(No Model.)

3 Sheets—Sheet 1.

J. T. HAWKINS.

WEB PERFECTING PRINTING MACHINE.

No. 332,521. Patented Dec. 15, 1885.

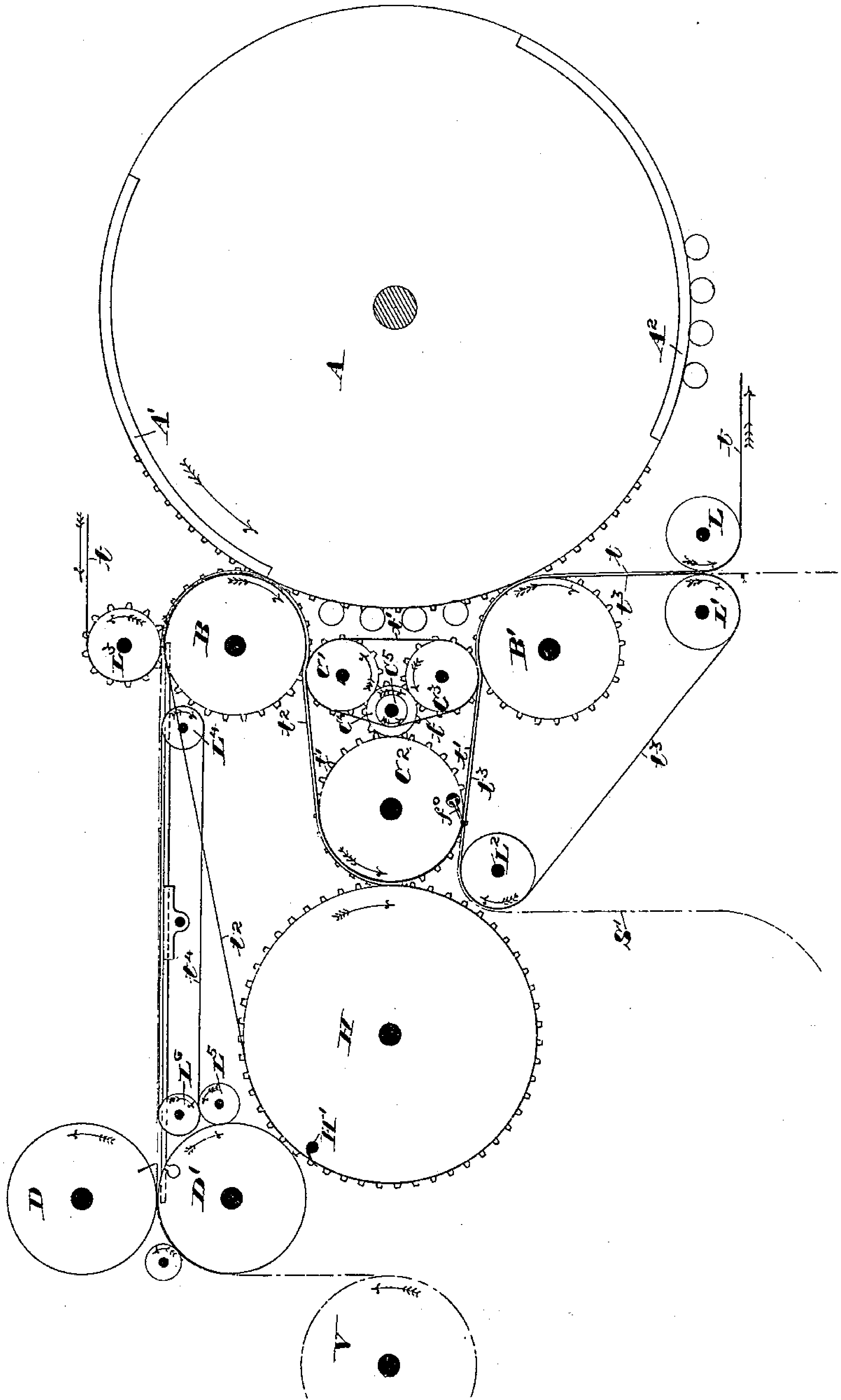

Fig. 1.

Witnesses:
Leo Von Rosenberg
Frances P. Reilley

Inventor:
John T. Hawkins
by R. M. Voorhees
Attorney.

