No. 877,375. PATENTED JAN. 21, 1908.

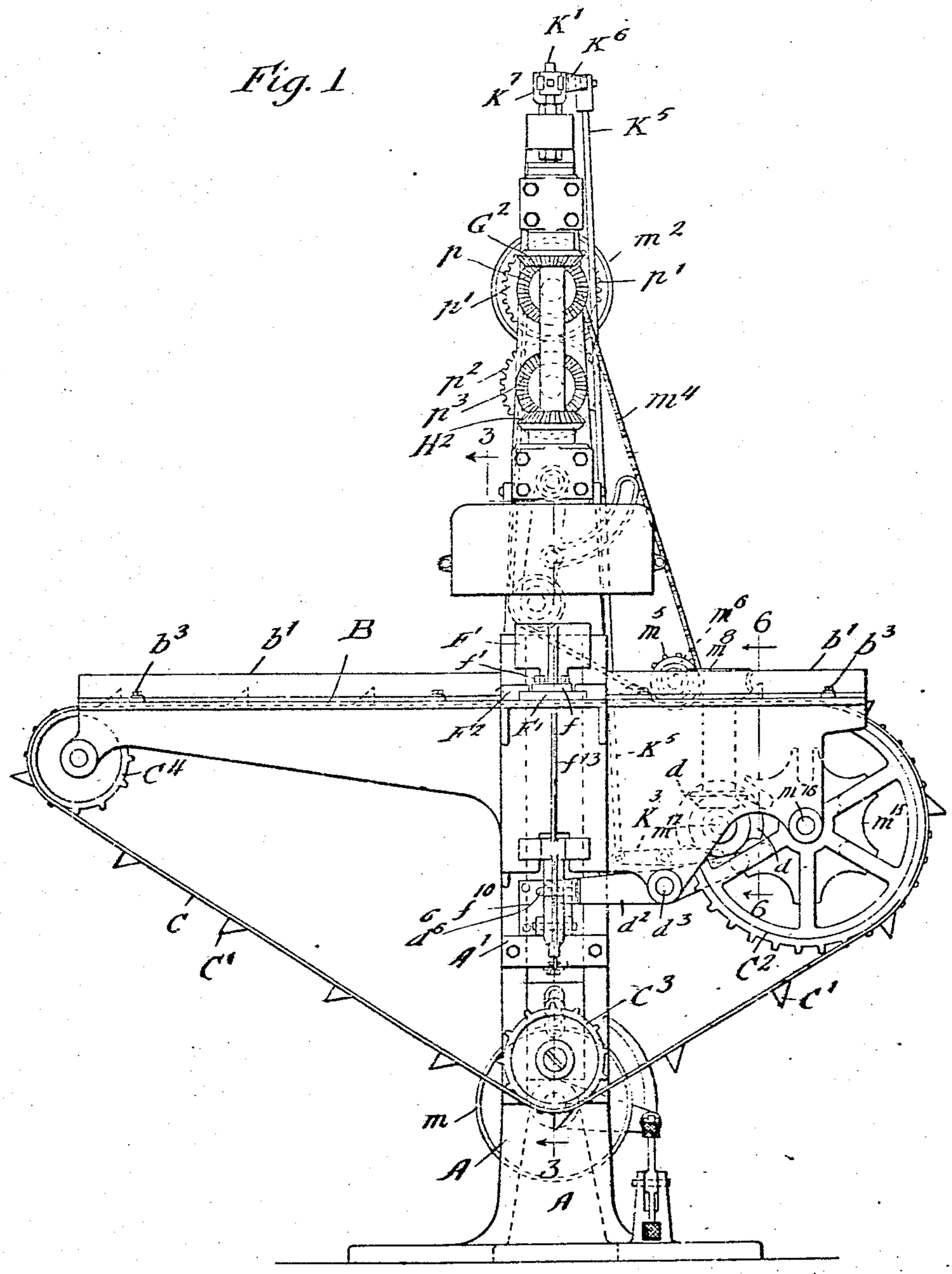
F. RUDOLPHI.

STATIONARY CAN DOUBLE SEAMING MACHINE.

APPLICATION FILED OCT. 30, 1905.

6 SHEETS—SHEET 1.

Fig. 1



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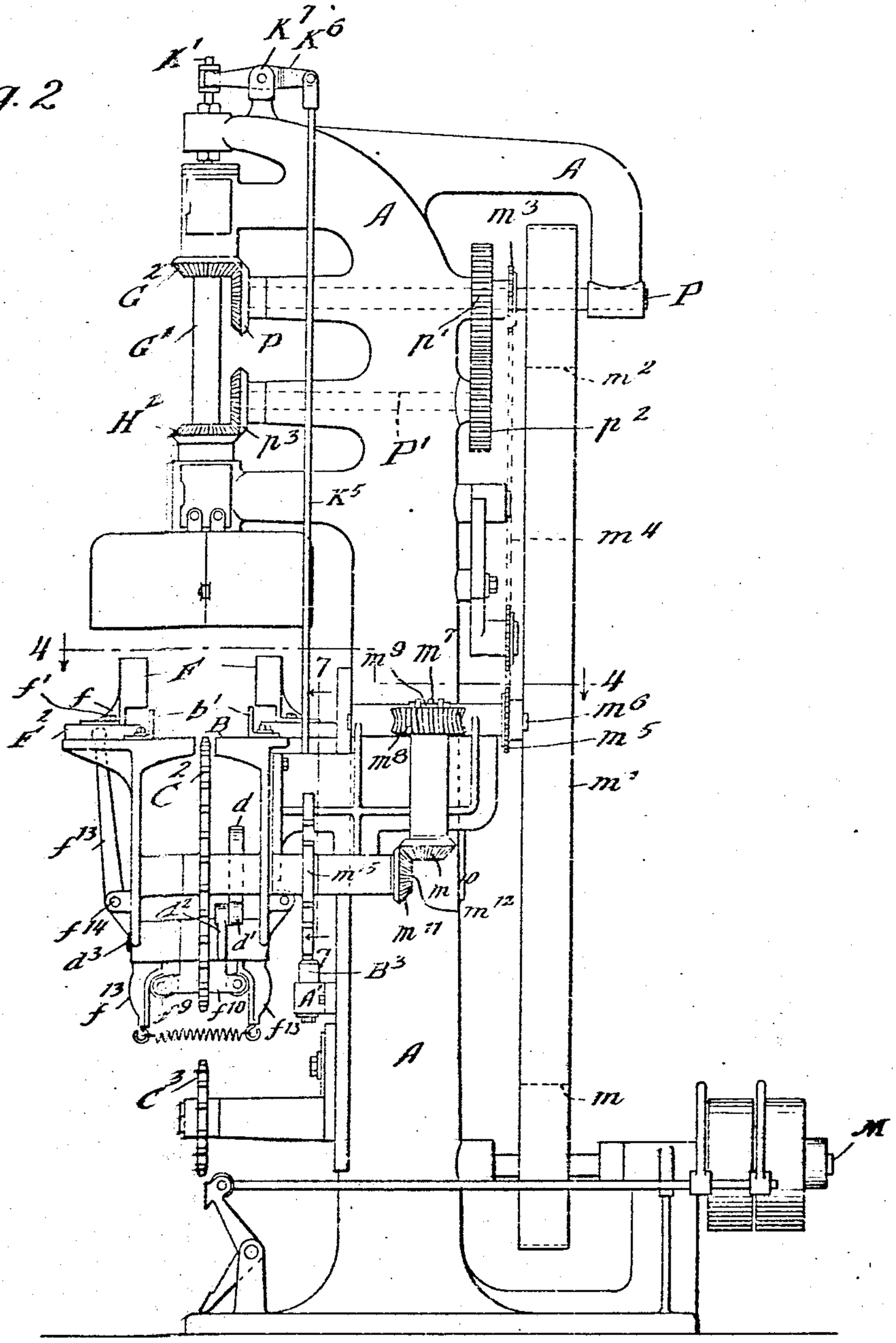
6 SHEETS—SHEET 2.

