

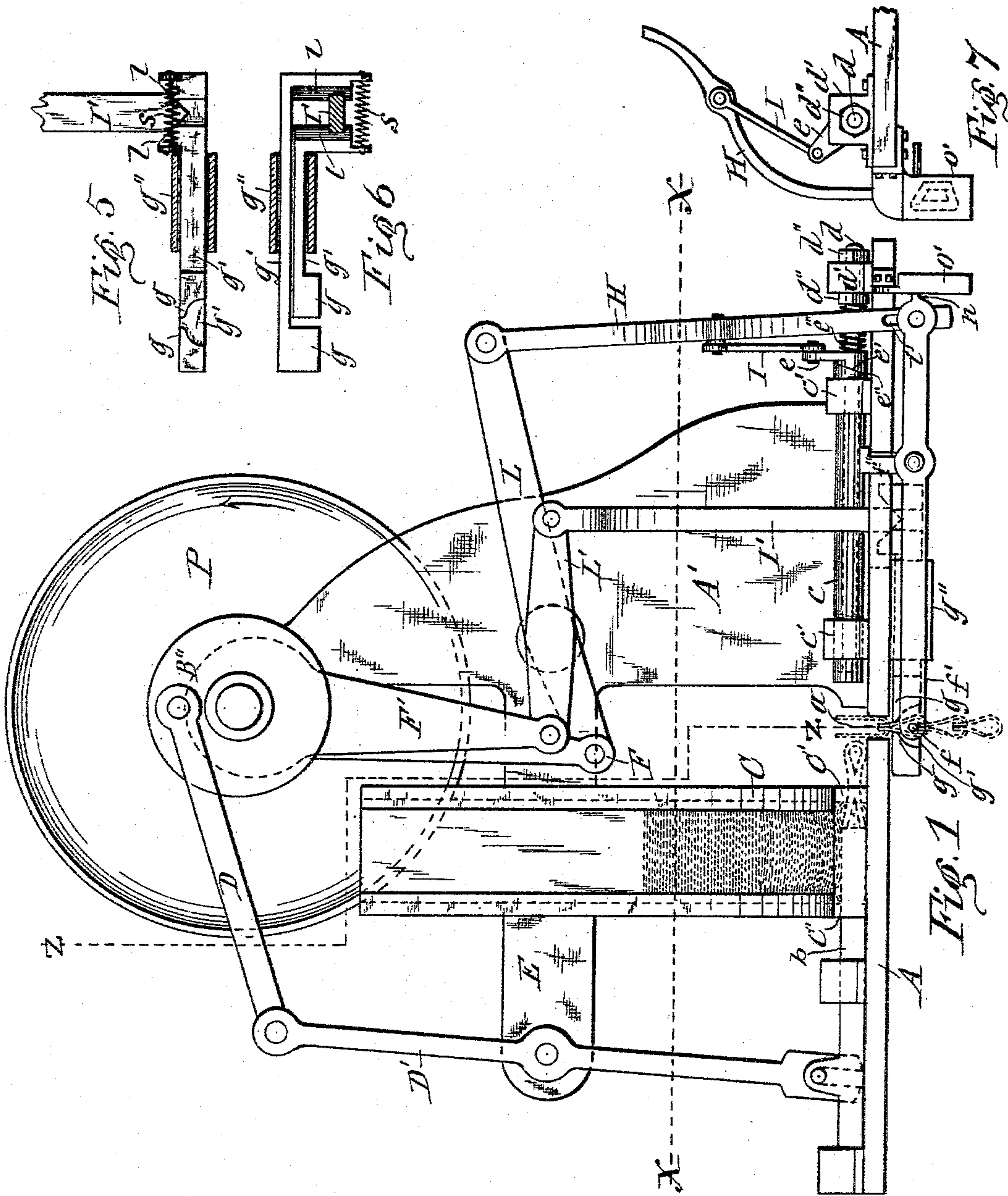
(No Model.)

4 Sheets—Sheet 1.

M. HEIM.
CHAIN LINKING MACHINE.

No. 494,780.

Patented Apr. 4, 1893.



WITNESSES:

C. L. Bendisore
H. M. Seaman

INVENTOR:

Martin Heim
By *And. Laaser Dull*
his ATTORNEYS.

(No Model.)

4 Sheets—Sheet 2.

M. HEIM.
CHAIN LINKING MACHINE.

No. 494,780.

Patented Apr. 4, 1893.

