

No. 668,920.

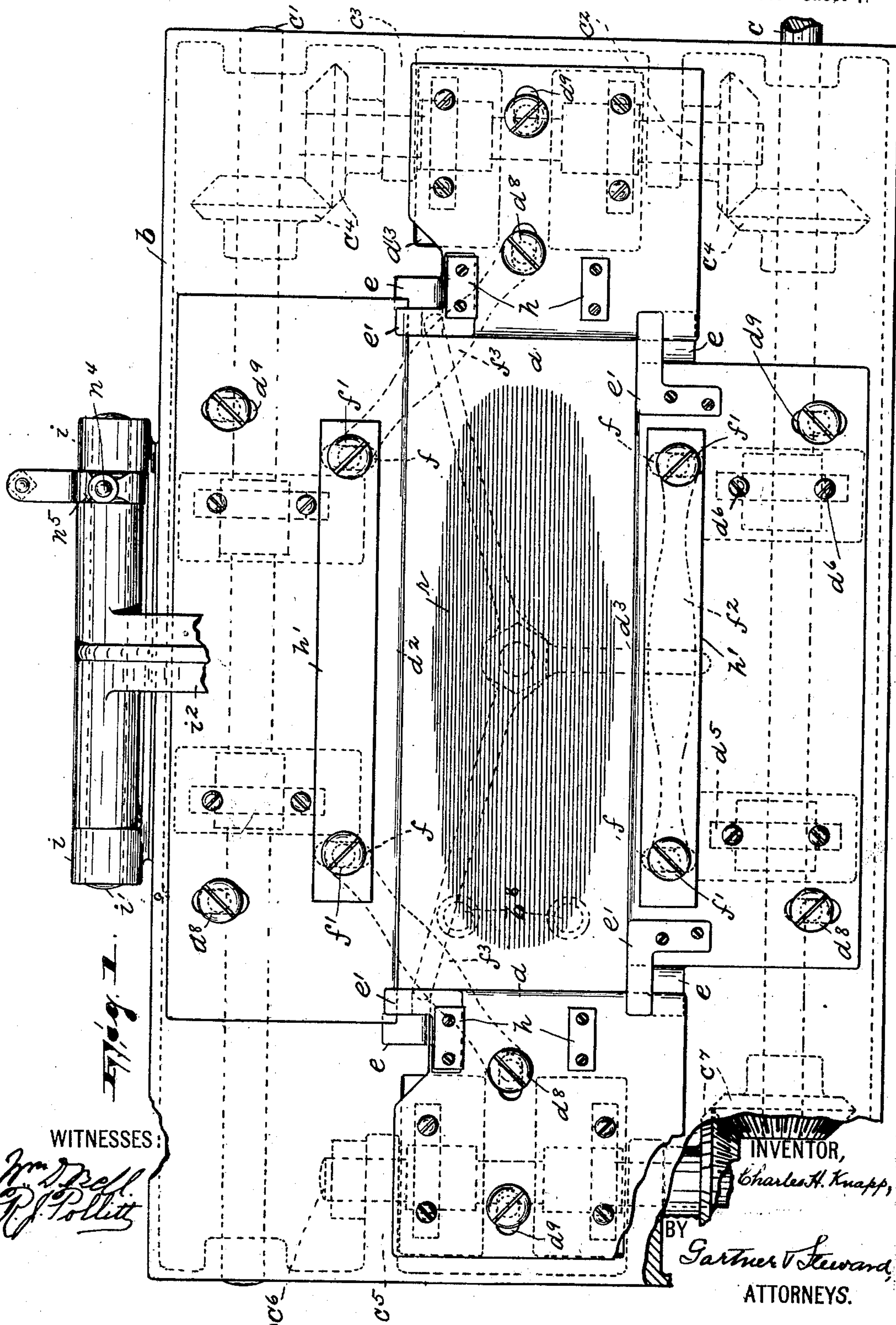
Patented Feb. 26, 1901.

C. H. KNAPP.
MACHINE FOR FOLDING COLLARS, &c.

(No Model.)

(Application filed Mar. 6, 1900.)

