the second inking mechanism to a guide h^1 , down under cylinder b' , up over a guide h , and then to a continuously-running delivery mechanism, which preferably consists of upper and lower web-guiding rollers i i' and coaxing tapes I, running over guide-rollers I^1 , I^2 , and I^3 , the upper rollers i' and I^3 being intergeared and the upper roller I^3 being driven by bevel-gears I^4 from a shaft I^5 , which is driven by gearing from the shaft c^7 . The delivery devices are adapted to feed the web out of the press as fast as it is delivered thereinto by the feed-rolls, and the web is at no time stopped between the feed-rolls G and the delivery, but runs continuously and in the same direction at all times.

If the beds A and B are driven by a crank mechanism, as indicated in Fig. 1, they have an accelerated and retarded movement during the printing strokes, and the web during this time can be compensated for this irregular movement of the bed by making the rollers g g^3 h h^3 movable, and, as shown, I mount each of these rollers on supporting-bars k , the lower ends of which are connected to one arm of bell-crank levers k' . The other arms of said levers k' are connected to an oscillatory bar k^2 , which bar is controlled by means of a bell-crank K' , which is pivoted on a fixed support at K^2 , one arm of said bell-crank engaging bar k^2 and the other arm being controlled by a cam K, which may be located at any desired point; but for convenience I place the same upon one of the bed-driving crank-gears J^2 , hereinafter referred to, the cam being so timed that the rollers g g^3 h h^3 will be slightly raised and lowered during the taking of impressions so as to compensate the web for the irregular movement of the type-form during the printing operations without stopping the forward movement of the web. A very slight movement of the rollers g g^3 h h^3 is sufficient to compensate the web for the irregular movement of the forms during the printing operation. and

after the printing operation and during the return stroke of the bed the web can run at a uniform speed over all of the rollers; but, as stated, at no time, either during or after the printing operation, is the web stopped or reversed, and it is therefore not subjected at any time to any jerking strains liable to rupture it.

As indicated in Fig. 2, the beds A and B are operated by pitmen-rods J, pivotally connected at one end to depending studs on the beds and at the other end to crank-pins J' on horizontally-disposed crank-gears J², which intermesh, and to one of these gears J² may be secured a bevel-gear J³, which meshes with a small bevel-gear J⁴ on a driven shaft D'.

The rollers g' g² may be mounted in adjustable supports to insure proper registration or sequence between the impressions produced on the web from the forms 1 2 by cylinders a a', and the rollers h' h² may be mounted in adjustable supports for a like purpose. The coaxing-rollers H and H' may be mounted in adjustable supports for the purpose of insuring registration of impressions between the forms on the beds A and B.

After the web has been perfected it is divided longitudinally by slitters L, which may be conveniently located adjacent to the roller i', the web being slitted longitudinally, as indicated in Fig. 8, and then the slitted portions of the web are led to and over the angle-bars L², located above the second printing mechanism, and thus the split sections of the web will be given a quarter-turn and are assembled and led to a folder, (not shown,) which may be conveniently located at the side of the press. By this arrangement of angle-bars four, eight, or twelve page papers can be printed on one web and the page slit and assembled before passing to the cutting-cylinders and without the employment of any other formers.

Figs. 3, 4, 5, and 6 are diagrams illustrating the method of printing the web by means of two cylinders and one bed. As illustrated in Fig. 3, the bed has just started to the right, several impressions having been made thereon, those marked x having been produced by cylinder a and forms 1, and those marked x' having been produced by cylinder a' and forms 2. The blank spaces y between the impressions x and x' are due to the fact that the web has been fed forward the length of an impression during the return non-printing strokes of the bed. During this forward stroke of the bed (see Fig. 4) another impression x is being printed by cylinder a and form 1 and another impression x' is being produced by cylinder a' and form 2. At the end of the printing stroke (see Fig. 5) the cylinder a has just completed an impression x on the web from form 1, the cylinder a' has just completed an impression x' from form 2, and there are other impressions x in advance

of and following impression x which was previously produced on the web by cylinder a and form 1. As indicated in Fig. 6, during the return stroke of the bed the web is fed so as to bring a blank space y of paper to cylinder a' and carry the impressions x x' away from cylinder a'. At the end of the return stroke the web is again in the position indicated in Fig. 3 with a blank space y in front of the cylinder a' and ready to be printed thereon at the next operation. It will be seen, however, that the cylinders a a' do not print upon the same part of the web, but upon alternate sections thereof, and the impression from forms 1 and 2 are thus produced upon the web close together and in proper continuity, the impression from form 1 alternating with the impressions from form 2. The impressions from forms 1 and 2 on the web will be backed up and the web perfected by impressions from the forms 1^a 2^a, produced by the cylinders b b' in the same manner. Thus, as before stated, the web is fed continuously between the beds and cylinders and thirty-five inches of web are printed at each forward stroke of the beds, although they only move seventeen and one-half inches during the taking of impressions on each forward stroke.