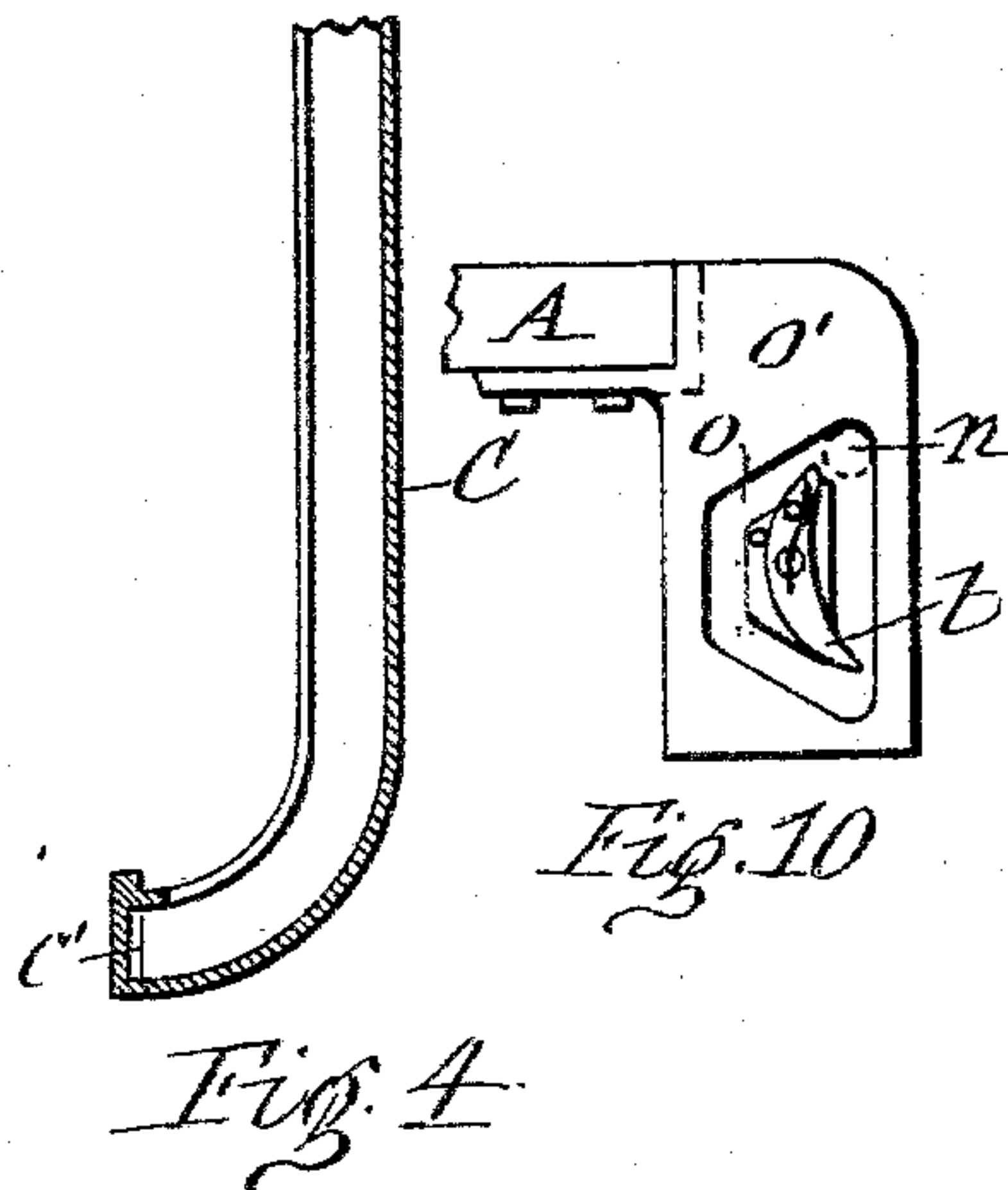
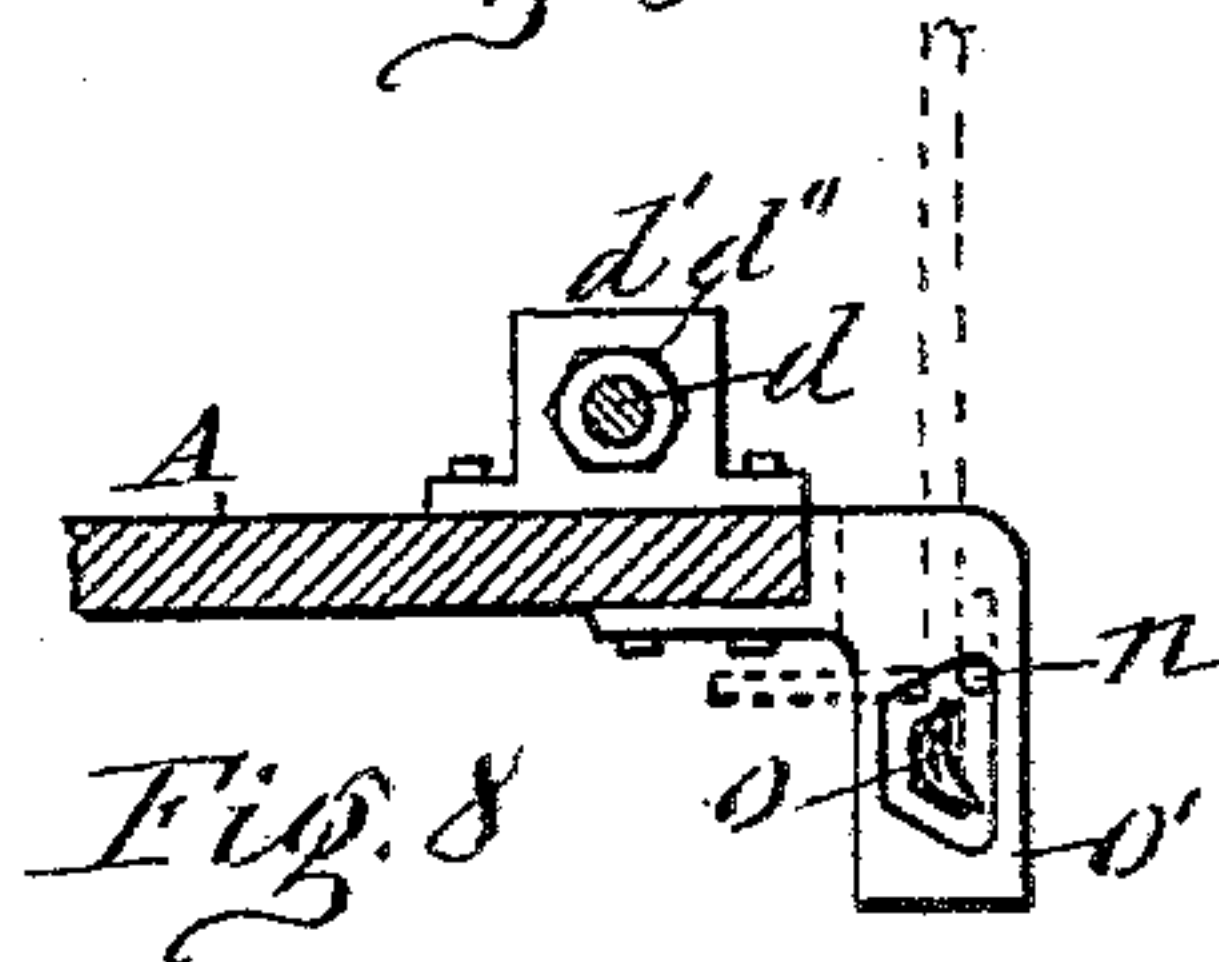
