(No Model.) 6 Sheets—Sheet 1.

C. B. McDONALD.

CAN HEADING MACHINE.

No. 594,547. Patented Nov. 30, 1897.

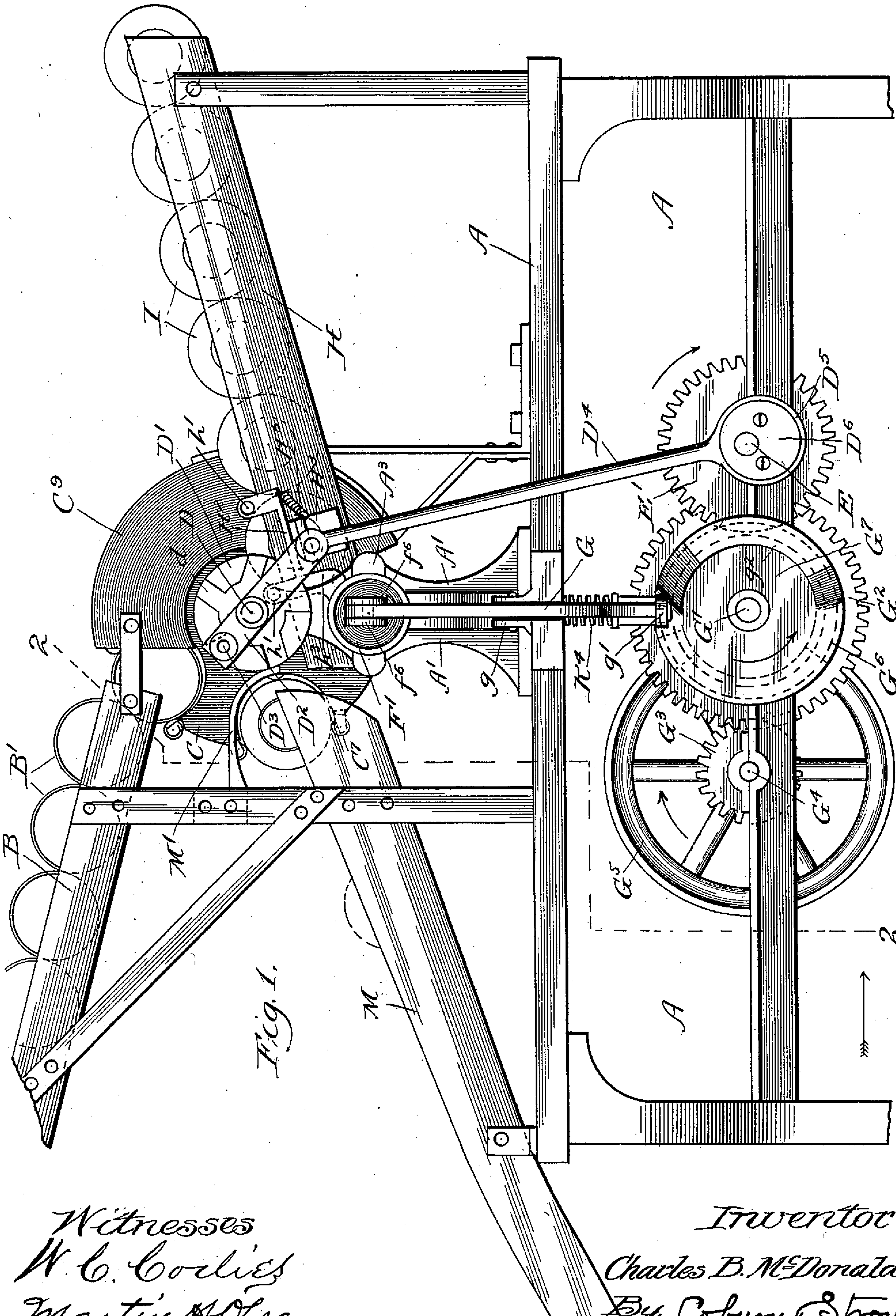

Fig. 1.