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

(No Model.)

3 Sheets—Sheet 2.

J. T. HAWKINS.

WEB PERFECTING PRINTING MACHINE.

No. 332,521. Patented Dec. 15, 1885.

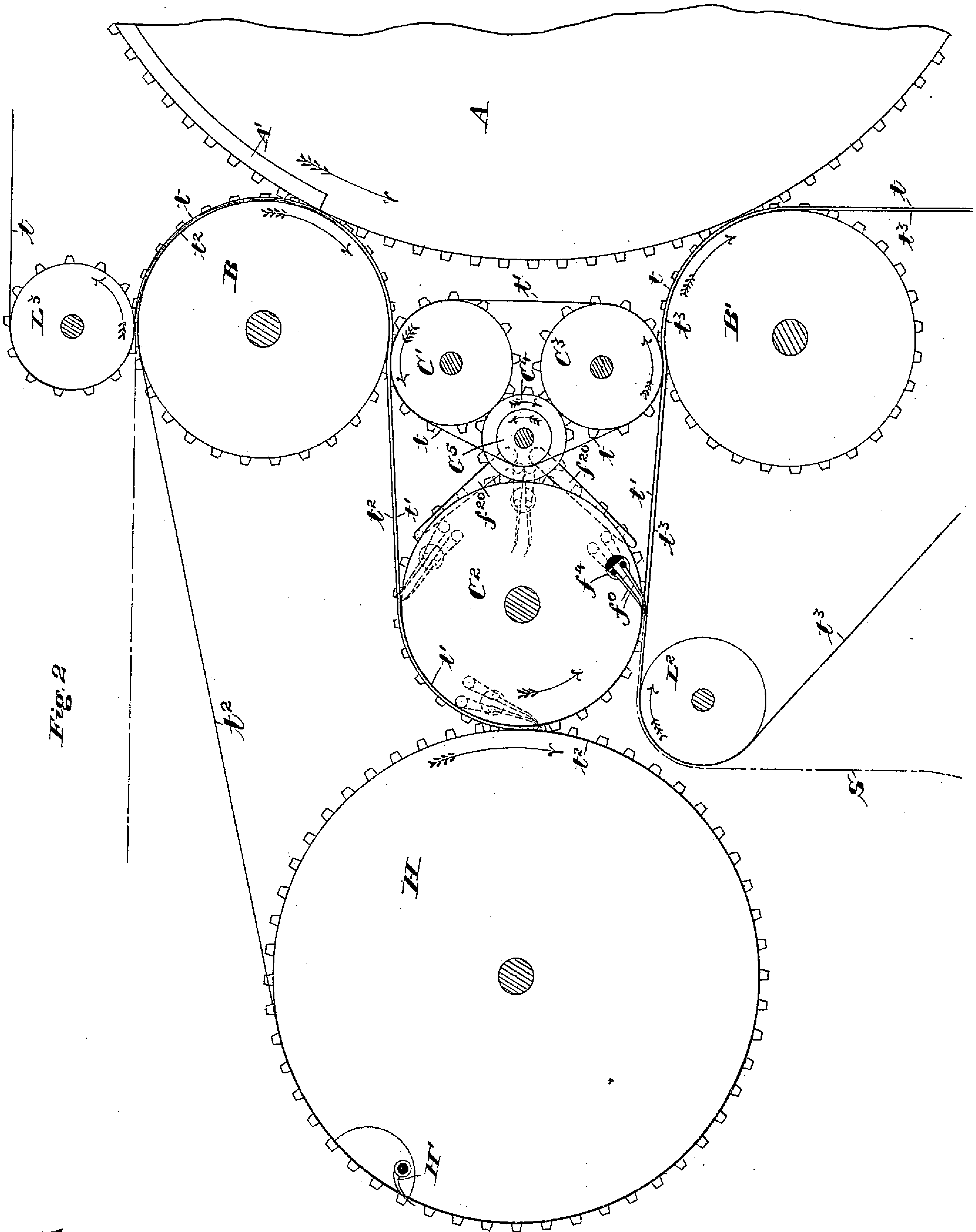

Fig. 2

Witnesses:
Leo Von Rosenberg
Francis P. Reilly

Inventor:
John T. Hawkins
by R. R. Voorhees
Attorney

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

(No Model.)