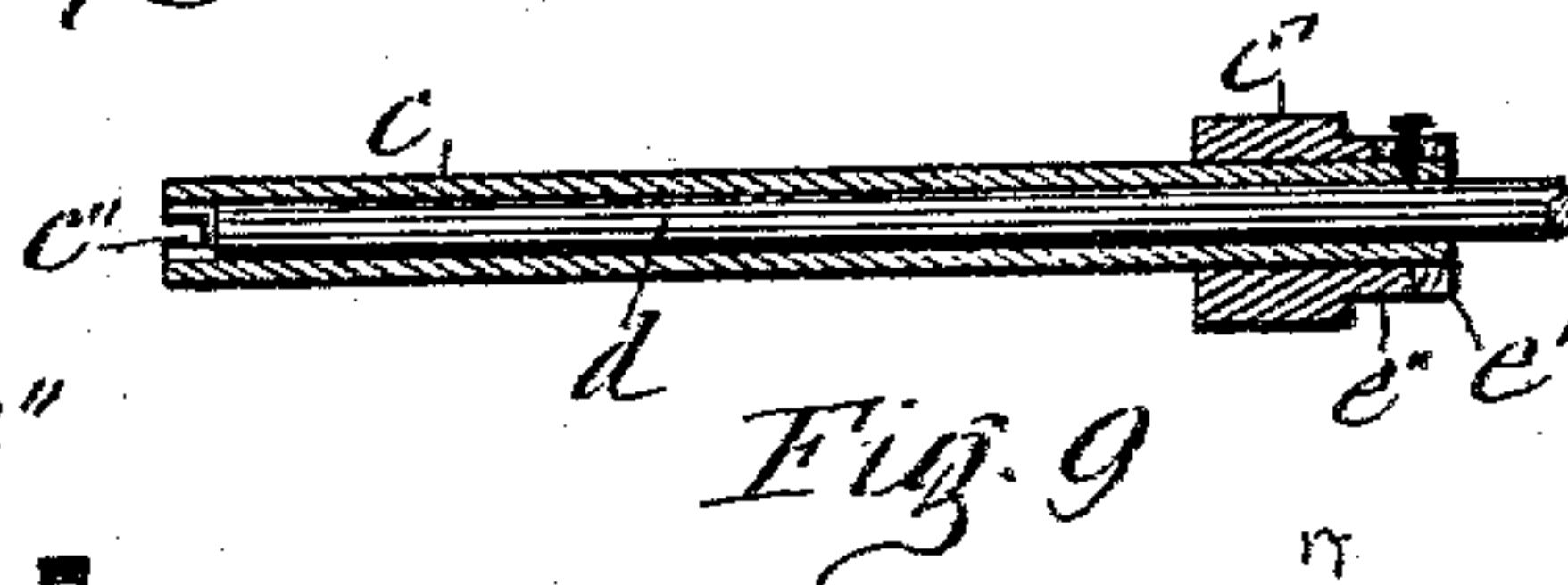