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CAN HEADING MACHINE.

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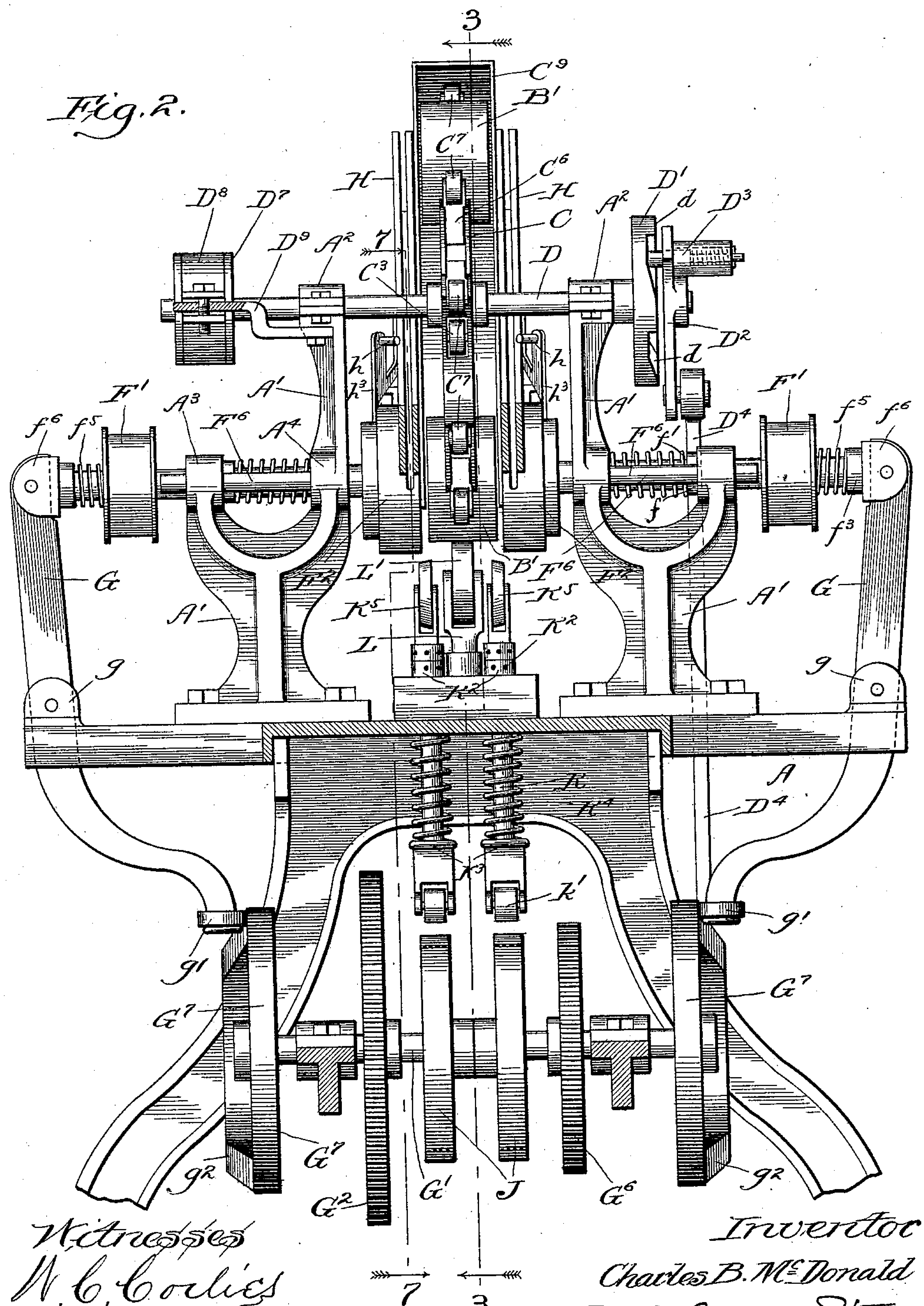
Fig. 2.