Fig. 2



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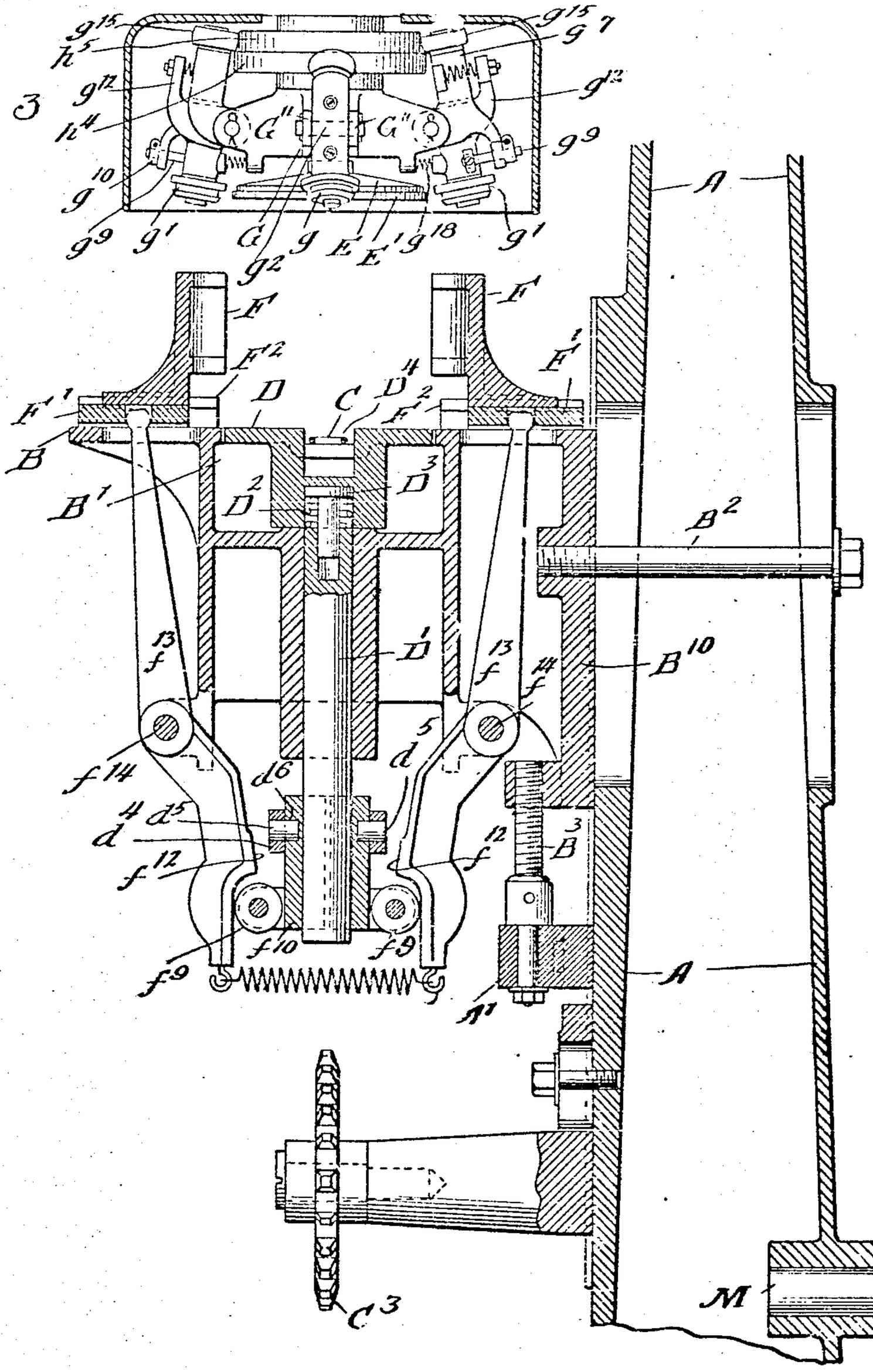
6 SHEETS—SHEET 3.