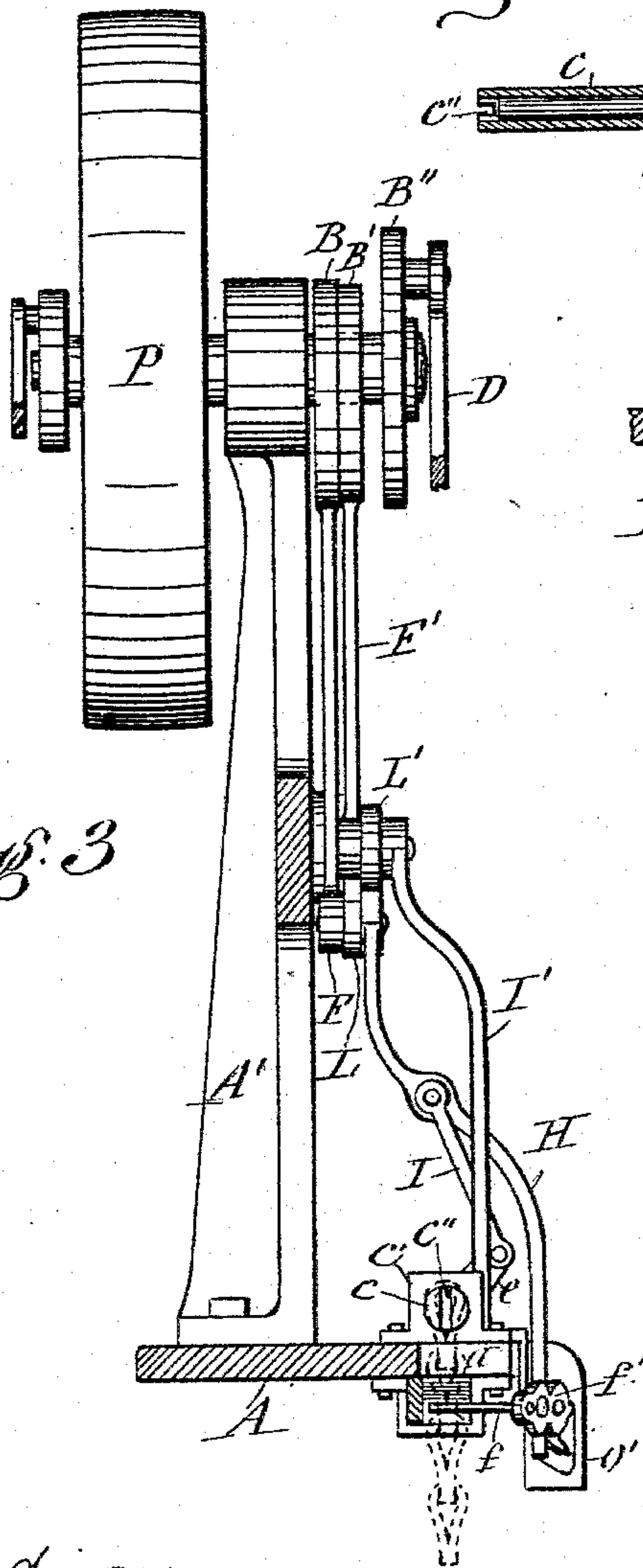
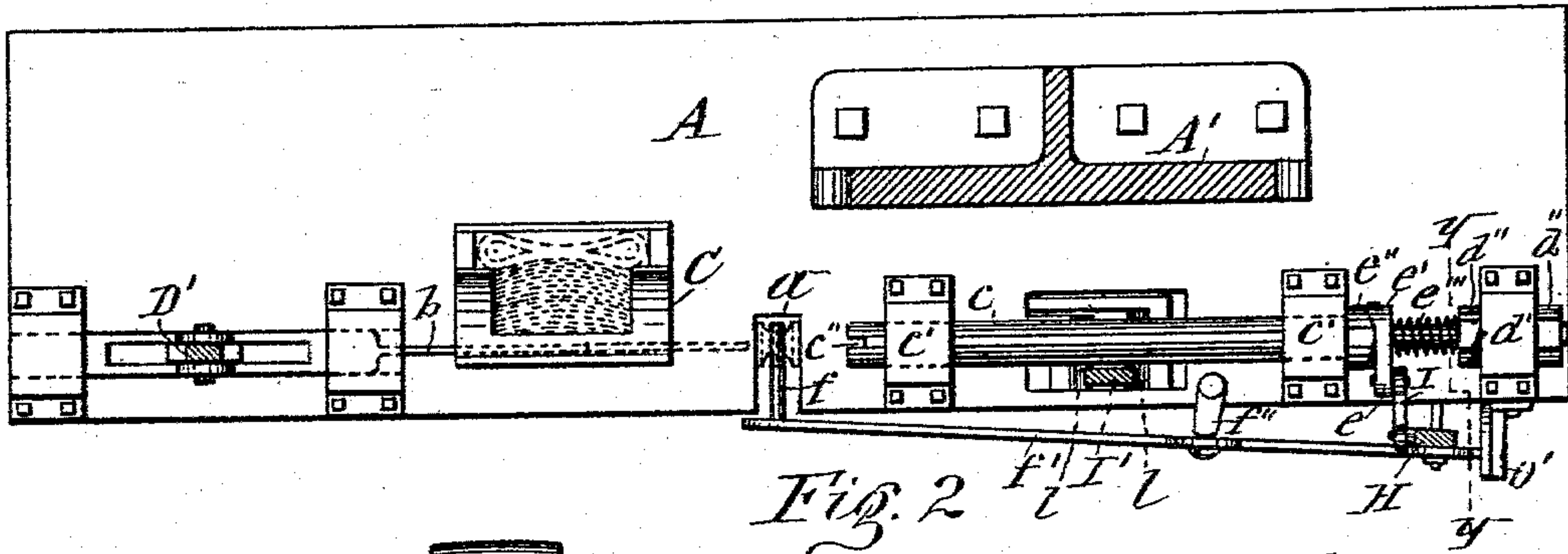