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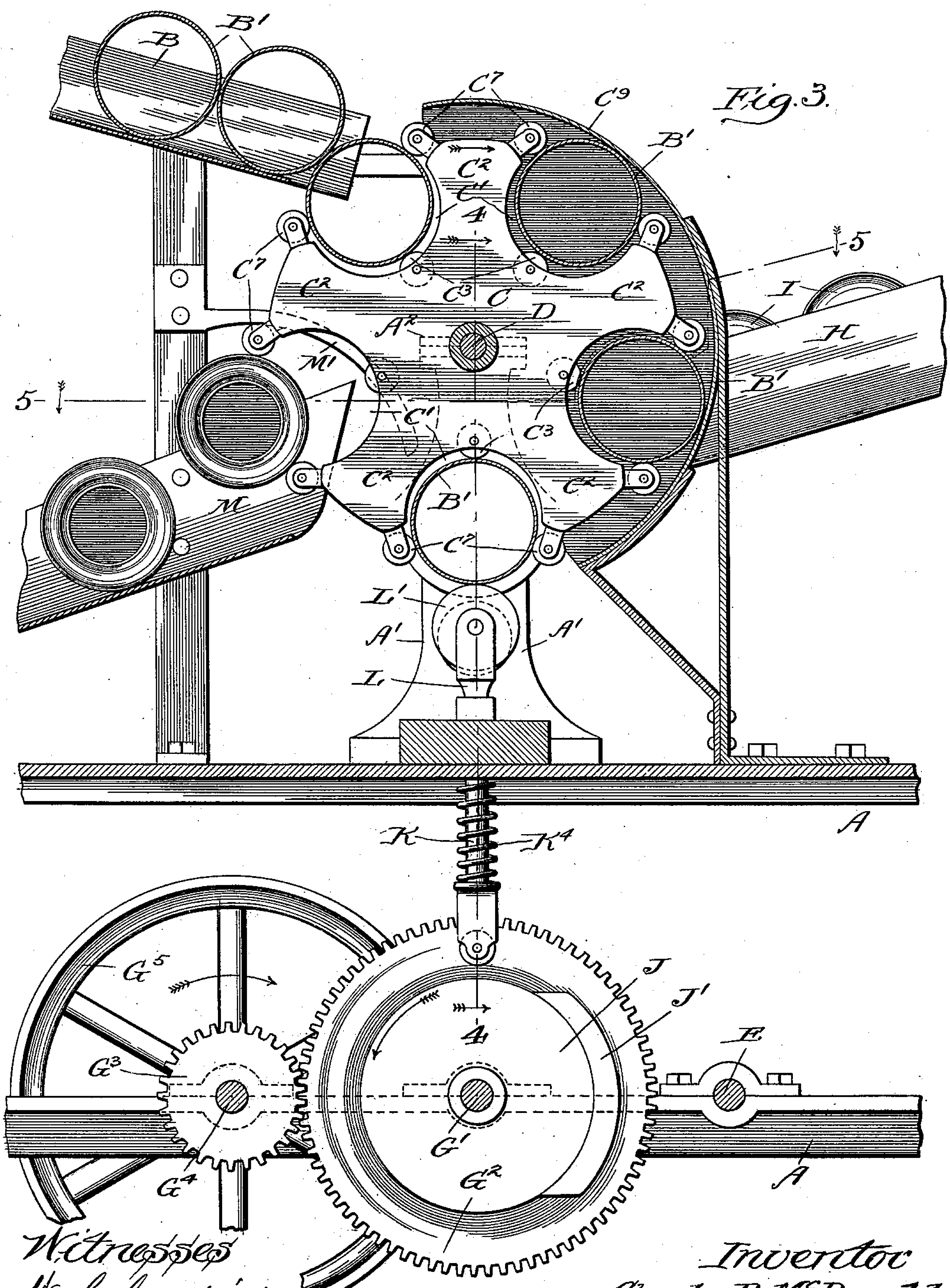