Fig. 3



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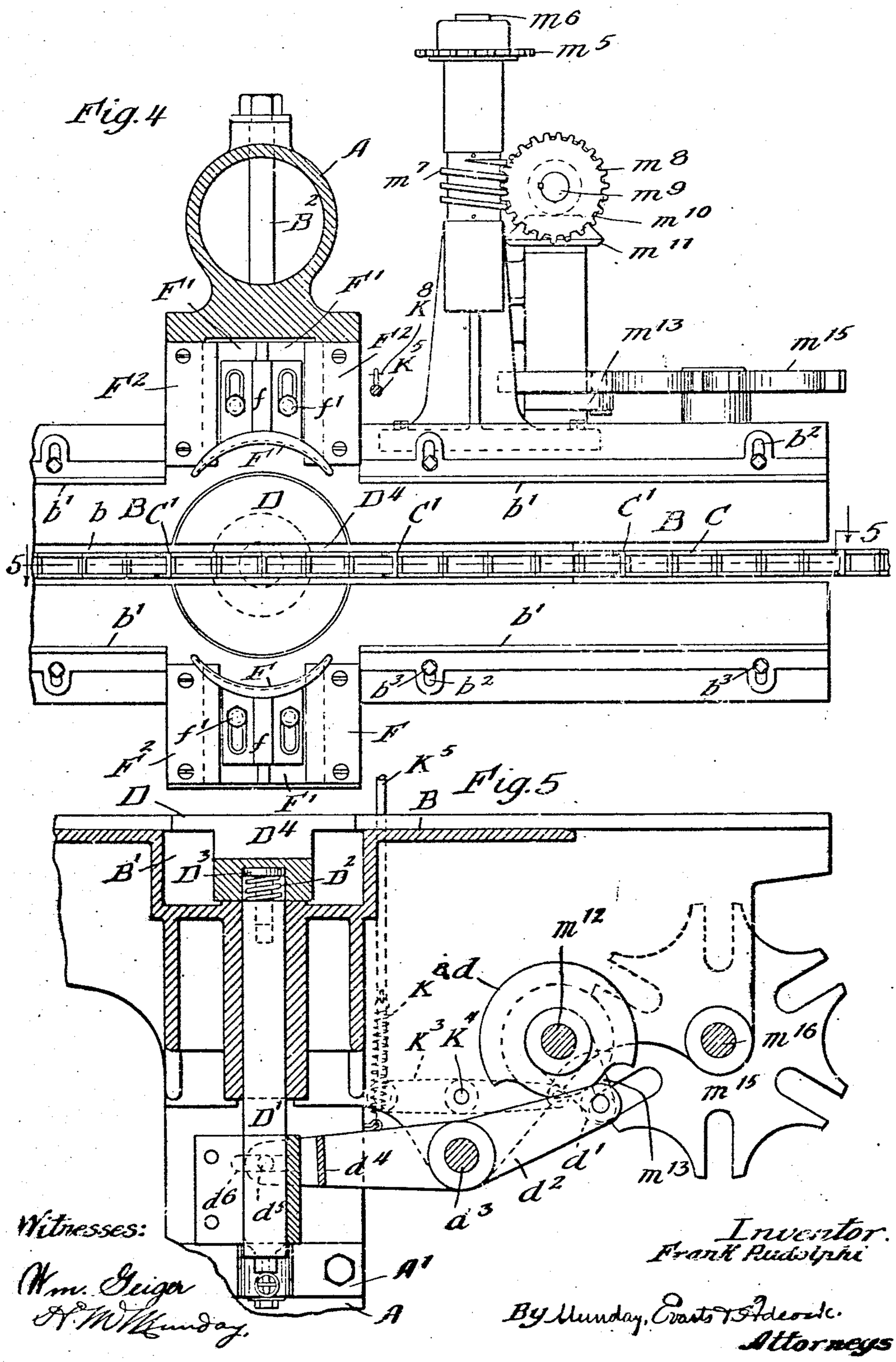
6 SHEETS—SHEET 4.

Fig. 4



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6 SHEETS—SHEET 5.