3 Sheets—Sheet 3.

J. T. HAWKINS.

WEB PERFECTING PRINTING MACHINE.

No. 332,521. Patented Dec. 15, 1885.

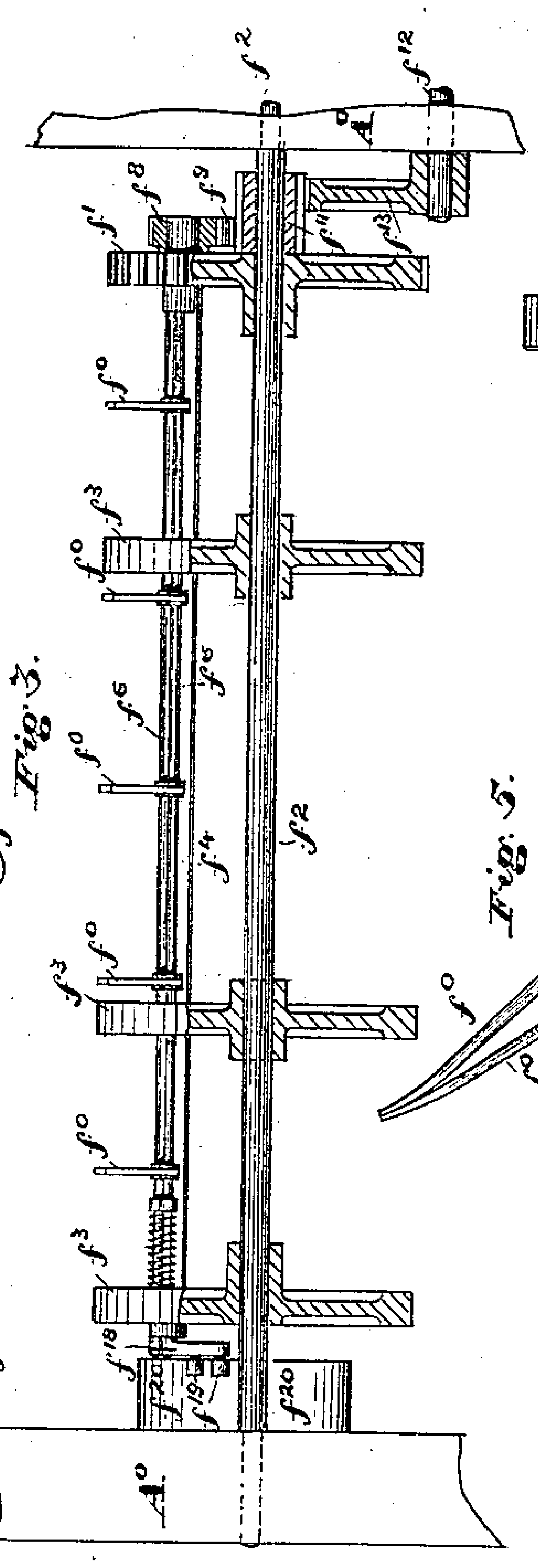
Fig. 3.