Fig. 10

Fig. 4

WITNESSES:

C. L. Burdixon
H. M. Seamans

INVENTOR:

Martin Heim
By *Quell, Lasso & Barth*
ATTORNEYS.

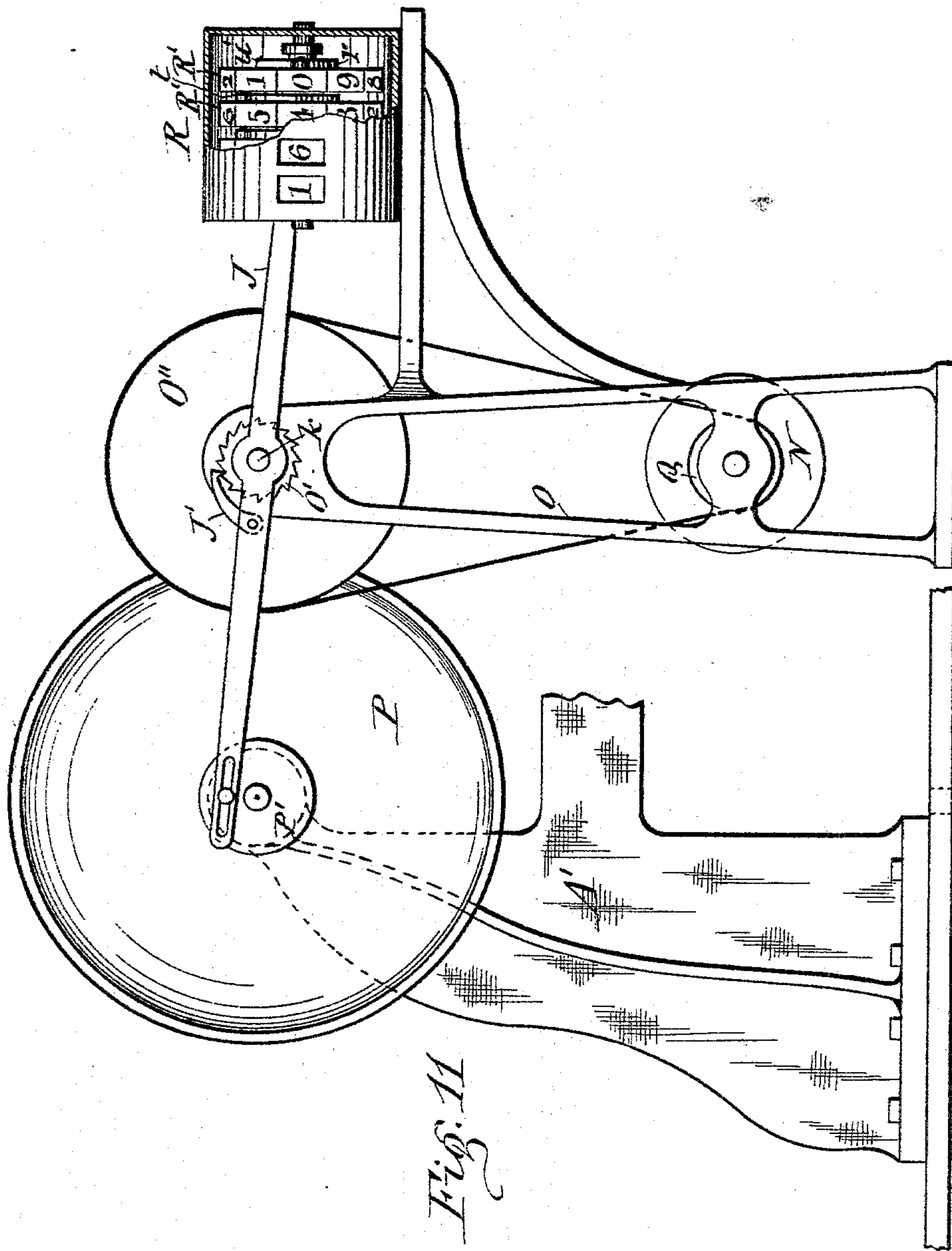
(No Model.)

4 Sheets—Sheet 3.

M. HEIM.
CHAIN LINKING MACHINE.

No. 494,780.

Patented Apr. 4, 1893.



WITNESSES:

C. L. Bendixon
H. M. Seaman

INVENTOR:

INVENTOR:
Martin Heim
By G. D. Bull, Laessle & Bull
his ATTORNEYS.

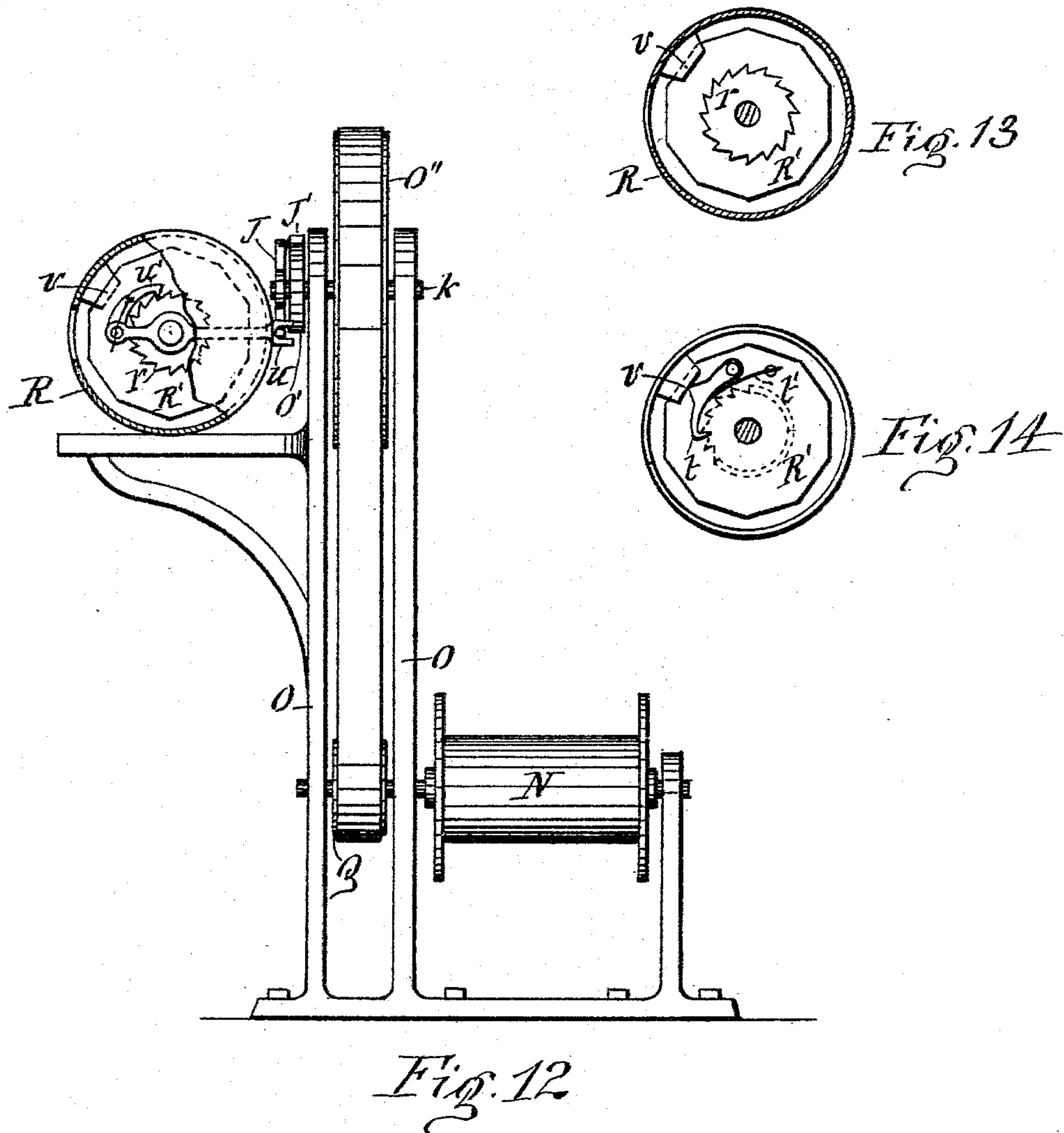
(No Model.)