3 Sheets—Sheet 1.



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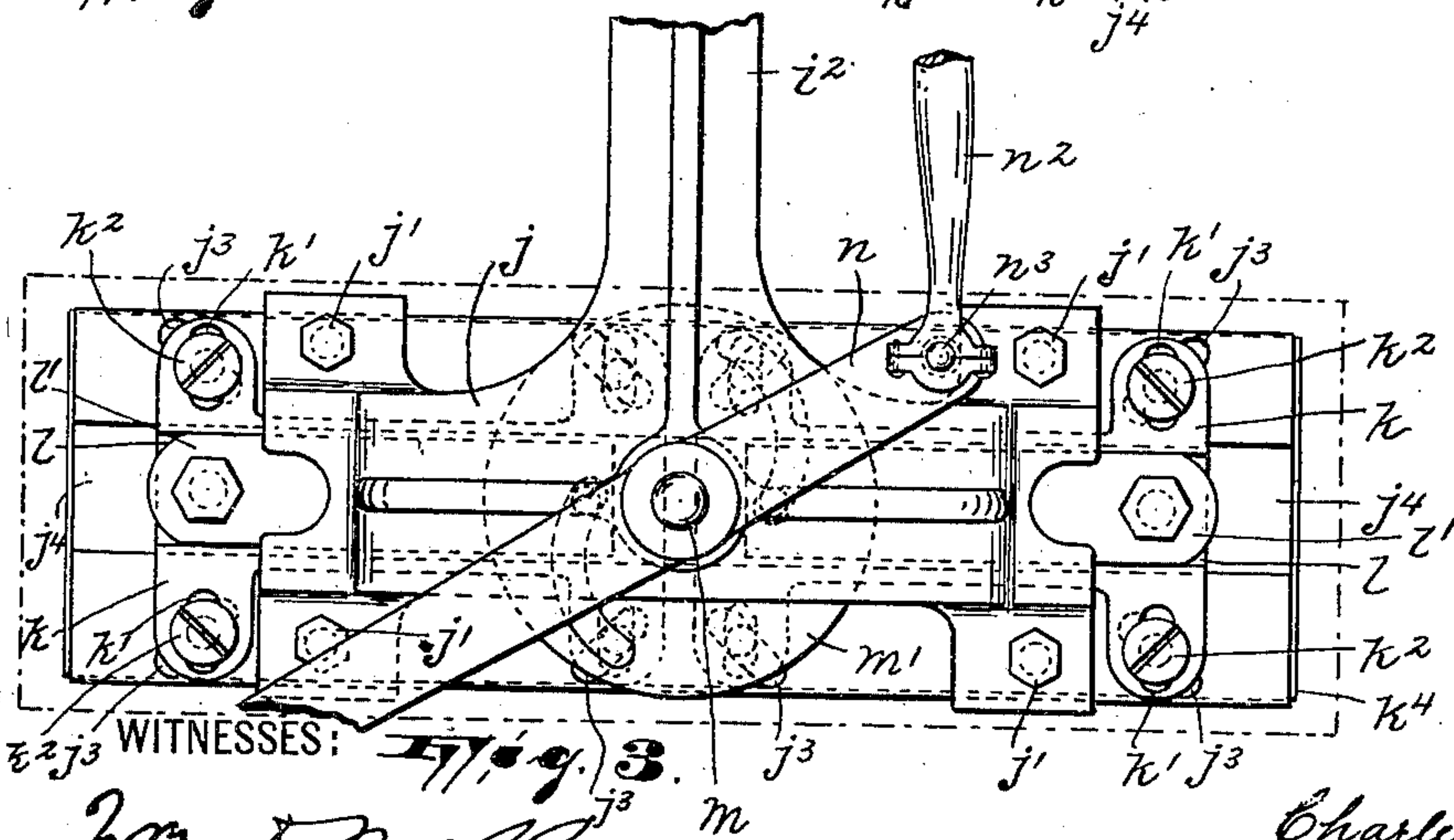
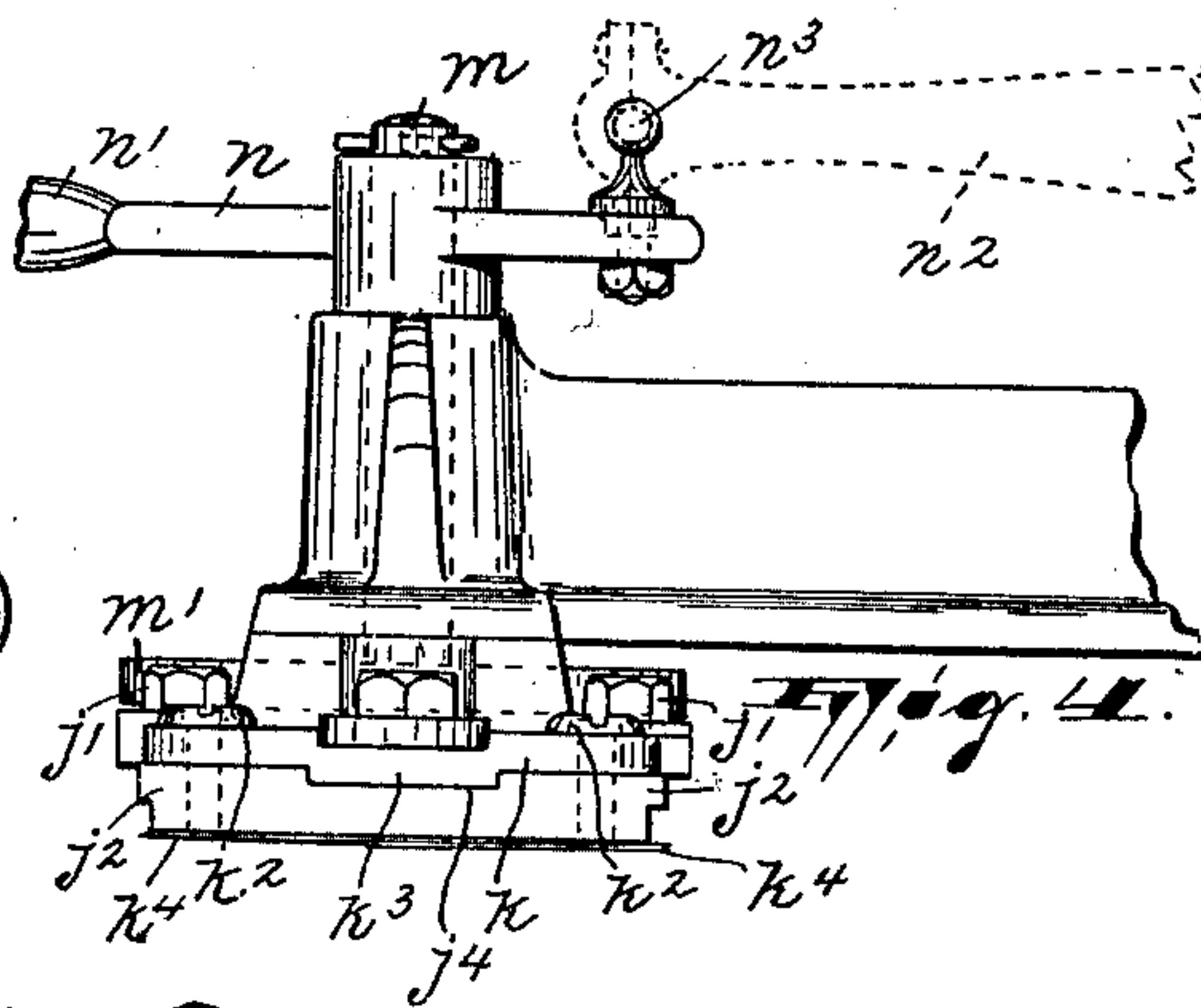