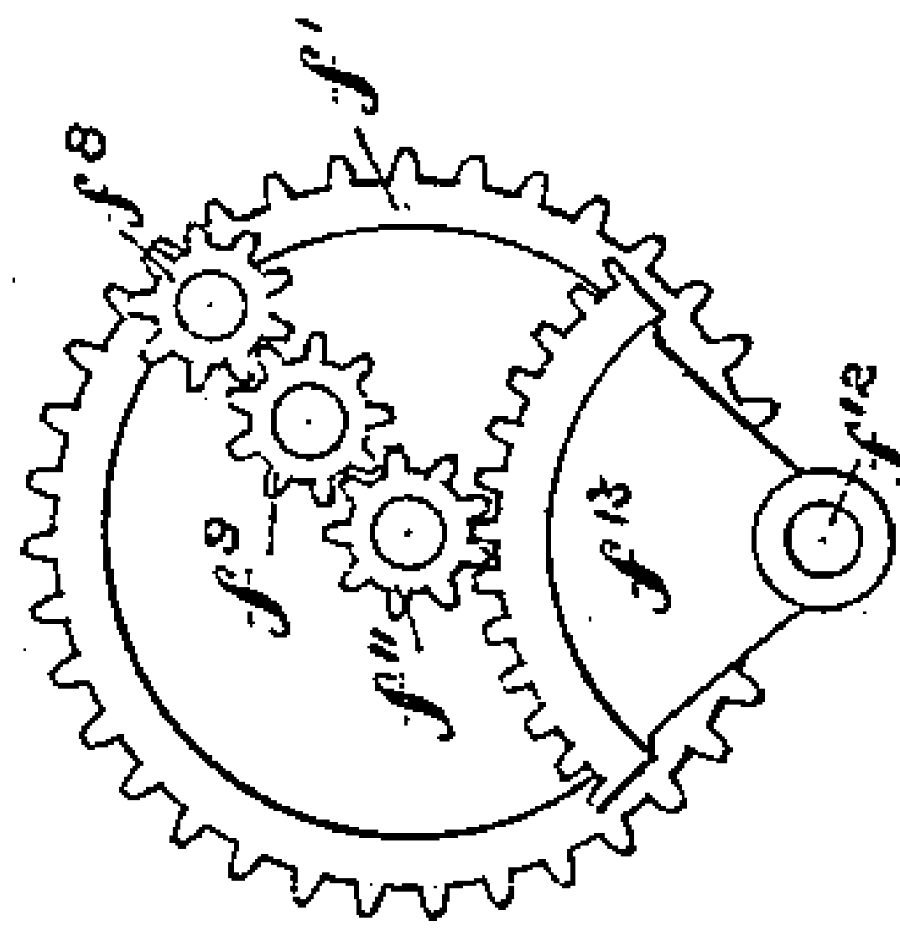
Fig. 4.

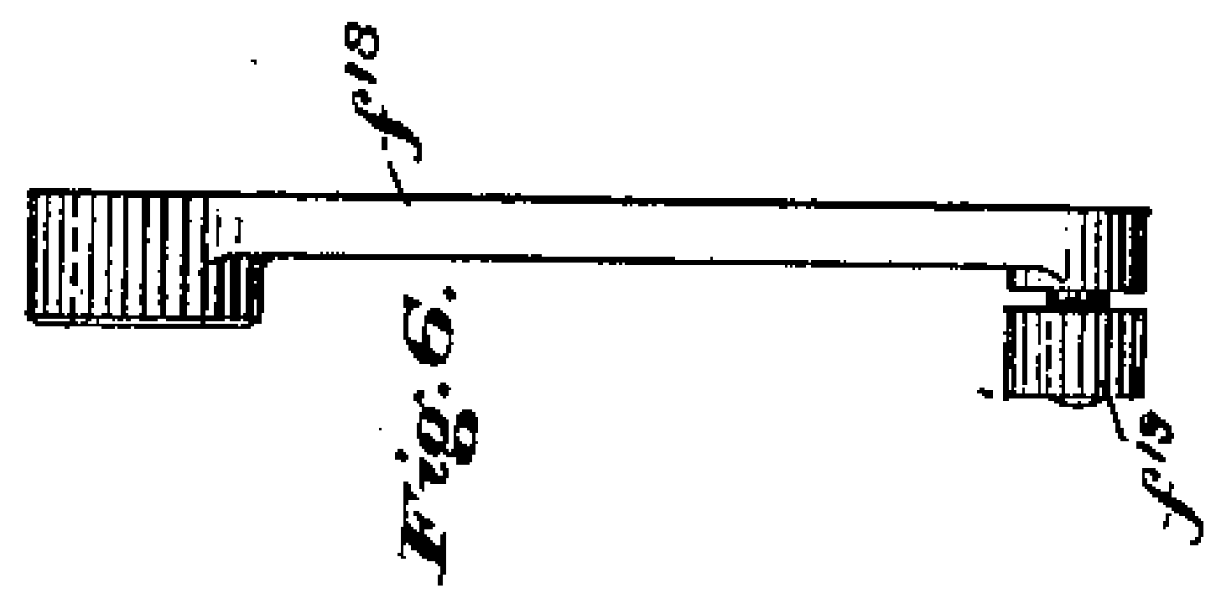
Fig. 6.