While the horizontal arrangement of the crank gears shown in Figs. 1 and 2 is preferable if a very low down press is desired, other arrangements could be used. For example, as shown in Fig. 11, the beds might be driven by means of pitmen M², connected to crank-gears M, attached to stub-shafts journaled in fixed bearings M', arranged in the frame intermediate the beds. Any other preferred form of bed-reciprocating mechanism can be used.

The cylinders shown in Figs. 1 and 2 may be oscillating cylinders, or two or three revolution cylinders, or stop-cylinders, or drum-cylinders, as obviously the particular kind of cylinders employed does not effect the main characteristic of the invention. For example, in Figs. 12, 13, and 14 we show a drum-cylinder. The periphery of such cylinder would move in the same direction and at substantially the same speed as the web at all times, both during and after impression and upon both strokes of the bed.

Operation: The operation may be summarized as follows: The web is fed in continually by the feed-rolls operated by suitable gearing from the feed-shaft and passes continually between cylinders a a' and bed A, then is led over suitable guides to and between cylinders b b' and bed B, and is continually delivered, being slit longitudinally and the slit portions given a quarter-turn over the angle-bars and assembled before reaching the folder. At each printing-stroke of the bed two impressions (making two, four, or six pages) are produced on the

web by the coaction of cylinders *a a'* and forms 1 and 2 on bed A, and a similar number of pages are printed on the opposite side of the web in register with the first impressions by cylinders *b b'* from forms 1^a 2^a on bed B. By dividing the forms on each bed and using two cylinders with each bed we are able to print thirty-five inches of web for each seventeen and one-half inches of movement of bed during the impression, or, in other words, print twice the length of web that could possibly be printed by a single cylinder and bed, as above explained, the web being fed continually forward both during and after impressions and as much web passing the cylinders between impressions as passes during impressions. The first cylinder in each pair, however, skips every other page width of web; but these skipped portions are printed by the second cylinder in each pair, which skips the previously-printed portions, the "skipping" recurring during the return stroke of the bed and while the impression is thrown off.

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

1. In a printing-press, the combination of a type-bed, mechanism for reciprocating said bed, two cylinders adapted to cooperate with different forms on the bed each cylinder operating on but one form, means for continuously feeding a web forward between the bed and cylinders, and means for compensating the web for irregular travel of the bed during printing.

2. In a printing-press, the combination of a type-bed, mechanism for reciprocating said bed, two cylinders adapted to cooperate with forms on the bed, one cylinder printing parts of the web skipped by the other cylinder, means for feeding a web between the bed and cylinders, and means for compensating the web for irregular travel of the bed during the printing.

3. In a printing-press, the combination of a reciprocating type-bed, crank mechanism for driving said bed, two cylinders adapted to cooperate with different forms on the bed, one cylinder printing parts of the web skipped by the other cylinder, means for continuously feeding a web between the bed and cylinders, and means for compensating the web for irregular travel of the bed during the taking of impressions.

4. The combination of a reciprocating type-bed adapted to carry two forms, two impression-cylinders respectively coacting with one of the two forms, and adapted to simultaneously operate on their related forms, one cylinder and form printing the part of the web skipped by the other cylinder and form, means for continuously traveling a web through the press, and means for regulating the movement of the web during im-

pressions in accordance with the movement of the type-bed.

5. The combination of a reciprocating type-bed adapted to carry two forms, two impression-cylinders adapted to simultaneously operate on the two forms each cylinder coacting with but one form, one cylinder and form printing part of the web skipped by the other cylinder and form, means for feeding a length of web between the cylinders and bed during impression and a corresponding length of web therebetween between impressions, and means for regulating the movement of the web during impressions in accordance with the movement of the type-bed.

6. In a printing-press, the combination of a reciprocating type-bed carrying two forms, two cylinders each cooperating with one of the forms on the bed, and one cylinder printing part of the web skipped by the other cylinder; means for guiding a web successively between the bed and cylinders, and means for throwing off impressions during the return stroke of the bed, and means for controlling the travel of the web during impressions to compensate for the irregular movement of the bed.