Fig. 6

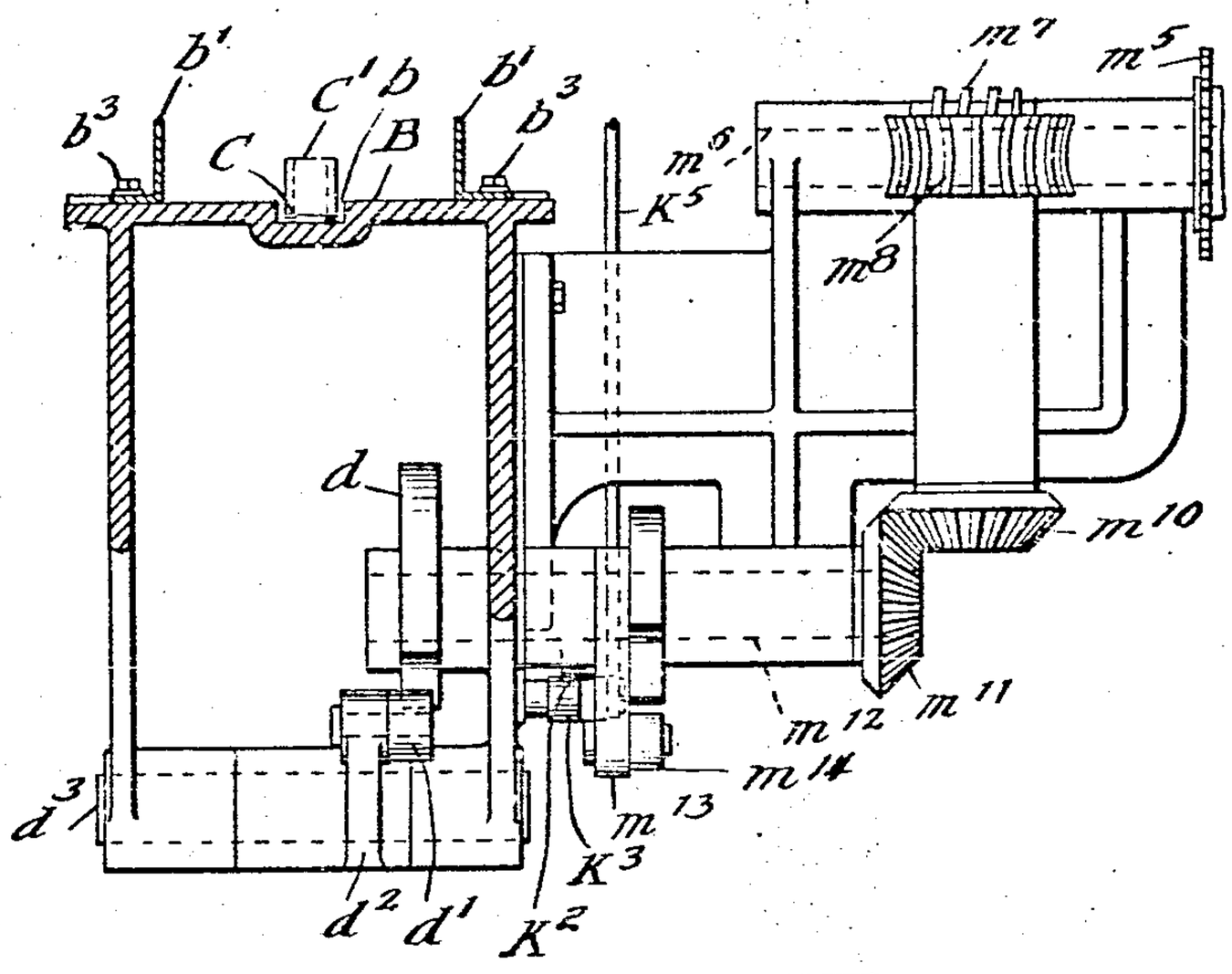
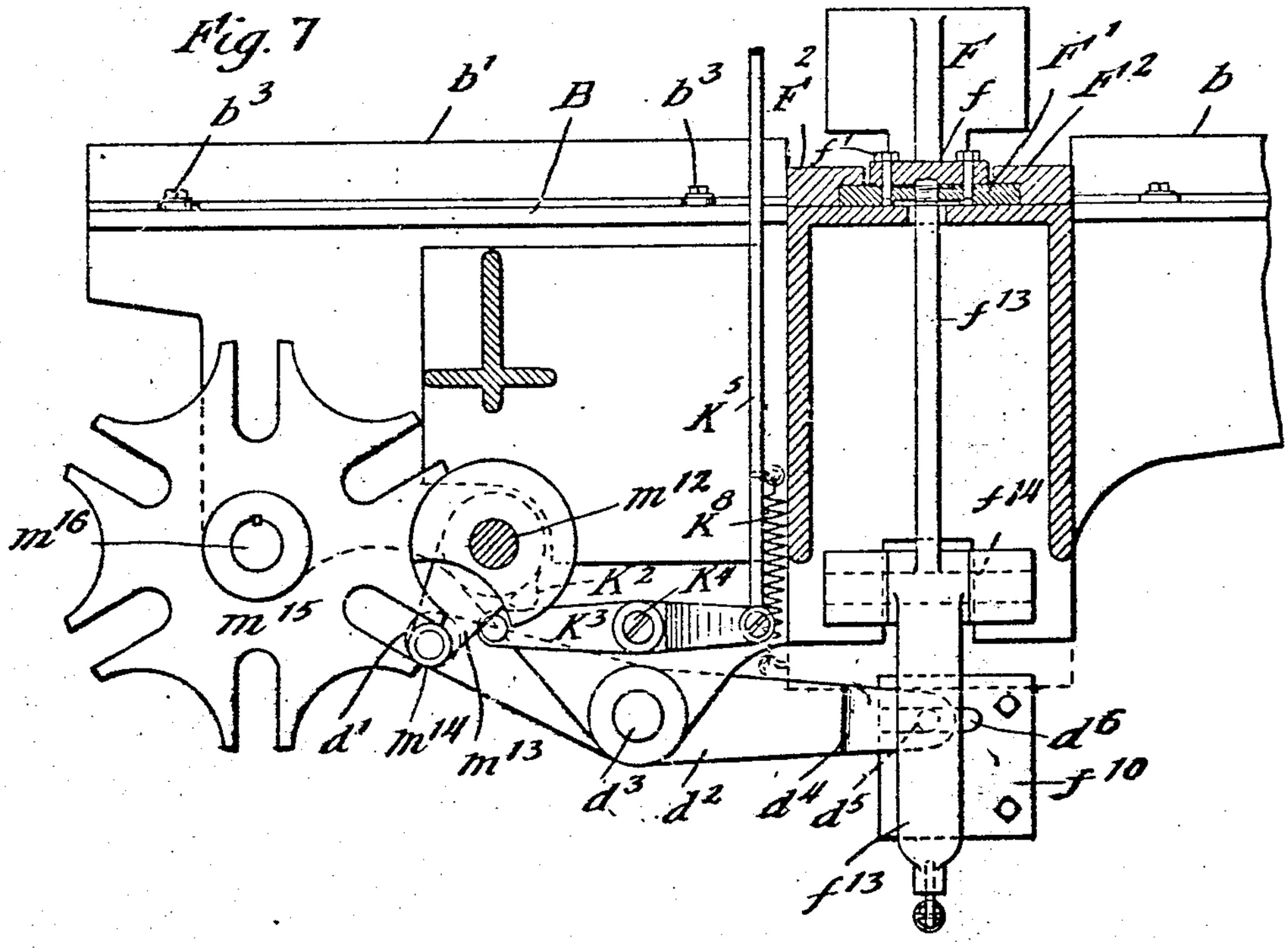


Fig. 7



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6 SHEETS—SHEET 6.