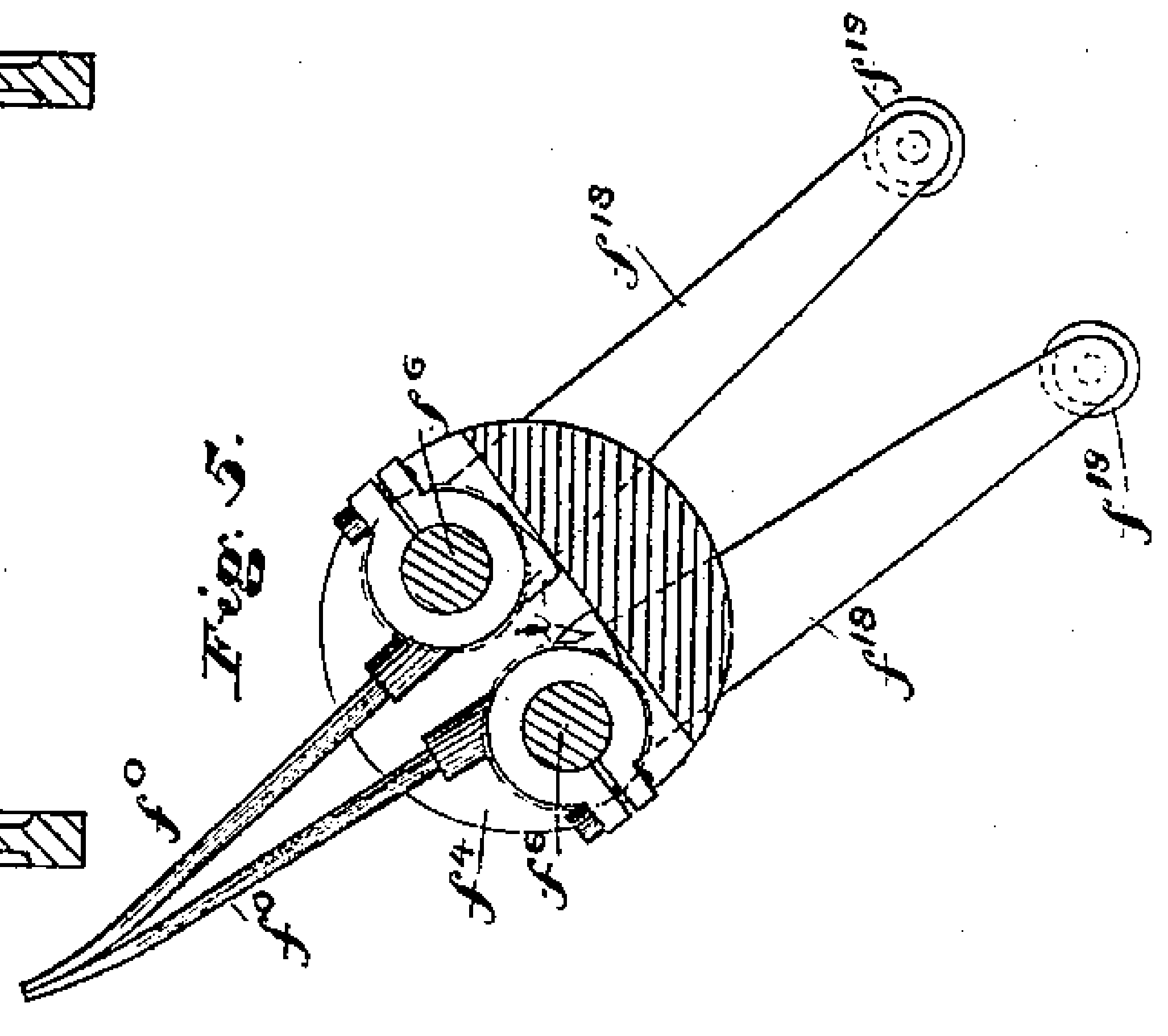
Fig. 5.