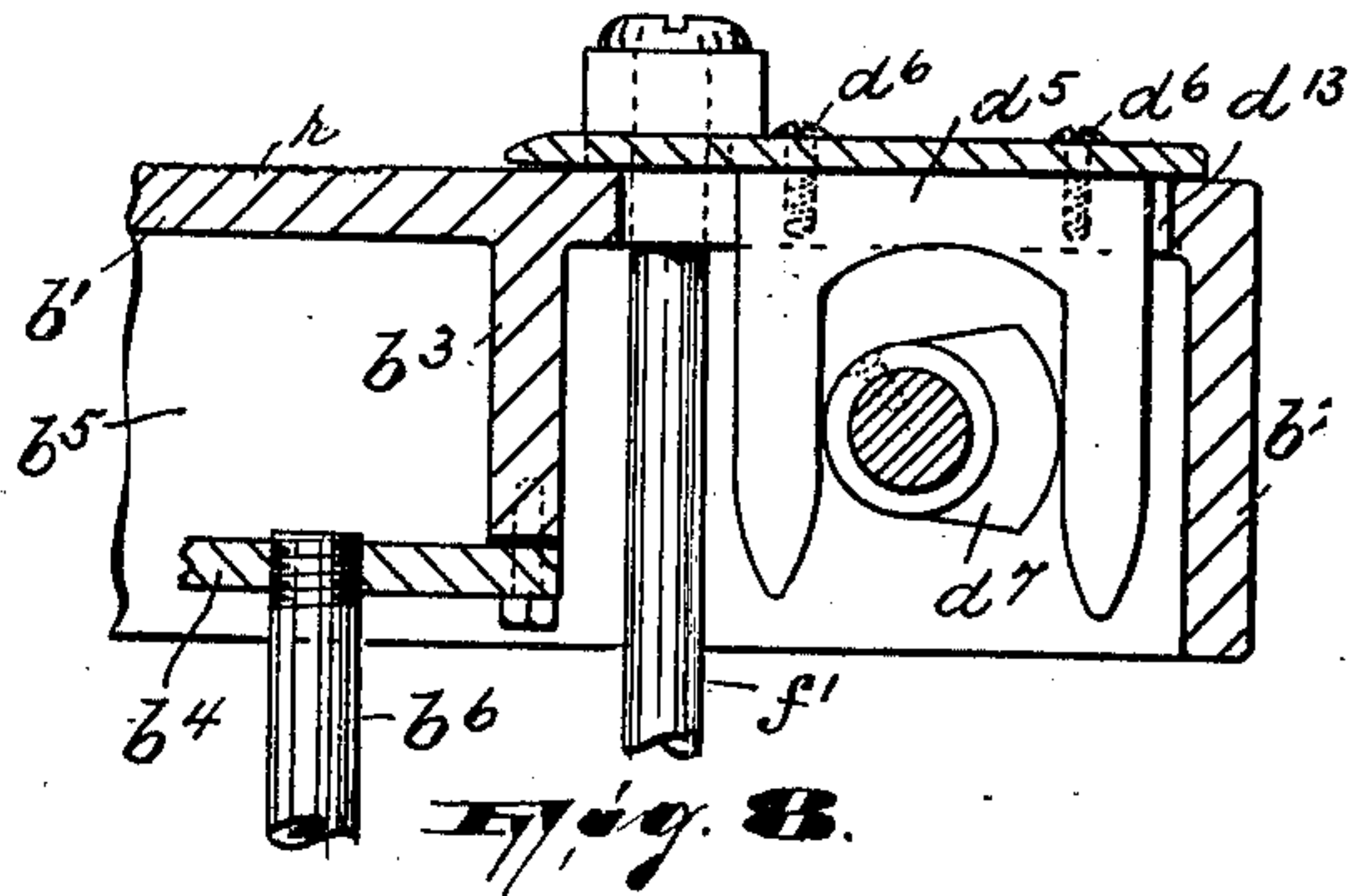
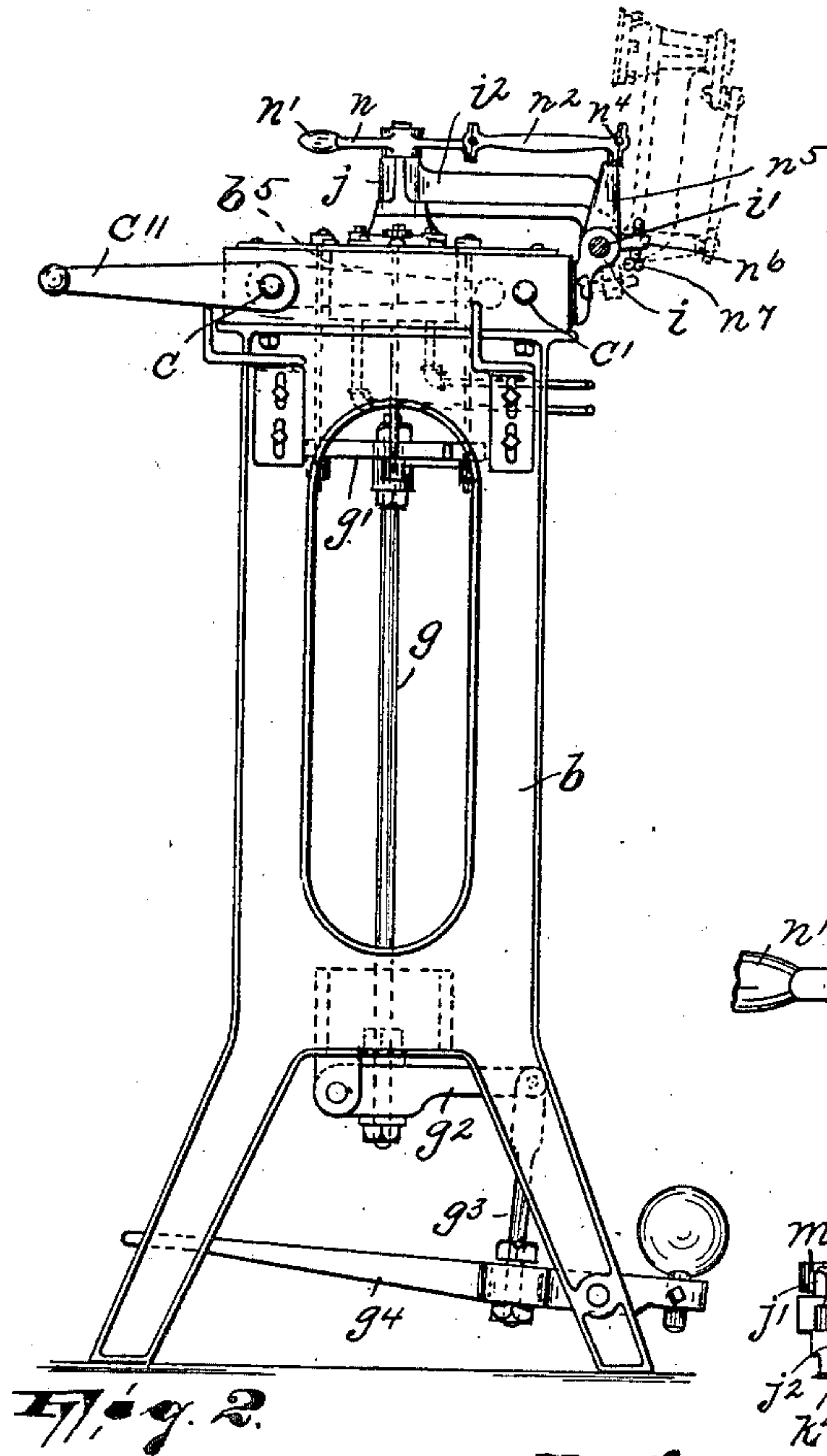
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C. H. KNAPP.
MACHINE FOR FOLDING COLLARS, &c.