Fig. 8

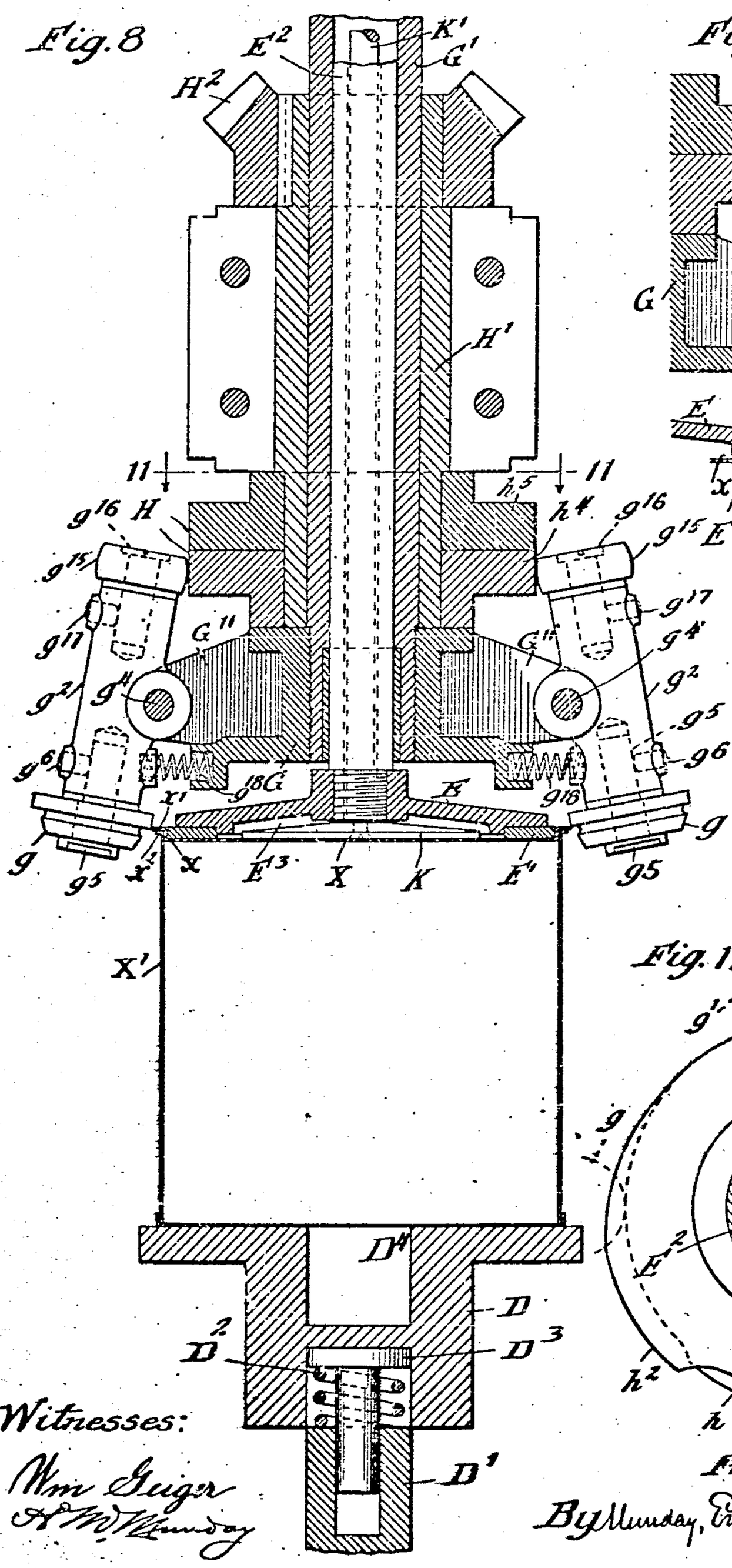

Fig. 9

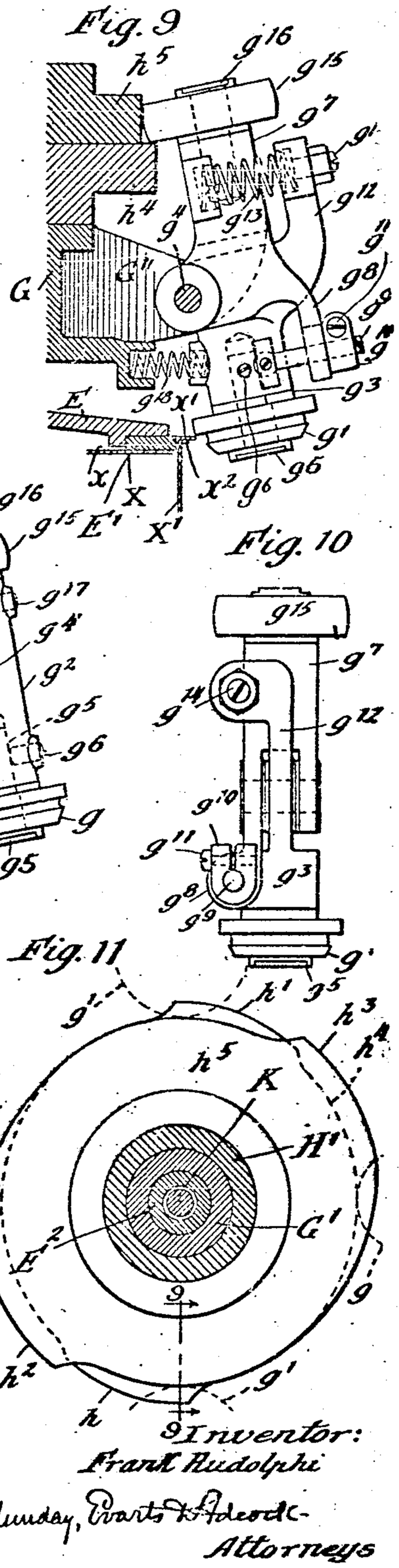

Fig. 10

Fig. 11

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UNITED STATES PATENT OFFICE.

FRANK RUDOLPH, OF CHICAGO, ILLINOIS, ASSIGNOR TO AMERICAN CAN COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

STATIONARY-CAN DOUBLE-SEAMING MACHINE.

No. 877,375. Specification of Letters Patent. Patented Jan. 21, 1908.

Application filed October 30, 1905. Serial No. 284,927.

To all whom it may concern:

Be it known that I, FRANK RUDOLPH, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Stationary-Can Double-Seaming Machines, of which the following is a specification.

My invention relates to double seaming machines for seaming the heads or covers upon sheet metal cans, and more particularly to double seaming machines of the kind or class in which the can is held stationary during the seaming operation, and which are specially designed for seaming the covers on filled cans, the can being given no rotatable movement in order to prevent danger of its contents being thrown out, as is the case in machines wherein the can is rapidly rotated during the seaming operation.

The object of my invention is to provide a stationary can double seaming machine of a simple, efficient and durable construction, by means of which covers may be rapidly, cheaply and perfectly double seamed on filled cans.

My invention consists in the means I employ to practically accomplish this object or result; that is to say, it consists, in connection with a can feed table or guide track, along which the cans may be fed or moved, one by one, an intermittently movable endless flexible can feeder or chain having can pusher arms thereon for feeding or moving the cans, one by one, intermittently along the can feed table or track, a vertically reciprocating chuck or plate upon which each can in turn is delivered by the feeder, a pair of horizontally reciprocating can clamping jaws for clamping and centering the can to be seamed with the upper can clamping chuck or plate and with the rotary seaming head, an upper can clamping chuck or plate coöperating with said lower reciprocating chuck or plate to firmly clamp and hold the cover on the can body preparatory to and during the seaming operation, a continuously rotating seaming head carrying a plurality of seaming rollers, each mounted upon a separate vibrating lever hinged to said seaming head, and a continuously rotating cam wheel mounted upon the seaming head and rotating independently thereof and at a slightly variant speed to cause the cam wheel to turn slowly in respect to the seaming head and thus cause the cams of the cam wheel to operate the several seaming roller levers in proper time and succession.

My invention also consists in the novel construction of parts and devices and in the novel combinations of parts and devices herein shown or described

In the accompanying drawings, forming a part of this specification, Figure 1 is a front elevation of a stationary can double seaming machine embodying my invention; Fig. 2 is a side elevation; Fig. 3 a detail central vertical section on line 3—3 of Fig. 1; Fig. 4 is a horizontal section on the broken line 4—4 of Fig. 2; Fig. 5 is a detail vertical section on line 5—5 of Fig. 4; Fig. 6 is a detail vertical section on line 6—6 of Fig. 1; Fig. 7 is a detail vertical section on line 7—7 of Fig. 2; Fig. 8 is an enlarged central vertical section of the rotary seaming head and can chucks; Fig. 9 is a partial vertical section on line 9—9 of Fig. 11, showing one of the other pair of seaming rollers, Fig. 10 is a detail front elevation of the seaming roller and its operating lever, shown in Fig. 9, and Fig. 11 is a detail section on line 11—11 of Fig. 8, and showing the cam wheel and cams thereon.