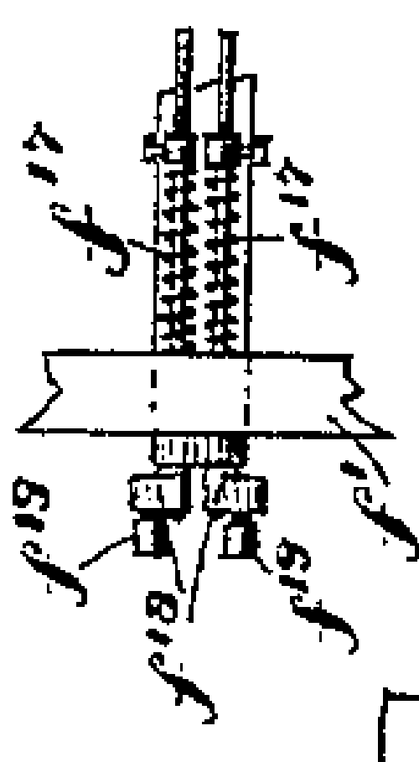
Fig. 7.

Witnesses:
Leo Von Rosenberg
Francis P. Reilly

Inventor:
John T. Hawkins
by R. N. Voorhees
Attorney.

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

UNITED STATES PATENT OFFICE.

JOHN T. HAWKINS, OF TAUNTON, MASSACHUSETTS.

WEB-PERFECTING PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 332,521, dated December 15, 1885.

Application filed May 11, 1885. Serial No. 165,051. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. HAWKINS, of Taunton, in the county of Bristol and State of Massachusetts, have invented a new and useful Improvement in Web-Perfecting Printing-Machines, which invention is fully set forth and illustrated in the following specification and accompanying drawings.

The object of this invention is to so arrange a rotary sheet-reverser, (such as that described in the specification of the application filed by me February 18, 1884, and bearing the Serial No. 121,083,) in relation to two impression-cylinders—from one to the other of which it transfers a sheet, reversing it during said transfer—and in relation to a type-cylinder, as to dispense with the necessity for conforming the proportions of said impression-cylinders and type-cylinder to those of the sheet-reverser and to its immediate connection to or distance from said cylinder, so that the position and diameter of said sheet-reverser may instead be made to conform in all cases to all conditions imposed by the other named elements.

The invention consists of the parts and combinations of parts as hereinafter described, and set forth in the claims.

In the accompanying drawings, Figure 1 is an outline longitudinal vertical section through such parts of one-half of a machine as are necessary to illustrate the invention, in which the sheets are cut before printing the first side, showing how (by the employment of intermediate wheels of suitable diameter) the sheet-reverser may, while conforming in diameter to the respective diameters of the impression-cylinders, be placed at any position relative to them and the type-cylinder necessary to bring the sheets at the proper times into positions to meet the proper forms. This figure also illustrates the use of the conveying or controlling cylinder for controlling the head of the sheet in this form of machine, as explained and claimed in my application filed February 18, 1884, bearing the Serial No. 121,084. In the case herein set forth, however, the sheets are cut from the web before printing the first side. Fig. 2 is an enlarged view of part of Fig. 1, showing the relative positions of parts of the sheet-reverser in connection with the contiguous elements of the machine. Figs. 3 to 7, inclusive, show details of the sheet-reverser and its operating mechanism, by means of which said reverser is actuated from any suitably-moving parts of the machine, similar to that fully described in application Serial No. 121,083, above mentioned.

Referring now to Figs. 1 and 2, the several letters therein indicate the respective parts below mentioned. A is the form-cylinder; A' and A^2, the forms; B B', impression-cylinders; C^2, the sheet-reverser; C' C^3, each a series of tape-pulleys with a gear-wheel on the axis, engaging, respectively, gear-wheels on the impression-cylinders B B'; C^4, an intermediate gear-wheel engaging the gears on the axes of the tape-pulleys C' and C^3 and the gear on the axis of the sheet-reverser C^2. C^5 are a series of tape-pulleys running loosely on the same axis to which the gear-wheel C^4 is secured, so that said pulleys may run in a contrary direction to the gear C^4 and its shaft. H is a cylinder carrying grippers H'. Said cylinder is made double the diameter of the sheet-reverser C^2, and geared thereto. D D' are cutting-cylinders for severing the sheets from the web as they pass through the machine. V is the roll from which the machine is fed. L L' L^2 L^3 L^4 L^6 are each a series of tape-pulleys carried upon suitable shafts. L^5 is an intermediate gear-wheel engaging similar wheels on D' and L^6, for imparting motion to the latter. A series of three tapes, t, which run in line with the unprinted margins of the sheet, pass, commencing at L^3, to the left around L^3, around the impression-cylinder B, thence over C' to and slightly around C^5, thence around C^3, thence around the impression-cylinder B', thence around L to the right-hand side of the machine, where is repeated this or a similar path, returning again to the pulleys L^3, it being presumed here that the entire apparatus shown, except the type-cylinder, is duplicated on the other side of the machine, and therefore not necessary to be shown. A series of tapes, t', commencing at C', pass to the left hand around C^2, around C^3, around C', to the point of starting. A series of tapes, t^2, commencing at the top of impression-cylinder B, pass around it to the right, thence partly over C^2, thence around H to the point of starting. A series of tapes, t^3, commencing at the top of