(No Model.)

(Application filed Mar. 8, 1900.)

3 Sheets—Sheet 2..



WITNESSES:

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No. 668,920.

Patented Feb. 26, 1901.

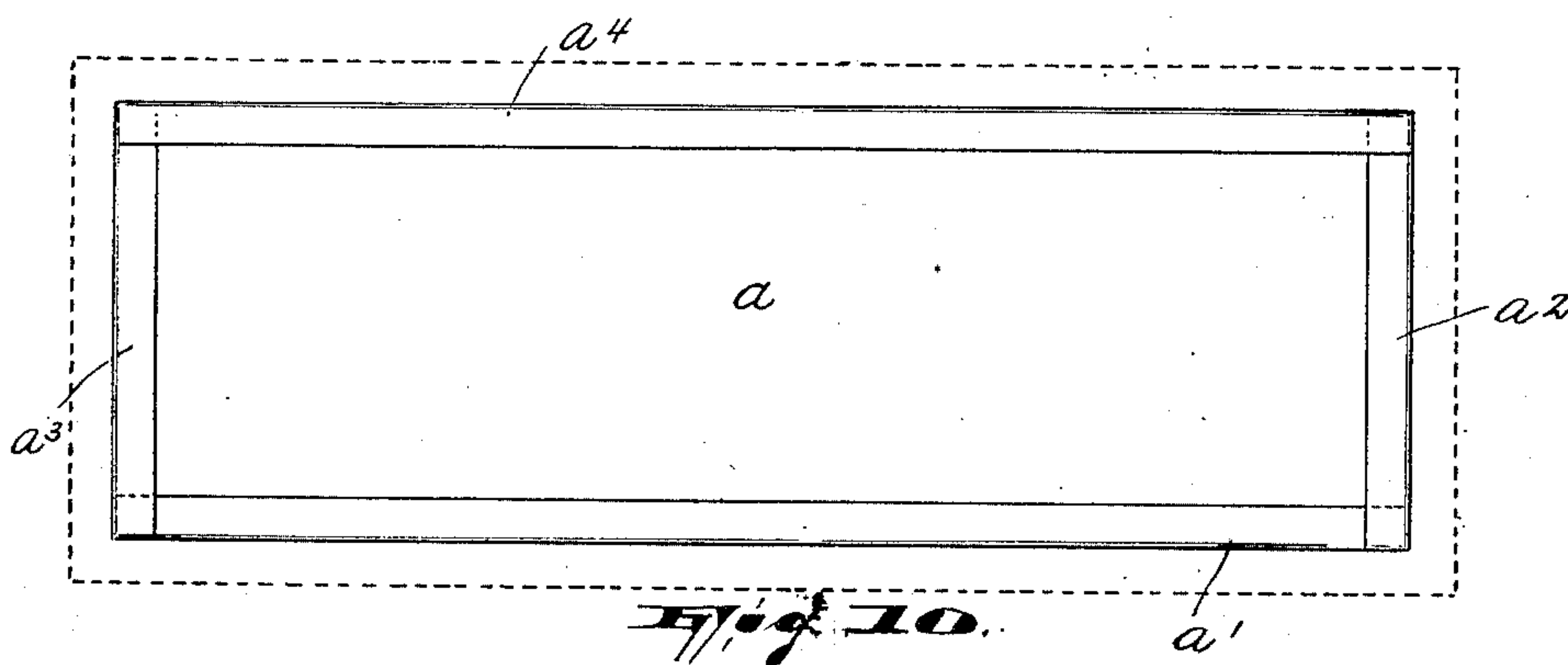
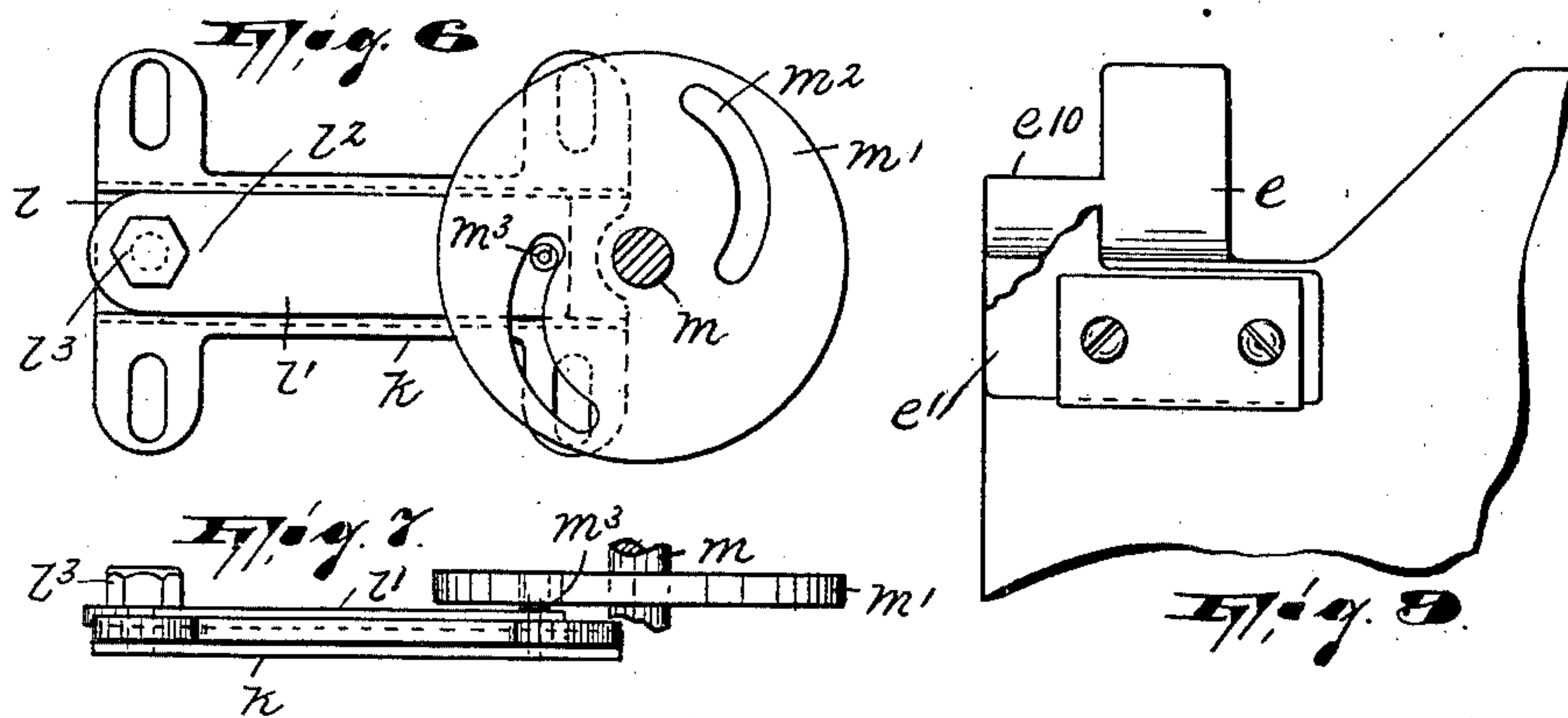
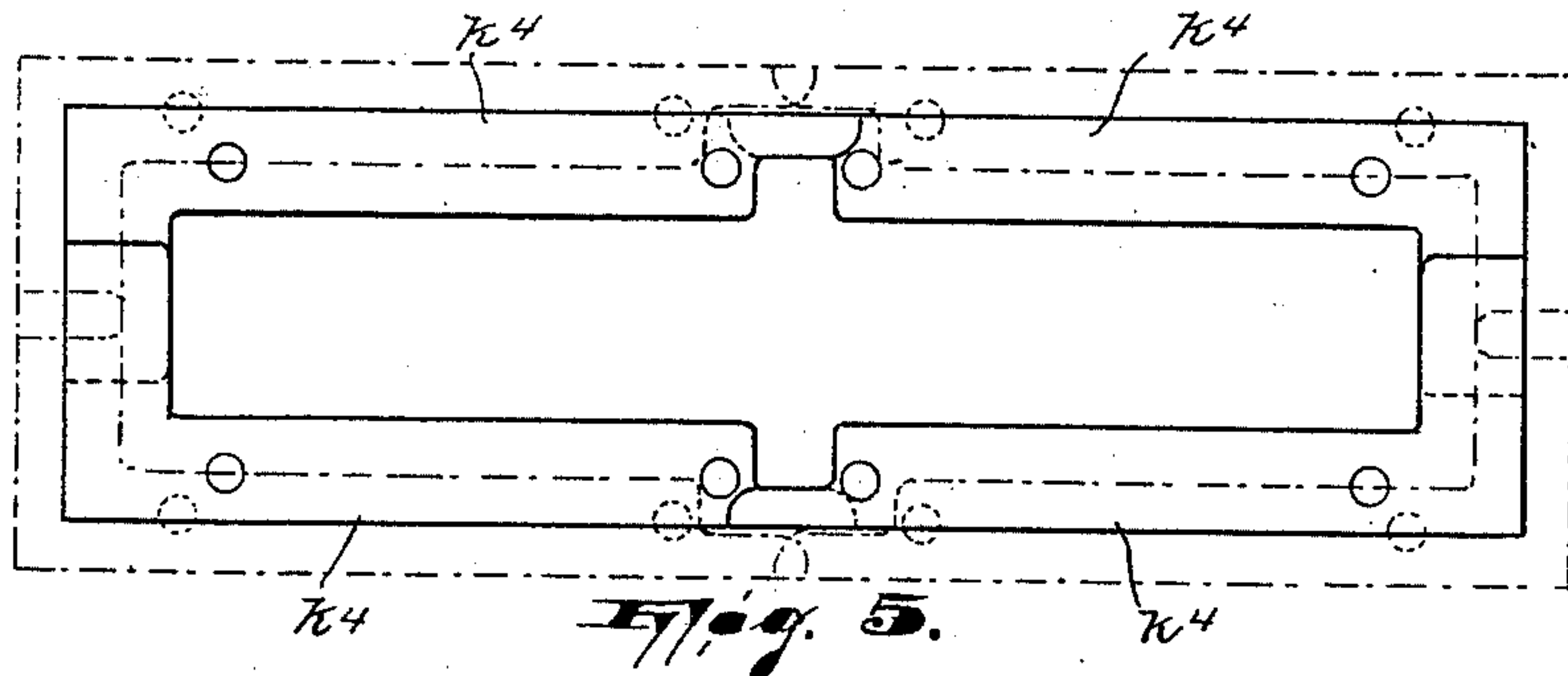
C. H. KNAPP.

MACHINE FOR FOLDING COLLARS, &c.

(Application filed Mar. 6, 1900.)

(No Model.)

3 Sheets—Sheet 3.



WITNESSES:

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UNITED STATES PATENT OFFICE.

CHARLES H. KNAPP, OF PATERSON, NEW JERSEY.

MACHINE FOR FOLDING COLLARS, &c.

SPECIFICATION forming part of Letters Patent No. 668,920, dated February 26, 1901.

Application filed March 6, 1900. Serial No. 7,484. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. KNAPP, a citizen of the United States, residing in Paterson, in the county of Passaic and State of New Jersey, have invented certain new and useful Improvements in Cuff-Folding Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to the construction of cuffs, collars, shirt-bosoms, and other similar forms of wearing-apparel which are approximately rectangular in form and are composed of two or more layers of fabric properly stiffened; and the invention consists in a machine for folding the layers of an article of this nature in a manner peculiar to my improved construction thereof.