In the drawing A represents the frame of the machine, B is the can feed table or guide track along which the cans to be seamed are pushed or fed by the endless can feeder C, preferably consisting of an endless chain, furnished with can pusher arms or projections C^1 and traveling upon pulleys or sprocket wheels C^2 C^3 C^4. The can feed table B is furnished with a central slot or channel *b* to receive and accommodate the feeder C, and also with side guides b^1 furnished with transverse slots b^2 and adjustably secured in place by bolts or screws b^3, so that these guides may be placed close together or farther apart as required for operation upon cans of different diameters.

D is the lower vertically reciprocating can chuck fitting in a central opening B^4 in the feed table or track B, upon which each can in turn is delivered by the feeder C, and by which the can is moved upward and clamped against the upper stationary cam chuck E in position for being operated upon by the seaming head and seaming rollers or tools. The upper can chuck or plate E is furnished

with a ring E^1 which fits within the countersink x of the cover X of the can X^1.

F F are horizontally reciprocating can body clamping and centering jaws, preferably segmental in form, and having slotted shanks f for adjustably securing the same by bolts f^1 to the slides F^1 which travel in suitable guides F^2 on the frame of the machine, and by which the can body clamping jaws F are operated to clamp and center each can in turn with the upper chuck E and seaming head G, just before the lower chuck D clamps the can X and its cover X^1 against the stationary upper chuck E.

G is a rapidly and continuously rotating seaming head rigidly secured to the hollow seaming head shaft G^1, surrounding the hollow stem E^2 upon which the upper stationary chuck E is supported. The rotary seaming head G carries two pairs of seaming rollers, one pair g g being forming rollers, and the other pair g^1 g^1 finishing rollers, the forming rollers coming first into action to curve or fold the flange x^1 of the cover X about the flange x^2 of the can body X^1, and the finishing rollers g^1 g^1 coming next into action to finish the formation of the seam and compress its several folds or flanges snugly and closely together. The rotary seaming head G has four lugs or projections G^{11}, preferably formed integral therewith, to which the seaming roller levers g^2 and g^3 are pivotally connected or hinged by suitable pivots g^4. The seaming tools or rollers g g^1 are rotatably mounted upon their carrying levers g^2 g^3 by suitable studs g^5 secured in place by set screws g^6. The operating levers g^3, upon which the finishing rollers g^1 are mounted, are preferably furnished with an additional separate piece or adjustable arm g^7 pivotally connected to the lever g^3 by the pivot pin g^4, the arm g^7 being additionally and adjustably and yieldingly connected to the lever g^3 by an arm or projection g^8, having a slot through which passes a stop bolt g^9 having a split adjusting nut g^{10} which is firmly fixed in any position to which it may be turned by a set screw g^{11}; the lever g^3 having also an arm g^{12} furnished with a spring g^{13} interposed between said arm g^{12} and the hinged and adjustable arm g^7. The arm g^{12} of the lever g^3 is also furnished with an adjusting screw g^{14} for further regulating the tension of the spring g^{13} and thus the yielding connection between the lever g^3 and its hinged arm g^7. Each of the seaming roller operating levers g^2 g^3 is furnished with an anti-friction roller g^{15}, journaled upon a suitable stud g^{16} fixed in place by a set screw g^{17} for purpose of engagement with the rotary cam wheel H by which the several seaming rollers are operated or forced against the seaming flanges of the can and cover to perform the seaming operation. The anti-friction rollers for engaging the cam which operates the seaming levers g^3 is mounted upon the adjustable hinged arm g^7 of the lever g^3. The cam wheel H, carrying the cams h h^1 h^2 h^3 for operating the several seaming roller levers is, preferably, for convenience of construction, formed in two separate pieces or disks h^4 h^5, but as both these disks are rigidly and immovably secured to the same rotating sleeve or hollow shaft H^1 the operation is the same as if the two disks h^4 h^5 were in one piece. The cams h h^1 for operating the two forming rollers g g are, preferably, formed on the lower disk h^4 of the cam wheel H, and the two cams h^2 h^3 for operating the two finishing rollers g^1, are preferably formed upon the upper disk h^5 of the cam wheel H. The shaft H^1 to which the cam wheel is secured preferably surrounds the hollow rotary shaft G^1, carrying the rotary seaming head G, and it is rotated at a speed slightly varying from that of the seaming head, the cam wheel being rotated preferably at a speed slightly exceeding that of the rotary seaming head. This is preferably done by furnishing one of the gears through which motion is communicated to the cam wheel shaft with an additional tooth over the number in the corresponding gear through which motion is communicated to the rotary seaming head.

K is a reciprocating can extractor disk, fitting in a recess E^3 in the lower face of the upper chuck E, and operated by a reciprocating stem K^1 to eject or free the can from the chuck E after the seaming operation has been completed.

The required slow intermittent movement is communicated to the can feeder C from the driving shaft M by a pulley m thereon; belt m^1, pulley m^2 on the rotary seaming head driving shaft P, having sprocket gear m^3 thereon, chain m^4, sprocket m^5 on worm shaft m^6, having a worm m^7 engaging a worm gear m^8 on the shaft m^9 which carries the bevel gear m^{10} meshing with the bevel gear m^{11} on the shaft m^{12}, carrying an arm m^{13} carrying a roller m^{14}, engaging a radially slotted Geneva stop wheel m^{15} on the shaft m^{16}, which carries the driving sprocket wheel C^2 of the can feeder C.

The required vertically reciprocating movement is imparted to the lower reciprocating can chuck D by a cam d on said shaft m^{12}, which engages a roller d^1 on the bell-crank lever d^2 hinged to the frame at d^3, and having a bifurcated arm d^4, having studs d^5 fitting in slots d^6 in the sleeve f^{10} on the upright stem D^1 of the chuck D. A spring D^2 is interposed between the stem D^1 and the chuck D to give a yielding movement to compensate for slight variations in the height of the cans, the spring surrounding a pin D^3.

The can body clamping and centering jaws F, or their reciprocating slides F^1, are opened and closed or reciprocated as required by means of rollers f^9 on a sleeve f^{10} secured to the operating stem D^1 of the chuck D, and

which rollers f^9 engage cam-faces f^{12} on the levers f^{13} which are connected at their upper ends to the slides F^1, and which levers are pivoted to the frame at f^{14}.

The required continuous rapid rotary movement is communicated to the rotary seaming head G, or its shaft G^1, from the shaft P by means of a bevel gear p on said shaft P, which meshes with a beveled gear G^2 on the shaft G^1.