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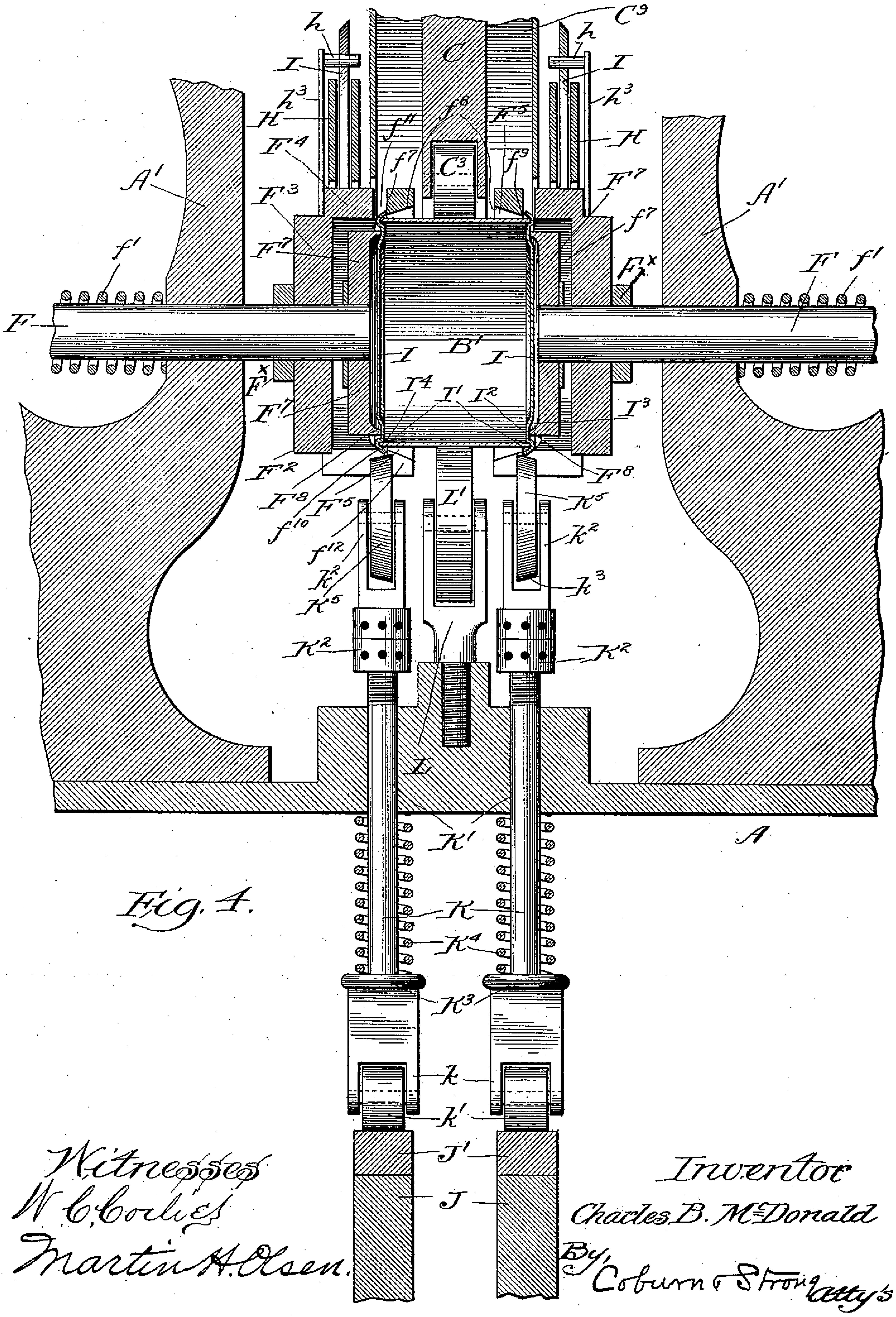

Fig. 4.