4 Sheets—Sheet 4.

M. HEIM.
CHAIN LINKING MACHINE.

No. 494,780.

Patented Apr. 4, 1893.



WITNESSES:

C. L. Bendixon
H. W. Seaman

INVENTOR:

Martin Heim
By Hull, Lasso & Hull
his ATTORNEYS.

UNITED STATES PATENT OFFICE.

MARTIN HEIM, OF SYRACUSE, NEW YORK.

CHAIN-LINKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 494,780, dated April 4, 1893.

Application filed October 10, 1892. Serial No. 448,287. (No model.)

To all whom it may concern:

Be it known that I, MARTIN HEIM, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful
5 Improvements in Chain-Linking Machines, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to the manufacture
10 of that class of chains which are composed of links formed of flat plates, each of which is perforated at both ends and bent across its center into the form of a loop and receives through the perforations in its ends the loop
15 of the adjacent link formed in the same manner; and the invention consists in an improved organization of a machine which bends the link-blanks into the requisite loop shape and couples them together in an expeditious
20 and efficient manner, all as hereinafter more fully described and specifically set forth in the claims.

In the annexed drawings, Figure 1 is a side
25 elevation of a machine embodying my invention. Fig. 2 is a horizontal longitudinal section on line *x, x*, in Fig. 1. Fig. 3 is a vertical transverse section on line *z, z*, in Fig. 1. Fig. 4 is a vertical transverse section of the hopper containing the link-blanks. Figs. 5
30 and 6 are respectively side and plan views of the jaws which complete the bending of the blank into link shape. Fig. 7 is an end elevation of the devices for turning the blank from an edgewise to a horizontal position and
35 for operating the pin which draws the blanks down into position to be operated on by the aforesaid jaws. Fig. 8 is a vertical transverse section on line *y, y*, in Fig. 2. Fig. 9 is a longitudinal section of the bar which turns the
40 link-blank from a vertical into a horizontal position. Fig. 10 is an enlarged face view of the cam which imparts lateral motion to the lever which draws down the link-blank. Fig. 11 is a side elevation of the chain winding,
45 measuring and registering mechanism. Fig. 12 is an end elevation of the same with part of the case broken away, and Figs. 13 and 14 are views of opposite sides of one of the registering wheels.

50 Similar letters of reference indicate corresponding parts.

A—represents the base plate of the frame

of the machine, and —A'— a standard which rises from said base-plate. Said base-plate is provided with a vertical transverse slot —*a*—
55 at one side of which is the chute —C— erected on the base-plate. This chute is to contain the blanks from which the links are to be formed, and is therefore of rectangular form in cross section to carry the blanks horizon-
60 tally and piled up in a tier as indicated by dotted lines in Fig. 1 of the drawings. The chute is disposed with the long sides of the rectangle parallel with the base plate or at
65 right angles to the slot —*a*—, and the base of the chute is curved laterally as shown in Fig. 4 of the drawings, to turn the blanks thereat into a vertically edgewise position. A vertical
70 slot —C'— in the base of the chute at the edge facing the slot —*a*— permits the bottom blank to be pushed out endwise from the chute. Another similar slot is provided in
75 the opposite edge of the chute for the entrance of the push-bar —*b*— which pushes the blank from the chute a proper distance to bring the center of the length of the blank
across the slot —*a*.