The required rotary motion is communicated to the cam wheel H or its shaft H^1, by means of a gear p^1 on the shaft P, which meshes with a gear p^2 on the shaft P^1, which carries a bevel gear p^3, which meshes with a bevel gear H^2 on the cam wheel shaft H^1. The gear p^3 has one less tooth than the gear p^1 to cause the cam wheel shaft to rotate at a slightly greater speed than the rotary seaming head shaft. In practice I ordinarily make the gear p^1 with 51 teeth and the gear p^2 with 50 teeth.

The can ejector disk K, or its stem K^1, is preferably intermittently reciprocated as required by a cam K^2 on the shaft m^{12} engaging a lever K^3, pivoted to the frame at K^4, and connected to a rod K^5 connected with a lever K^6 pivoted to the frame at K^7 and connected to the stem K^1 of the ejector K. A spring K^8 connected at one end to the rod K^5 and the other to the frame of the machine holds the disk normally in its upper or retracted position.

To adapt the machine to operate upon cans of different heighths, the feed table B is connected to or formed integral with a vertically movable slide B^{10}, which is secured to the frame A by a bolt B^2, and which may be adjusted up and down as required by an adjusting screw B^3 threaded in the slide B^{10}, and turning in the bracket A^1 of the frame A.

The vertically reciprocating lower chuck D is furnished with a slot or channel D^1 to receive the can feeder chain C and to enable the chuck D to move upward as required without interfering with the feeder chain.

The seaming roller carrying levers g^2 g^3 are normally held in their open or retracted position by springs g^{18} interposed between said levers and the seaming head G.

In operation, the cans with the covers in place thereon, are placed on the feed table B and moved forward intermittently by the feeder C, and each thus delivered in turn on top of the lower reciprocating chuck D, the feeding chain pausing during the time necessary for operation upon each can. The chuck D then moves upward to clamp the can and its cover against the upper stationary chuck E, the segmental centering jaws F F closing against the can bodies for centering the can with the chuck E, just before the chuck D forces the can against the chuck E. At the time the can is forced against the chuck D all the seaming rollers $g\ g\ g^1\ g^1$ on the rotary seaming head, are in their open or retracted position to properly admit the can and its cover into the chuck E, the rapidly rotating seaming-roller-lever-operating cam wheel H being properly timed with the chuck D for this purpose. As soon as the can is properly clamped against the stationary chuck E by the reciprocating chuck D the accelerated rotary movement of the rapidly and continuously rotating cam wheel H, in respect to the rapidly and continously rotating seaming head G, causes the cams $h\ h^1$ on the cam wheel H to begin to close the pair of forming rollers $g\ g$ against the seaming flanges of the can cover and can body, and thus curl or fold said flanges together as the forming rollers $g\ g$ are rapidly rotated around the stationary can by the rotary seaming head, the forming rollers $g\ g$ bearing more and more upon the can as the rotation continues. After the forming rollers $g\ g$ have thus been carried around the can a number of times, and the cover flange properly folded or curved over the can body flange, the further accelerating movement of the cam wheel, in respect to the rotary seaming head, causes the finishing rollers $g^1\ g^1$ to be forced against the seaming flanges of the can body and cover and the seaming operation thus finished or completed, the seaming rollers then retract and the chuck D moves downward until its upper face is flush with the feed table B, and then the feeder C again moves forward and brings another can into position for operation, when the operation is repeated.

I claim:

1. In a stationary can double seaming machine, the combination with a can feed table, of an intermittently movable can feeder, an intermittently reciprocating chuck upon which the cans are delivered one by one by the feeder, a pair of horizontally reciprocating can clamping jaws for clamping and centering the cans in position, an upper non-rotary can chuck, a continuously rotating seaming head carrying a plurality of seaming rollers, seaming roller operating levers hinged to the seaming head and upon which the seaming rollers are journaled, and a continuously rotating cam wheel furnished with cams for operating the seaming roller levers and rotating at a speed varying from that of the seaming head to cause the seaming rollers to open and close against the can at intervals, substantially as specified.

2. In a stationary can double seaming machine, the combination with a can feed table, of an intermittently movable can feeder, an intermittently reciprocating chuck upon which the cans are delivered one by one by the feeder, a pair of horizontally reciprocating can clamping jaws for clamping and centering the cans in position, an upper non-rotary can chuck, a continuously rotating seaming head carrying a plurality of seaming rollers, seaming roller operating levers hinged

to the seaming head and upon which the seaming rollers are journaled, and a continuously rotating cam wheel furnished with cams for operating the seaming roller levers and rotating at a speed varying from that of the seaming head to cause the seaming rollers to open and close against the can at intervals, and a reciprocating can ejector disk in the stationary can chuck, substantially as specified.

3. In a stationary can double seaming machine, the combination with a can feed table, of an intermittently movable can feeder, an intermittently reciprocating chuck upon which the cans are delivered one by one by the feeder, a pair of horizontally reciprocating can clamping jaws for clamping and centering the cans in position, an upper can chuck, a continuously rotating seaming head carrying a plurality of seeming rollers, seaming roller operating levers hinged to the seaming head and upon which the seaming rollers are journaled, and a continuously rotating cam wheel furnished with cams for operating the seaming roller levers and rotating at a speed varying from that of the seaming head to cause the seaming rollers to open and close against the can at intervals, said lower reciprocating can chuck having a slot or channel across the same to receive or accommodate the can feeder, substantially as specified.

4. In a stationary can double seaming machine, the combination with a pair of non-rotatable chucks for clamping and holding the can and its cover, of a continuously rotating seaming head furnished with seaming rollers and seaming roller levers extending lengthwise of said seaming head and hinged thereto, a continuously rotating cam wheel having an axis concentric with that of the seaming head and rotating at a different speed from the seaming head to cause the cams on the cam wheel to operate the seaming roller levers at intervals, as required, substantially as specified.

5. In a stationary can double seaming machine, the combination with a pair of non-rotatable chucks for clamping and holding the can and its cover, of a continuously rotating seaming head furnished with seaming rollers and seaming roller levers extending lengthwise of said seaming head and hinged thereto, a continuously rotating cam-wheel having an axis concentric with that of the seaming head and rotating at a different speed from the seaming head to cause the cams on the cam-wheel to operate the seaming roller lever at intervals, as required, and a reciprocating can ejector disk in the upper can chuck, substantially as specified.

6. In a stationary can double seaming machine, the combination with a pair of non-rotatable chucks for clamping and holding the can and its cover, of a continuously rotating seaming head furnished with seaming rollers and seaming-roller-levers, a continuously rotating cam wheel having an axis concentric with that of the seaming head and rotating at a different speed from the seaming head to cause the cams on the cam wheel to operate the seaming rollers at intervals as required, a can feed table and an endless flexible can feeder, the lower can chuck having a slot or channel to receive and accommodate the upper run of the endless flexible can feeder, substantially as specified.