B', pass around it to the right, thence around L', thence over L^2, thence to the point of starting. A series of tapes, t^4, commencing at the top of L^6, pass to the right, thence around L^4, thence under and around L^6, to the point of starting. It will be obvious that in this construction, by varying the proportions of intermediate gears, C' C^3 C^4, and their pulleys, the sheet-reverser C^2 may be placed in any position relative to the impression-cylinders B and B' and the form-cylinder A necessary to bring the sheets and forms in contact at the proper times. It will also be seen that in this construction the severed sheets will be conveyed through the entire operation of printing without the use of grippers in the impression-cylinders B B', as in the application Serial No. 121,083, above mentioned. Thus the path of the web will be as follows: Coincident with the sheet being cut from the web by the cutting-cylinders D D' the leading end enters in between tapes t t^2 at the point of contact of the impression-cylinder B and pulleys L^3, remaining between them until reaching the point of contact of impression-cylinder B and pulleys C', whence it passes to C^2 between tapes t' and t^2, until seized at the tail end by the twin grippers f^0 of the sheet-reverser C^2, the head of the sheet having been previously carried partly around H by the grippers H', which seize the head of the sheet at the proper time at the point of contact of the cylinder H and the sheet-reverser C^2. The grippers H' are made to release the head of the sheet about at the time that the twin grippers f^0 have made a semi-revolution. After grasping the tail of the sheet and having conveyed the tail of the sheet so as to enter between the tapes t' and t^3, at which point the twin grippers f^0 release it, it is conveyed by tapes t' t^3 to the point of contact of impression-cylinder B' and pulleys C^3, where it enters between tapes t and t^3, being thence conveyed by them until it issues from the machine by the pulleys L L', whence it may be conveyed to the delivery apparatus or folder in any desired position.

The positions of the sheet are indicated throughout by broken lines.

Fig. 3 is an elevation, partly in section, of the sheet-reverser, showing broken parts of the main frames A^0 of the machine, in which frames it is carried and operated, as fully described in application Serial No. 121,083, above mentioned. Fig. 4 is an end view of the right-hand end of Fig. 3, the frame A^0 of the machine being removed. Fig. 5 is a transverse section enlarged of the gripper-carrier, showing the twin grippers, their shafts, and operating-levers. Fig. 6 is a side elevation on the same enlarged scale of the levers secured to the twin-gripper shafts. Fig. 7 is a view in plan of one end of the twin-gripper shafts, showing the position of the springs which operate to close the twin grippers upon each other.