At the opposite side of the slot —*a*— and in range with the delivery of the chute —C—
80 is a tubular bar —*c*— mounted revolubly in suitable bearings —*c'*—*c'*— secured to the base-plate —A'—. The end of said bar adjacent to the slot —*a*— is provided with a transverse groove —*c''*— for the purpose hereinafter explained. Within the bar —*c*— is
85 a cylindrical rod —*d*— which normally extends from the groove —*c''*— through the opposite end of the bar and through a collar —*d'*— fastened to the base-plate. Said rod is
90 secured stationary in its position by nuts —*d''*—*d''*— applied to the screw-threaded end portion of the rod at opposite sides of the collar —*d'*—. Between the collar —*d'*— and
95 adjacent bearing —*c'*— is a crank —*e*— which is rigidly attached to the end of the tubular bar —*c*— and the hub of said crank is formed with a cam-shaped face —*e'*— at the side adjacent to the bearing —*c'*— and the latter has
100 firmly affixed to it or formed integral with it a similar cam —*e''*— against which the hub of the crank is pressed by a spiral spring —*e'''*— interposed between said hub and adjacent nuts —*d''*—. By turning the crank
—*e*—, the bar —*c*— receives a quarter turn

and at the same time the two cams —*e'*—*e'*— push the crank laterally and thereby cause the tubular bar —*c*— to move longitudinally so as to bring the grooved end of said bar flush with the end of the rod —*d*—. The purpose of the bar —*c*— is to receive in its groove —*c'*— the end of the link-blank pushed from the hopper and across the slot —*a*— in the bed plate, and the turning of the said bar as aforesaid turns the link-blank into a horizontal position, and in this position it is left by the longitudinal movement of the bar —*c*— which by aid of the rod —*d*— liberates the blank from the groove —*c'*—.

For bending the blank into the shape of a link I employ a horizontally disposed pin —*f*— which has a vertical movement terminating in lateral movements. In beginning to form the links and coupling the same I bend the first blank into U-shape and insert it vertically into the slot —*a*— with the ends of the blank upward as indicated by dotted lines in Fig. 1 of the drawings. From thence on I bend the blanks by the machine, and this I accomplish by means of the pin —*f*— which in its upward and subsequent lateral movement enters the base of the loop-shaped blank held in the slot —*a*— and in its downward movement draws said loop farther down. The succeeding blank having previously been inserted into the perforated upper ends of the U-shaped blank, causes the central portion of the inserted blank to be drawn down into the slot —*a*— by the U-shaped blank. The pressure of the sides of the slot on the blank drawn into said slot bends it into U-shape.

For carrying the pin —*f*— in the directions before described I preferably employ a vertically and laterally oscillatory lever —*f'*— which is pivoted intermediate its length to a suitable support —*f''*— on the base plate —*A*— and has a pin —*f*— projecting laterally from the end adjacent to the slot —*a*— as shown in Fig. 2 of the drawings.

For completing the bending of the blanks into the requisite link-shape I employ two jaws —*g*—*g*— which are movable toward and from each other and disposed at opposite sides of the U-shaped blank which is immediately below the slot —*a*—. Said jaws are affixed to bars —*g'*—*g'*— sliding longitudinally in a guide —*g''*— secured to the base plate —*A*—, and in the approach of said jaws the end portions of the interposed blank are pressed together as illustrated in Fig. 1 of the drawings.

For operating the described link-forming and coupling devices in their requisite order I preferably employ the following mechanism.

In the upper end of the standard —*A'*— I mount the shaft of the driving pulley —*P*—, and to said shaft I attach the eccentrics —*B*— and —*B'*— and crank-wheel —*B''*—. To the wrist-pin of this crank-wheel I connect the pitman —*D*— which in turn is connected to the upper end of a lever —*D'*— pivoted to an arm —*E*— on the standard and connected at its lower end to the push-bar —*b*— to which

it imparts a reciprocating motion and which pushes the link-blanks from the chute —*C*— and into position for being bent into link-shape as hereinbefore described. The crank —*e*— receives the necessary rocking motion to impart to the tubular bar a quarter turn by means of the eccentric rod —*F*— connected to the eccentric —*B*— and to one end of a lever —*L*— which is pivoted to the standard —*A'*—, and has connected to its opposite end the pitman —*H*—, which in turn is connected with the crank —*e*— by a rod —*I*—. The lever —*f'*—, which carries the pin —*f*—, receives its vertical oscillatory motion from the pitman —*H*— which is connected at its lower extremity to the outer end of the said lever, by a wrist-pin attached to the lever and passing through a vertical slot —*i*— in the pitman, said slot permitting a limited lost motion which causes the lever to remain at rest while the straight blank is introduced into the U-shaped blank, and turned into a horizontal position as hereinbefore described. The lateral oscillation of the lever —*f'*— is produced by a pin —*n*— projecting longitudinally from the outer end of the lever and moving in a cam-groove —*o*— formed in a bracket —*o'*— attached to the bed-plate. A spring actuated guard —*t*— is pivoted to the bracket and lies normally across the groove —*o*— at the upper and lower portions thereof to guide the pin —*n*— so as to cause it to make a complete circuit of the cam-groove. The jaws —*g*—*g*— receive their requisite reciprocating motion from the eccentric —*B'*—, the eccentric rod —*F'*— of which is connected to one end of a lever —*L'*— pivoted to the standard —*A'*—. To the opposite end of said lever is connected the plunger —*I'*—, the lower end of which is beveled V-shaped. Said plunger thus reciprocated passes with its beveled end between beveled cams —*l*—*l*— which are attached to the bars —*g'*—*g'*— and are automatically drawn toward each other by a spring —*s*—, as shown in Figs. 5 and 6 of the drawings. The downward stroke of the plunger forces the two jaws —*g*—*g*— against opposite sides of the blank to complete the link, as hereinbefore described.