7. In a stationary can double seaming machine, the combination with a pair of non-rotatable chucks for clamping and holding the can and its cover, of a continuously rotating seaming head furnished with seaming rollers and seaming-roller-levers, a continuously rotating cam wheel having an axis concentric with that of the seaming head and rotating at a different speed from the seaming head to cause the cams on the cam wheel to operate the seaming rollers at intervals as required, a can feed table and an endless flexible can feeder, the lower can chuck having a slot or channel to receive and accommodate the upper run of the endless flexible can feeder, and the feed table having a channel to receive and accommodate said upper run of said endless flexible can feeder, substantially as specified.

8. In a stationary can double seaming machine, the combination with a pair of non-rotatable chucks for clamping and holding the can and its cover, of a continuously rotating seaming head furnished with a pair of forming seaming rollers and levers for operating the same, and a pair of finishing rollers and levers for operating the same, said finishing roller levers having additional yielding and adjustable hinged arms, and a continuously rotating cam wheel having an axis concentric with that of the rotary seaming head and rotating at a variant speed from that of the seaming head, substantially as specified.

9. In a stationary can double seaming machine the combination with a pair of non-rotatable chucks for clamping and holding the can and its cover, of a continuously rotating seaming head furnished with a pair of forming seaming rollers and levers for operating the same, a pair of finishing rollers and levers for operating the same, said finishing roller levers having additional yielding and adjustable hinged arms, a continuously rotating cam wheel having an axis concentric with that of the rotary seaming head and rotating at a variant speed from that of the seaming head, and a pair of horizontally reciprocating can body-clamping and centering jaws, substantially as specified.

10. In a stationary can double seaming machine, the combination with a pair of non-rotatable chucks for clamping and holding the can and its cover, of a continuously rotating seaming head furnished with seaming

rollers and seaming roller levers, a continuously rotating cam wheel having an axis concentric with that of the seaming head and rotating at a different speed from the seaming head to cause the cams on the cam wheel to operate the seaming roller levers at intervals as required, and a pair of horizontally reciprocating can body clamping and centering jaws, substantially as specified.

11. In a stationary can double seaming machine, the combination with a pair of non-rotatable chucks for clamping and holding the can and its cover, of a continuously rotating seaming head furnished with seaming rollers and seaming roller levers, a continuously rotating cam wheel having an axis concentric with that of the seaming head and rotated at a different speed from the seaming head to cause the cams on the cam wheel to operate the seaming roller levers at intervals as required, a pair of horizontally reciprocating can body clamping and centering jaws and a can feeder, substantially as specified.

12. In a stationary can double seaming machine, the combination with a pair of non-rotatable chucks for clamping and holding the can and its cover, of a continuously rotating seaming head furnished with seaming rollers and seaming roller levers, a continuously rotating cam wheel having an axis concentric with that of the seaming head and rotating at different speed from the seaming head to cause the cams on the cam wheel to operate the seaming roller levers at intervals as required, a pair of horizontally reciprocating can body clamping and centering jaws, and a reciprocating can ejector in the upper can chuck, substantially as specified.

13. In a stationary can double seaming machine the combination with a pair of non-rotatable chucks for clamping and holding the can and its cover, of a continuously rotating seaming head furnished with seaming rollers and seaming roller levers, a continuously rotating cam wheel having an axis concentric with that of the seaming head and rotating at different speed from the seaming head to cause the cams on the cam wheel to operate the seaming levers at intervals as required, a pair of horizontally reciprocating can body clamping and centering jaws, a can feed table furnished with a central longitudinal channel and with a central opening for the lower can chuck to reciprocate through, and an endless flexible can feed chain having its upper run fitting and moving in the channel of the can feed table, substantially as specified.

14. In a stationary can double seaming machine, the combination with a pair of non-rotatable chucks for clamping and holding the can and its cover, of a continuously rotating seaming head furnished with seaming rollers and seaming roller levers, a continuously rotating cam wheel having an axis concentric with that of the seaming head and rotating at different speed from the seaming head to cause the cams on the cam wheel to operate the seaming levers at intervals as required, a pair of horizontally reciprocating can body clamping and centering jaws, a can feed table furnished with a central longitudinal channel and with a central opening for the lower can chuck to reciprocate through, an endless flexible can feed chain having its upper run fitting and moving in the channel of the can feed table, said lower can chuck having a slot or channel across the same to accommodate the upper run of said feed chain, substantially as specified.

15. In a stationary can double seaming machine, the combination with a pair of non-rotatable chucks for clamping and holding the can and its cover, of a continuously rotating seaming head furnished with seaming rollers and seaming roller levers, a continuously rotating cam wheel having an axis concentric with that of the seaming head and rotating at different speed from the seaming head to cause the cams on the cam wheel to operate the seaming roller levers at intervals as required, a pair of centering jaws, a reciprocating can ejector in the upper can chuck, a can feed table furnished with a central longitudinal channel and with a central opening for the lower can chuck to reciprocate through, an endless flexible can feed chain having its upper run fitting and moving in the channel of the can feed table, and said lower can chuck having a slot or channel across the same to accommodate the upper run of said feed chain, substantially as specified.

16. In a stationary can double seaming machine, the combination with a pair of non-rotatable chucks for clamping and holding the can and its cover, of a rotary seaming head furnished with a plurality of seaming rollers and seaming roller levers extending lengthwise of said seaming head and hinged thereto, a rotary cam wheel having a plurality of cams for operating said seaming roller levers, means for rotating the seaming head and means for rotating the cam wheel at a different speed from that of the seaming head to cause the cams on the cam wheel to operate the seaming roller levers, substantially as specified.

17. In a double seaming machine, the combination with a pair of chucks for clamping the can and its cover, of a rotary seaming head furnished with seaming rollers and vertically swinging seaming roller levers extending lengthwise of said seaming head and hinged thereto, a rotary cam wheel for operating said seaming roller levers, means for rotating the seaming head and means for rotating the cam wheels at a variant speed from that of the seaming head, substantially as specified.

18. In a seaming machine, the combination with a pair of non-rotatable chucks for clamping and holding the can and its cover, of a rotary seaming head furnished with seaming rollers and seaming roller levers extending lengthwise of the seaming head and hinged thereto, and a rotary cam wheel rotating at a different speed from the seaming head for operating the seaming rollers, substantially as specified.

FRANK RUDOLPHI.

Witnesses:
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