Referring to said figures, a gear-wheel, f', is secured to the shaft f^2, the latter journaled in the frame A^0, engaging gears C^4 and the gear on cylinder H. Three or any number of plain wheels, f^3, of the same diameter as the pitch-circle of the gear f', are also secured to the shaft f^2. Journaled in the gear f' and the wheels f^3 is a gripper-carrier, f^4. In the gripper-carrier f^4 are journaled two gripper-shafts, f^6. On one end of the gripper-carrier f^4 is secured a spur-pinion, f^8. Upon a stud in the gear f' runs an intermediate pinion, f^9. On the shaft f^2 runs freely a wide-faced pinion, f^{11}, gearing on one half its face with the intermediate pinion, f^9. On a short rock-shaft, f^{12}, journaled in the frames A^0, is secured, to its inner end, a sector-gear, f^{13}, gearing with the other half of the face of the wide-faced pinion f^{11}, and on its outer end a lever (not shown) carrying a roller which engages a cam, as fully described in application Serial No. 121,083, above mentioned. On the pair of twin-gripper shafts f^6 are secured pairs of twin grippers f^0, closing upon each other at their points by means of the springs f^{17}. The hub of each of these twin grippers f^0 is made so as to form a stop, i, resting on the flat part of the gripper-carrier f^4, to prevent one of each pair of grippers f^0 from following the other when either shall be opened, as hereinafter explained. On each twin-gripper shaft, outside of the outer wheel, f^3, is secured a lever-arm, f^{18}, each of said arms carrying a roller, f^{19}. To the frame A^0 are secured two stationary cams, f^{20}, in position to engage the rollers f^{19}. As the entire sheet-reverser is rotated the sector f^{13}, by means of the cam referred to—as shown in Serial No. 121,083, but not shown herein—is given such motion as to bring the gripper-carrier f^4, and with it the twin grippers f^0, to assume the various positions shown in Fig. 2 in full lines, when delivering the tail of the sheet to and between the tapes t' t^3, into its path to receive its impression upon its second side, and in dotted lines in three other positions, always coming to the several positions shown at those points. At the point shown in full lines, Fig. 2, one of the cams f^{20} is about to open one of the twin grippers f^0, allowing the sheet to follow the path between the tapes t' t^3. Continuing the rotation of the sheet-reverser in the direction of the arrow, Fig. 2, both rollers f^{19}, as next seen in dotted lines, are in contact with the cams f^{20}, and the twin grippers f^0 are both opened away from each other. Continuing to the next position, as shown in dotted lines, Fig. 2, one of the twin grippers f^0 has returned to the position as limited by the stop i, and the other is held partly open by the action of one of the cams f^{20} for the reception of the tail of the sheet then passing in its path between tapes t' t^2 after having received its impression on its first side. Thus the sheet enters from the cutting-cylinders D D' between the tapes t t^2, receives its first impression, then passes between tapes t t^2, is conveyed around the sheet-reverser C^2, seized at the head by the grippers H′ of the controlling-cylinder H, conveyed partly around the latter, meanwhile being seized by the tail by the twin grippers f^0, until the parts assume the position shown in Figs. 1 and 2, with the grippers H′ releasing the head of the sheet to drop down, as indicated by dotted lines at S, Fig. 1, at which time the twin grippers f^0 are leading the tail end into and between the tapes t' t^3; thence it passes between tapes t t^3, receives its impression on the second side, and finally passes from the machine between tapes t t^3 to the folder or other means of delivery.

I do not herein claim the parts illustrated on Sheet 3 of the accompanying drawings, as the same are claimed in my pending application, Serial No. 121,083, filed February 18, 1884.

Having thus fully described my said improvements, as of my invention I claim—

1. In a web-perfecting printing-machine, in combination with a type or form cylinder, as A, impression-cylinders, as B B′, a rotary sheet-reverser, as C^2, and a series of intermediate gears, as C' C^3 C^4, whereby the sheets from one impression-cylinder are timed in their paths proper to meet their respective forms, while the sheet-reverser is maintained of the same diameter as that of the impression-cylinders, substantially as and for the purposes set forth.

2. In a web-perfecting printing-machine, in combination with a type or form cylinder, as A, a pair of impression-cylinders, as B B′, a rotary sheet-reverser, as C^2, a series of intermediate gears, as C' C^3 C^4, and a sheet-conveying cylinder, as H, whereby the sheet is reversed, its tail becoming its head, substantially as and for the purposes set forth.

3. In a web-perfecting printing-machine, in combination with a type or form cylinder, as A, a pair of impression-cylinders, as B B′, a rotary sheet-reverser, as C^2, a series of intermediate gears, as C' C^3 C^4, a sheet-conveying cylinder, as H, and a series of conveying-tapes, as t t' t^2 t^3, forming paths for the sheet, whereby it is conveyed through the impressions and to the sheet-reverser without the use of grippers in said impression-cylinders, substantially as and for the purposes set forth.

JOHN T. HAWKINS.

Witnesses:
ELISHA T. JACKSON,
J. F. HALEY.