7. In a printing-press, the combination of a type-bed carrying two forms, two cylinders simultaneously cooperating with the forms on the bed, means for guiding a web successively between the bed and cylinders, means for throwing off impressions during one stroke of the bed, and means for traveling a web at a substantially uniform rate of speed between the bed and cylinders both during and after impressions; with an ink-fountain between the cylinder-rollers for supplying ink from the fountain to both forms on the bed, a mechanism for reciprocating the bed, and means for compensating the web during impressions for irregular movements of the bed.

8. In a web-perfecting press, the combination of two type-beds, means for reciprocating the beds in opposite directions, a pair of cylinders above and coacting with each bed, and means for directing a web between the first bed and first pair of cylinders, to be printed on one side, and then between the second bed and second pair of cylinders to be perfected.

9. In a web-perfecting press, the combination of two type-beds, means for reciprocating the beds in opposite directions, a pair of cylinders above and coacting with each bed, means for directing a web between the first bed and pair of coacting cylinders, and then between the second bed and pair of coacting cylinders, one cylinder in each pair printing part of the web skipped by the other cylinder, and means for moving the web continually between the beds and cylinders at substantially uniform speed.

10. In a web-perfecting press, the combination of two reciprocating type-beds, a pair of cylinders coacting with each bed, and means for directing a web between the first bed and its pair of coacting cylinders, and then between the second bed and its pair of coacting cylinders; with means for reciprocating the beds in opposite directions, an ink-fountain and ink-supplying rolls between the cylinders in each pair, and means for compensating the web for irregular travel of the beds during impressions.

11. In a web-perfecting press, the combination of two type-beds, means for reciprocating the beds in opposite directions, a pair of cylinders above and coacting with each bed, and means for directing a web between the first bed and first pair of cylinders, to be printed on one side, and then between the second bed and second pair of cylinders to be perfected; with means for regulating the travel of the web between the beds and cylinders during impressions.

12. In a web-perfecting press, the combination of a pair of reciprocating type-beds in substantially the same plane, a pair of stationary impression-cylinders coacting with each bed, one cylinder printing parts of the web skipped by the first cylinder, and means for directing a web between one bed and its cylinders, and then between the second bed and its cylinders to be perfected; with means for reciprocating the beds in opposite directions; an ink-fountain and ink-supplying roll between the cylinders in each pair, and means for compensating the web for irregular travel of the beds during impressions.

13. The combination of a type-bed, a plurality of impression-cylinders adapted to simultaneously coöperate with forms on the beds, page-forms arranged end to end on said bed, means for directing a web between the bed and cylinders, means for longitudinally slitting the web in the margins between the page impressions, and angle-bars over which the slitted portions of the web are given a quarter-turn and assembled; means for reciprocating the beds, and means for feeding the web between the bed and cylinders both during and after impressions.

14. The combination of a pair of type-beds, a plurality of impression-cylinders for and coacting with each bed, page-forms arranged end to end on said beds, means for directing a web successively between the beds and cylinders, means for longitudinally slitting the web in the margins between the adjacent page impressions, and angle-bars over which the slitted webs are assembled by giving them a quarter-turn; means for reciprocating the beds, and means for feeding the web between the beds and cylinders both during and after impressions.

15. The combination of a pair of type-beds, a plurality of impression-cylinders for

and coacting with each bed, page-forms arranged end to end on said beds, means for directing a web successively between the beds and cylinders, means for longitudinally slitting the web in the margins between the adjacent page impressions, and angle-bars over which the slitted webs are assembled by giving them a quarter-turn; means for reciprocating the beds, and means for feeding the web between the beds and cylinders both during and after impressions; means for feeding the web continuously between the beds and cylinders both during and after impressions; and means for throwing off impressions on one stroke of the beds.

16. The combination of a pair of type-beds, a plurality of impression-cylinders for and coacting with each bed, page-forms arranged end to end on said beds, means for directing a web successively between the beds and cylinders, means for longitudinally slitting the web in the margins between the adjacent page impressions, and angle-bars over which the slitted webs are assembled by giving them a quarter-turn; means for feeding the web continuously between the beds and cylinders both during and after impressions, means for reciprocating the beds, and means for throwing off impressions on one stroke of the bed.

17. In a printing-press, the combination of a pair of type-beds, a pair of impression-cylinders coacting with each bed and adapted to simultaneously operate on different rows of forms carried by such beds, and print alternate spaces on the web; type page-forms arranged end to end transversely of the beds; means for feeding a web continuously between the beds and cylinders both during and after impressions; means for slitting the web longitudinally between the page margins and angle-bars for giving the slit webs a quarter-turn and assembling them at the folder.