I have fully illustrated my invention in the accompanying drawings, wherein—

Figure 1 is a top plan view of my improved machine, certain parts thereof being broken away. Fig. 2 is an end view of my improved machine. Figs. 3 and 4 are respectively a top plan view and an end view, certain parts being broken away, of a die used in connection with my machine. Fig. 5 illustrates the arrangement of several plates comprised in the construction of said die. Figs. 6 and 7 show a portion of the mechanism for moving said plates, Fig. 6 being a top plan view and Fig. 7 being a view in side elevation. Fig. 8 is a sectional view of a portion of the machine as shown in Fig. 1 and illustrating operating means for certain other movable plates. Fig. 9 is an enlarged top plan view of a portion of one of said last-named movable plates and illustrating particularly the manner of connecting it to the next adjacent plate, and Fig. 10 is a plan view of the article produced by my machine.

At present cuffs and the other articles above referred to are formed by stitching together the two layers of material of which they are composed, with the stiffening between them, near and parallel to the folding-line formed by turning in each edge of each

layer. At the corners of the article thus formed, since there is no other means than the stitching for maintaining the raw edges of the layers in proper disposition, the article is either likely to ravel or its material will be undesirably "bunched," and either of these objections may arise, notwithstanding that the greatest care is employed in forming the article and notwithstanding that it is produced, as usual, by hand.

The article *a* (shown in Fig. 10) illustrates one of the two outside layers of a cuff formed after the principles of my invention. Referring to said figure, it will be seen that the layer is first folded lengthwise along one side edge, as at *a'*, and then transversely along both end edges, as at *a² a³*, and then lengthwise again, as at *a⁴*, along the remaining side edge. Two layers thus folded are then placed together back to back and with the fold *a⁴* of each opposite the fold *a'* of the other, the ends of the fold *a⁴* of each layer being set in between the ends of the fold *a'* of the other layer and the adjoining ends of the folds *a² a³* thereof. When the two layers are placed together in the manner just described, it will be seen that their corners interlock each other, and thus when the layers are stitched together near their edges to form the cuff the corners of the cuff will not only be uniformly folded, but there will be no danger of their working out of place or raveling.

The machine which I am now about to describe is adapted to accomplish all the folding of each layer of the article to be produced in the manner above described where said layer is rectangular in form, or substantially so. Where the form of the layer departs from the rectangular—that is to say, has some of its corners rounded—the folding of said rounded corners may be accomplished by hand after the machine has performed the folding of the other corners.

The frame of the machine is designated by the reference-letter *b* and consists, essentially, of two standards, upon which is supported a bed-plate *b'*, having a downwardly-extending surrounding flange *b²*, whereby it is bolted to said standards, and also provided with another downwardly-projecting flange *b³*, which forms a rectangular inclosure, with which a plate *b⁴*, that is bolted thereto, forms a chest

or receptacle b^5 . (Shown in dotted lines in Fig. 2 and partially shown in full lines in Fig. 8.) Pipes b^6 are connected to said chest or chamber for conveying steam or other heat vehicle through the same.

At the ends of the bed-plate in the flange b^2 are journaled shafts c c' , which are disposed beneath and lengthwise of said plate and parallel to and near its side edges. The shaft c constitutes the drive-shaft and may receive power in any desirable manner, as from a crank c^{11} . It is connected with the shaft c' by means of a transversely-extending shaft c^2 , which is journaled in projections c^3 , extending inwardly from the flange b^2 at one end of the bed-plate, bevel-gears c^4 being adapted to transmit rotary motion from the one to the other of the shafts c and c^2 and c^2 and c' . In projections c^5 , corresponding to the projections c^3 , is journaled transversely to the bed-plate and near the other end of the shaft c another shaft c^6 , said shaft and the shaft c being operatively connected by means of bevel-gearing c^7 .

Upon the top of the bed-plate rest, preferably, four thin sliding pressure-plates d , d' , d^2 , and d^3 . The plates d and d' are arranged oppositely near the shorter sides of the bed-plate, while the other two plates d^2 and d^3 are arranged near the longer sides of said bed-plate. Beneath each of these plates the bed-plate is provided with a pair of rectangular openings d^{13} , through which extend forked projections d^5 , that are secured to the under side of the plate, preferably by screws d^6 . The several shafts carry cams d^7 , which are adjustably secured on said shafts and each of which is disposed between the bifurcations of one of the forked projections and adapted to impart through the latter in an obvious manner movements inwardly and outwardly on the bed-plate to the corresponding sliding plate. Each sliding plate is guided by means of screws or bolts d^8 , which penetrate slots d^9 in said plate. The plate d^3 is provided at each of its inner corners with an L-shaped lug e , that extends longitudinally with reference to the plate and is considerably thinner than the plate itself. Upon the top of the plate d^3 and extending over each lug e is another lug e' , whose innermost edge forms an extension of the corresponding edge of the plate. The free portion e^2 of the L-shaped lug e and the outer end of the lug e' , it will be seen, serve as guiding means for the adjacent plate d or d' . Regarding the plates d d' , it is to be said that the corners thereof which are adjacent the plate d^2 are provided with lugs e e' , formed and disposed substantially as the lugs on the plate d^3 and adapted to perform the same function as above set forth.

Penetrating the bed-plate and each of the pair of plates d^2 d^3 , which are provided with slots f for their reception, are bolts f' . These bolts and also the innermost bolts d^8 of the plates d d' extend downwardly an appreci-

able distance below the bed-plate and the chest or receptacle beneath it, the two bolts f of the plate d^3 being connected by a link f^2 and each pair of bolts d^8 and f' being connected by a corresponding link f^3 . Nuts on the lower ends of the bolts keep these links in position.

g is a vertical rod that extends downwardly beneath the bed-plate, having at its upper end a three-armed bracket g' , which is suspended from the links f^2 and f^3 and which is connected at its lower end to a lever g^2 , that is fulcrumed in lugs in the frame b and is itself connected by a pitman g^3 with a weighted presser-lever g^4 , fulcrumed beneath said lever g^2 . When the presser-lever is operated by the attendant's foot, it will act through the three-armed bracket g' , the links f^2 and f^3 , and the bolts d^8 and f' to press the several sliding plates against the bed-plate. The sliding plates, it will be apparent, are adapted to effect the folds or creases in the article, and in order to strengthen them in their acting portions (it being remembered that they are comparatively thin) I have provided for the plates d d' bracing-blocks h , which are secured thereto, preferably by screws, and for the plates d^2 d^3 flat bars h' , said bars being penetrated and kept in place by the bolts f' .