In connection with the described chain-linking machine I prefer to employ an apparatus for automatically winding the chain upon a drum —*N*—. To impart the requisite motion to the drum I mount on the shaft of the driving pulley —*P*—, a crank-wheel —*P'*— and on the upper ends of standards —*O*— or other suitable supports I journal a horizontal shaft —*k*— to which is fastened a ratchet-wheel —*O'*— and pulley —*O''*—. On said shaft is also mounted a lever —*J*— one end of which is slotted longitudinally and receives through it the wrist-pin of the crank-wheel —*P'*— which imparts an oscillatory motion to the lever. A pawl —*J'*— connected to the lever and engaging the ratchet wheel —*O'*— transmits intermittent rotary motion to the latter

and to the pulley —O'—. To the lower portion of the standard —O— is journaled the shaft to which are fastened a pulley —Q— and drum —N—. A belt connecting the two pulleys —O'— and —Q— transmits an intermittent motion to the drum —N— which winds upon it the chain formed by my chain linking machine hereinbefore described.

If desired a suitable apparatus may be employed for automatically registering the number of feet of chain wound upon the drum. For exemplification I have shown a registering apparatus —R— of the form of a plurality of wheels —R'—R'— mounted loosely on one and the same shaft and each having the numerals from 0 to 9 plainly marked and uniformly distributed upon the periphery thereof. Said wheels are surrounded by a case having in front of each wheel an aperture of a size to expose one of the numerals on the wheel.

To the outer side of the first wheel (which represents units), is attached a ratchet-wheel —r— and to the opposite side of said wheel is connected a pawl —t— which is adapted to engage a ratchet-wheel on the adjacent side of the second wheel. A spring —t'— holds the said pawl normally out of engagement with the ratchet-wheel. A cam *v* on the inner side of the case which incloses the wheel throws the pawl —t— in engagement with the ratchet-wheel of the second wheel at the end of each revolution of the first wheel and thus motion is imparted to the second wheel. The cam is of such a length as to hold the pawl in its engagement only during a sufficient period to turn the second wheel a distance equal to that from center to center of two adjacent numerals, and in a like manner each succeeding wheel receives such periodical motion at the end of each complete revolution of the preceding wheel. The first or unit registering wheel —R'— receives intermittent rotary motion by means of a rock-arm —u— mounted on the shaft of the registering wheels and connected at one end to the end of the lever —J— and provided at the opposite end with a pawl —u'— which engages the ratchet-wheel —r— on the aforesaid registering wheel.

The described mechanisms for transmitting motion to the first or unit registering wheel are so proportioned and arranged that said registering wheel is turned the distance from center to center of two adjacent numerals thereon during the time required to manufacture one foot of chain by the hereinbefore described chain-linking machine, and thus the length of the chain produced by said machine is automatically measured and registered.

It is obvious that an eccentric may be used in lieu of the crank-wheel —P'—, and sprocket-wheels and a chain may be substituted for the pulleys —O'— and —Q— and their driving belt, and I therefore do not limit myself in that respect.

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

1. In combination with the base-plate —A— provided with the slot —a—, the chute —C—, push-bar —b—, and the lever —f'— provided with the pin —f— and pivoted to move vertically and laterally as set forth. 70

2. In combination with the base-plate —A— provided with the slot —a—, the chute —C—, push-bar —b— and the revoluble bar —c— provided with the transverse groove —c''—, substantially as and for the purpose set forth. 75

3. In combination with the base-plate —A— provided with the slot —a—, the revoluble bar —c— provided with the transverse groove —c''—, and the lever —f'— provided with the pin —f— substantially as set forth. 80

4. In combination with the base-plate —A— provided with the slot —a—, the chute —C—, push-bar —b— revoluble bar —c— provided with the transverse groove —c''— and the lever —f— provided with the pin —f—, substantially as described and shown. 85 90

5. In combination with the base-plate —A— provided with the slot —a—, the chute —C—, push-bar —b—, revoluble bar —c— provided with the groove —c''—, the lever —f— provided with pin —f— and the reciprocating jaws —g—g— all combined to operate as set forth. 95

6. In combination with the base-plate —A— provided with the slot —a—, the chute —C— and push-bar —b—, the revoluble tubular bar —c— provided with the groove —c''—, the crank —e— attached to said bar and formed with the cam-face —e'—, the stationary cam —e''—, the rod —d— within the bar —C— and extending from the outer end thereof and confined in its position, and the spring —e'''— holding the crank with its aforesaid cam face in contact with the cam —e''—, substantially as set forth. 100 105

7. The combination of the bars —g'—g'— moving in a guide —g''—, the jaws —g—g— attached to one end of said bars, the cams —l—l— attached to the opposite end of the bars, the spring —s— drawing the cams toward each other, and the plunger —I'— entering between said cams as set forth. 110 115

8. The chute —C— disposed erect and of rectangular form in cross section and terminating with a laterally curved base provided with vertical slots at opposite edges, in combination with the push-bar —b— entering one of said slots to push the bottom blank from the chute as set forth. 120

9. In combination with the base-plate —A— provided with the slot —a—, the lever —f'— provided at one end with the laterally projecting pin —f— and at the opposite end with the longitudinally projecting pin —n—, the pitman —H— imparting a vertical oscillatory motion to said lever, the bracket —o'— provided with the cam-groove —o— entered by the pin —n—, and the guard —t— guiding the 125 130

pin and in connection with said cam-groove
imparting a lateral movement to the lever,
substantially as set forth.

10. In combination with the driving shaft
5 of the chain linking machine, and a drum for
winding up the chain issuing therefrom, a
crank mounted on said shaft, a lever actu-
ated by said crank, pulleys and a belt trans-
mitting motion to the drum, and a pawl and

ratchet transmitting motion from the lever to
one of the pulleys as set forth.

In testimony whereof I have hereunto signed
my name this 27th day of September, 1892.

MARTIN HEIM. [L. S.]

Witnesses:

H. M. SEAMANS,
C. L. BENDIXON.