18. In a printing-press, the combination of a pair of reciprocating beds, a pair of stationary impression-cylinders coacting with each bed and adapted to simultaneously operate on different rows of forms carried by such beds and print alternate spaces on the web, one type-bed and its cylinders perfecting the web, type page-forms arranged end to end transversely of the beds; means for feeding a web continuously between the beds and cylinders both during and after impressions, means for throwing off impressions on one stroke of the beds, means for slitting the web longitudinally between the page margins, and angle-bars for giving the slit webs a quarter-turn and assembling them at the folder.

19. In a printing-press, the combination of a reciprocating bed, two stationary cylinders respectively adapted to coöperate with one-half of the forms on the bed, means for feed-

ing approximately equal lengths of the web forward between the bed and cylinders both during and after impressions, and means for guiding the web so that the part of the web fed past the first cylinder and its coacting forms after impressions will be printed by the second cylinder and its coacting forms.

20. The combination of a reciprocating type-bed adapted to carry two forms, two impression-cylinders adapted to simultaneously operate on the related forms, each cylinder coacting with but one form, means for feeding a length of web forward between the cylinders and bed during impression and a corresponding length of web forward between the bed and cylinders after impressions, and means for regulating the movement of the web during impressions in accordance with the movement of the type-bed.

21. In a printing-press the combination of a type-bed carrying two forms, two cylinders simultaneously operating with the forms on the bed, each cylinder coacting with but one form, means for guiding a web successively between the bed and cylinders, means for throwing off impressions during one stroke of the bed, and means for traveling the web between the bed and cylinders at a substantially uniform rate of speed both during and after impressions.

22. In a printing-press, the combination of a type-bed carrying two forms, two cylinders each coöperating with but one of the forms on the bed, one cylinder and form printing part of the web skipped by the other cylinder and form, means for guiding a web successively between the bed and cylinders, means for throwing off impressions during the return stroke of the bed, and means for moving the web continuously forward and at a substantially uniform rate of speed between the bed and cylinders both during and after impressions.

23. In a printing-press, the combination of a bed adapted to carry two forms, two cylinders adapted to simultaneously coöperate with forms on the bed, each cylinder coacting with but one form, and one cylinder printing parts of the web skipped by the other cylinder, an inking mechanism arranged between the cylinders, adapted to supply ink to both sets of forms on the bed, web-guides and means for continuously traveling the web through the press and between the bed and cylinders both during and after impressions.

24. In a printing-press, the combination of a reciprocating type-bed, two cylinders adapted to coöperate with forms on the bed, each cylinder coacting with but one form, and an inking mechanism arranged between the cylinders, adapted to ink the forms for both cyl-

inders; with web-guides and means for feeding a length of web through the press during impressions and for feeding a like length of web through the press and between the bed and cylinders after impressions, the web being continuously moved in one direction.

25. In a printing-press, the combination of a reciprocating bed carrying two transversely-arranged sets of forms, two cylinders above the bed each adapted to coöperate with one set of forms on the bed, said cylinders operating simultaneously on their respective forms; with web-guides, and means for feeding a length of web equal to the width of one form forward between the bed and cylinders during impressions, and for feeding a corresponding length of web forward between the bed and cylinders in the interval between impressions and during the back strokes of the beds.

26. In a printing-press, the combination of a bed carrying transversely-arranged sets of forms, cylinders above the bed each adapted to coöperate with one set of forms on the bed, said cylinders operating simultaneously on their respective forms, web-guides, and means for continually feeding a web forward between the bed and cylinders both during impressions and between impressions; an ink-fountain above the bed and between the cylinders, and means for supplying ink from said fountain to the forms on the bed.

27. In a web-perfecting press, the combination of two reciprocating type-beds, a pair of cylinders coacting with each bed, one cylinder in each pair printing part of the web skipped by the other cylinder in such pair, guides for directing a web between the first bed and its pair of coacting cylinders, and then between the second bed and its pair of coacting cylinders; with means for moving the web continually forward between the beds and cylinders at substantially uniform speed both during and after impressions.

28. In a web-perfecting press, the combination of a pair of reciprocating type-beds, a pair of impression-cylinders coacting with each bed, and guides for directing a web between one bed and its cylinders, then between the second bed and its cylinders; with means for feeding half the length of web for a paper forward between the beds and cylinders during impressions and the remaining half of the length of web forward between the bed and cylinders after impressions.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

PAUL FLEMMING COX.

Witnesses:

H. F. WINGATE,
F. H. WINGATE.