The die which I have provided and shown in Figs. 3 and 4 in detail and which is adapted to hold the material in place against the bed-plate while the sliding plates move inwardly, and to thus coact with said sliding plates, may be thus described: Projecting from the middle of one of the longer sides of the bed-plate is a pair of lugs i , carrying a bolt i' , which serves as a fulcrum for an arm i^2 . At its free end this arm carries an integral bracket or frame j , to which is secured by bolts j' a die-plate j^2 , having oblique cam-slots j^3 and provided with longitudinal slots j^4 in its upper surface. Between the bracket or frame j and the die-plate and adapted to work longitudinally of the die and to and from the center thereof is a pair of I-plates k , each having transverse slots k' , adapted to register with the slots j^3 in the die-plates, the registering slots being penetrated by pins k^2 . The end side of each I-plate is provided with a rib k^3 , which works in the slot j^4 in the die-plate, and thus guides the I-plate. On the lower ends of the pins k^2 are secured thin metallic strips or plates k^4 , which are disposed beneath the die-plate, of course, and slightly overlap each other. It will be seen that by moving the I-plates longitudinally toward the ends of the die the metallic strips or plates k^4 will be made to assume the position indicated by a dot-and-dash line, (shown in Fig. 3,) while a reverse movement of the I-plates will retract the metallic strips or plates into the position in which they are partially shown in full lines in said figure. The top of each I-plate is provided with a longitudinal recess l , in which is set a bar l' , having a longitudi-

nal slot l^2 , which receives a bolt l^3 , whereby said bar is adjustably secured to the I-plate. The die-plate and also the bracket provide bearings for a shaft m , which carries a disk m' , that is disposed between said bracket and the die-plate and is provided with eccentrically-arranged curved cam-slots m^2 , that receive pins m^3 on the bars l' . Upon the upper end of the shaft m is secured a lever n , the one end of which is provided with a handle n' and to the other end of which is connected a pitman n^2 by a ball-and-socket joint n^3 . The other or free end of this pitman is connected, also by a ball-and-socket joint n^4 , with an arm n^5 , that is pivotally mounted upon the shaft i' and carries a lug n^6 , in which is adjustably mounted a set-screw n^7 , the head of which is adapted to contact with the flange b^2 . It will be seen that the lever n is free to be moved when the die is in its lowermost position, as shown in solid lines in Fig. 2, while when the die is thrown back into the position shown in dotted lines in Fig. 2 as the set-screw n^7 engages the flange b^2 the stopping of the arm n^5 before the die reaches its complete open position will act through the pitman n^2 to turn the lever n , and consequently work the plates k^4 .

In operating the machine the attendant places the material from which the article is to be formed upon the bed-plate b' , with the edges thereof overlapping the inner edges of the sliding plates. The distance which each edge of the material overlaps the corresponding plate determines the depth of the fold. Thereupon the attendant lowers the die until the metallic strips or plates rest upon the material. It should be remarked that when the die is lowered the several strips or plates are in their extended positions—that is to say, as shown in the dot-and-dash line in Fig. 3—having been automatically so disposed by the action of the arm n^5 as its rearward movement was stopped in the previous opening of the die and in a manner already sufficiently described. The die being in place, the attendant throws the crank c^{10} over into the position shown in dotted lines in Fig. 3, which action turns the shaft c and the other shafts c' , c^2 , and c^7 and through the bifurcated projections d^5 and the cams d^7 effects the inward movements of the several plates. It should be here remarked that the cams are so disposed on their respective shafts that first the plate d^3 moves, then the two end plates d d' move, and then the other plate d^2 moves. Assuming that the plate d^3 moves first and that when the plates or strips k^4 of the die are in their extended position their edges approximately meet the edges of the sliding plates, the material will be folded along one of its longer edges, the fold being effected clear to each end by means of the lugs e . When the plates d d' move inwardly, they are guided, as hereinbefore described, between the lugs e and e' and effect the folding of the end edges of the material. That portion of

the material where each end fold and the side fold already formed are overlapped is laid even, because as each plate d d' advances it can fold the material at this point back over the edge e^{10} of the L-shaped lug e . When the plates d d' have advanced to their full extent, the plate d^2 moves inwardly, and thus effects the folding of the other long edge in the same manner as the folding of the other edges is effected by the other plates. Having effected the folding of the material, the operator works the lever n to thus retract the plates k^4 , whereupon he throws the die back into the position shown in dotted lines in Fig. 2. Pressure is then applied to the several sliding plates by means of the presser-lever g^4 , so as to lay and maintain the folds even. The pressing operation is greatly facilitated by the heating of the bed-plate by steam, hot air, or hot water, that is conveyed into and out of the chamber or chest of which the center portion of said bed-plate forms the top wall.

In order to keep the material securely in position upon the top of the bed-plate, the latter may be provided with corrugations r .

As hereinbefore intimated, the special function of the lugs e is the proper and even folding of the material at the corners. It has been remarked that when either of the plates d^3 , d , or d' advances the body portion of a fold is effected, while the folding is carried out nearly to the ends of the material by these lugs. Each free end of the fold thus left—that is to say, as much of each end as marks the depth of each adjacent side fold—is folded back over the edge e^{10} of each lug e (which edge, it will be noticed, is in alinement with the acting edge of the side plate when the latter is in its retracted position) into the space or recess between said lug e and the lug e' by the edge of the adjacent side plate d or d' or of the plate d^2 as it advances to produce its respective fold. The lug e' and the free or projecting portion of the lug e have practically nothing to do with the folding operation proper, being merely guides to insure true rectilinear movements of the plates.

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

1. In a machine for folding back the edges of a piece of fabric or other similar material, the combination, with the frame, of a bed-plate, sliding pressure-plates having slots, bolts penetrating said slots and suspended from said plates, pressure-exerting means, and operative connection between said bolts and the pressure-exerting means, substantially as described.

2. In a machine for folding back the edges of a piece of fabric or other similar material, the combination, with the frame, of a bed-plate, sliding pressure-plates having slots, bolts penetrating said slots and suspended from said plates, links connecting the lower ends of said bolts, a bracket connected to said

links, pressure-exerting means, and operative connection between said pressure-exerting means and the bracket, substantially as described.

5 3. In a machine for folding back the edges of a piece of fabric or other similar material, the combination, with the frame, of a bed-plate, sliding pressure-plates arranged on said
10 bed-plate for movement toward a common point, projections extending downwardly from said pressure-plates, interconnected shafts journaled in said frame and disposed transversely to the direction of movement of
15 said pressure-plates, and cams carried by said shafts and adapted to engage said projections, substantially as described.

4. In a machine for folding back the edges of a piece of fabric or other similar material, the combination, with the frame, of a bed-
20 plate, sliding pressure-plates arranged on said bed-plate for movement toward a common point, forked projections extending downwardly from said pressure-plates, interconnected shafts journaled in said frame and dis-
25 posed transversely to the direction of movement of said pressure-plates, and cams carried by said shafts and received by and adapted to engage said forked projections, sub-
stantially as described.

30 5. In a machine for folding back the edges of a piece of fabric or other similar material, the combination, with a bed-plate and a movable die, of a series of sliding plates mounted on said bed-plate about the die and adapted
35 to coact therewith, lugs arranged on some of said plates, said lugs being disposed at the contiguous corners of adjoining plates and each having one of its edges constituting an extension of the folding edge of one, and an-
40 other of its edges adapted to coact with the folding edge of the other, of said adjoining plates, and another lug disposed over each of said first-named lugs and having one of its edges coincident with the first-named edge
45 thereof, substantially as described.

6. In a machine for folding back the edges of a substantially rectangular piece of fabric or other similar material, the combination, with the frame, of a bed-plate mounted on
50 said frame, suitably-guided pressure-plates arranged on said bed-plate and movable to and from the sides thereof, downwardly-extending bolts connected to said sliding plates, links connecting said bolts, a presser-lever
55 fulcrumed in said frame, operative connecting means between said presser-lever and the links, an arm fulcrumed in said bed-plate, a die carried by said arm, adapted to assume a position in the space over the bed-plate and
60 between said sliding plates, and comprising a die-plate, contractile plates disposed on the under side of said die-plate, and means for actuating said contractile plates, said contractile plates being adapted to coact with the
65 sliding plates, operatively-connected revolvable shafts journaled on the under side of said

bed-plate, cams mounted on said shafts, and forked projections carried by said sliding plates and engaging said cams, substantially as described.

7. In a machine for folding back the edges of a substantially rectangular piece of fabric or other similar material, a die member consisting of a die-plate, a rectilineally-movable
70 bar mounted on said die-plate, said die-plate and the bar having registering pairs of slots of which the one slot in each pair is disposed obliquely to the other, contractile plates disposed on the under side of said die-plate, pro-
75 jections penetrating said slots and connected with said contractile plates, and means for actuating said bar, substantially as described.

8. In a machine for folding back the edges of a piece of fabric or other similar material, the combination, with the frame, of a bed-
80 plate mounted on said frame, an arm fulcrumed on said frame, contractile die-plates carried by said arm, a lever carried by said arm and controlling said die-plates, and means, operatively connected to said lever and adapted
90 to engage a suitable part of the machine, for shifting said lever when the arm is moved on its fulcrum, substantially as described.

9. In a machine for folding back the edges of a piece of fabric or other similar material, the combination, with the frame, of a bed-
95 plate mounted on said frame, an arm fulcrumed on said frame, contractile die-plates carried by said arm, a lever carried by said arm and controlling said die-plates, another arm fulcrumed in said frame, a stop for limiting the movement of said last-named arm,
100 and a pitman pivotally connected to said last-named arm and the lever, substantially as described.

10. In a machine for folding back the edges of a substantially rectangular piece of fabric or other similar material, the combination, with the frame, of a bed-plate mounted on
105 said frame, lugs projecting from said bed-plate, a shaft carried by said lugs, arms fulcrumed on said shaft, a contractile die carried by one of said arms, a lever controlling said contractile die, a pitman having a ball-and-socket connection with one end of said
110 lever and also with the other arm, a stop carried by said last-named arm, and suitably-operated sliding plates mounted on said bed-plate and movable to and from the sides thereof, said die being adapted to assume a position
115 in the space over the bed-plate and between the sliding plates and adapted to coact with the latter, substantially as described.

11. In a machine for folding back the edges of a substantially rectangular piece of fabric or other similar material, the combination, with a bed-plate and a movable die, of a series of sliding plates mounted in rectangular
120 disposition on said bed-plate and movable toward and from the sides thereof, one of said sliding plates having thin lugs at its ends and adjacent its folding edge and adapted to be
125

overlapped by the folding edges of the next adjoining sliding plates, and said adjoining plates having similar lugs adapted to be overlapped by the corresponding edge of the remaining sliding plate, substantially as described.

12. In a machine for folding back the edges of a substantially rectangular piece of fabric or other similar material, the combination, with a bed-plate and a movable die, of a series of sliding plates mounted in rectangular disposition on said bed-plate and movable toward and from the sides thereof, one of said sliding plates having thin L-shaped lugs at its ends and adjacent its folding edge and overlapped by the folding edges of the next adjoining sliding plates, and said adjoining plates having similar L-shaped lugs overlapped by the corresponding edge of the remaining sliding plate, and said first-named sliding plate and said next adjoining sliding plates also having lugs projecting over said

first-named lugs and coacting therewith to form guides, substantially as described.

13. In a machine for folding back the edges of a piece of fabric or other similar material, the combination, with a bed-plate and a movable die, of a series of sliding plates mounted on said bed-plate about the die and adapted to coact therewith, and lugs arranged on some of said plates, said lugs being disposed at the contiguous corners of adjoining plates and each having one of its edges constituting an extension of the folding edge of one, and another of its edges adapted to coact with the folding edge of the other, of said adjoining plates, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand this 1st day of August, 1899.

CHAS. H. KNAPP.

Witnesses:

WM. D. BELL,

JOHN W. STEWARD.