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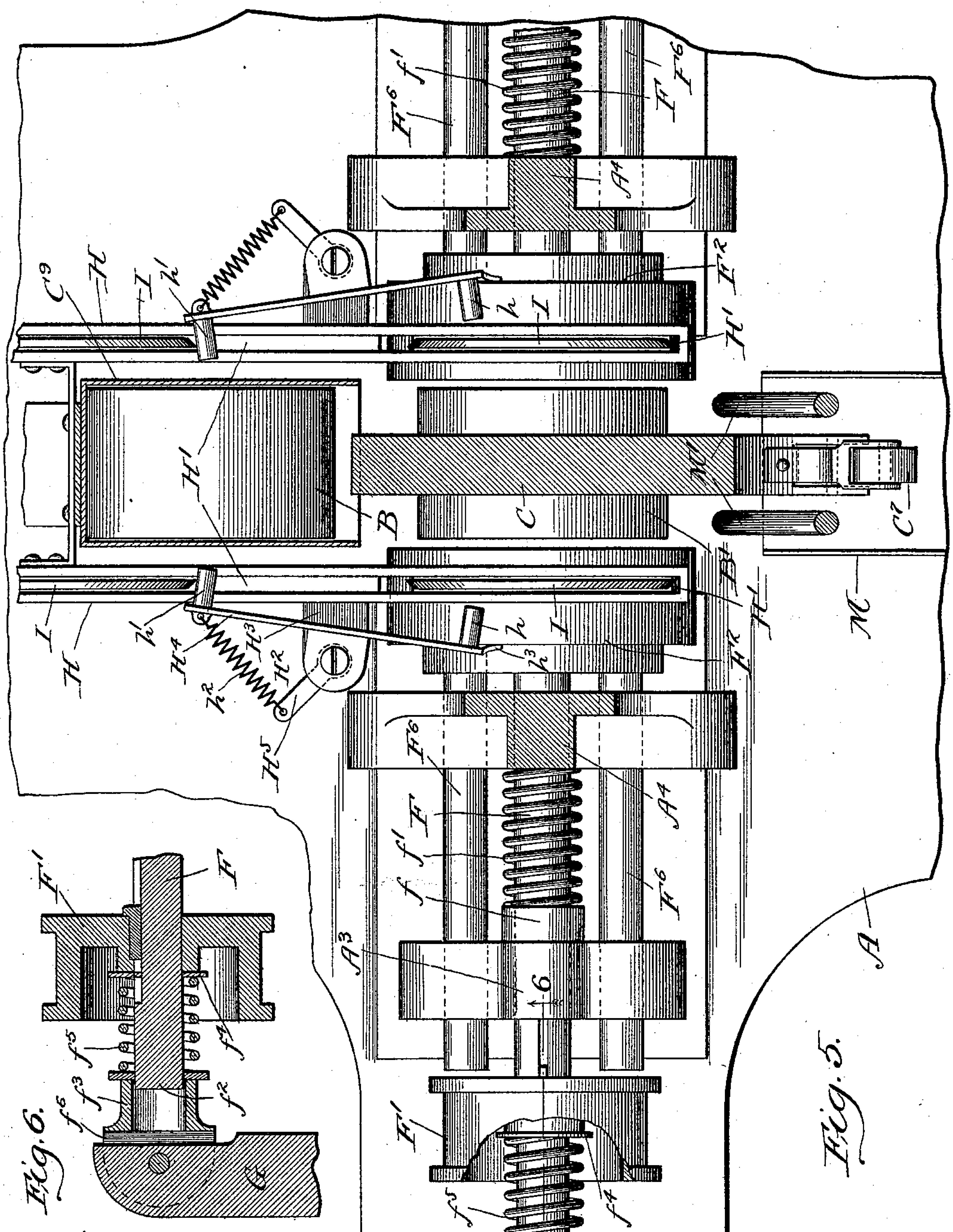

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(No Model.)

6 Sheets—Sheet 6.

C. B. McDONALD.

CAN HEADING MACHINE.

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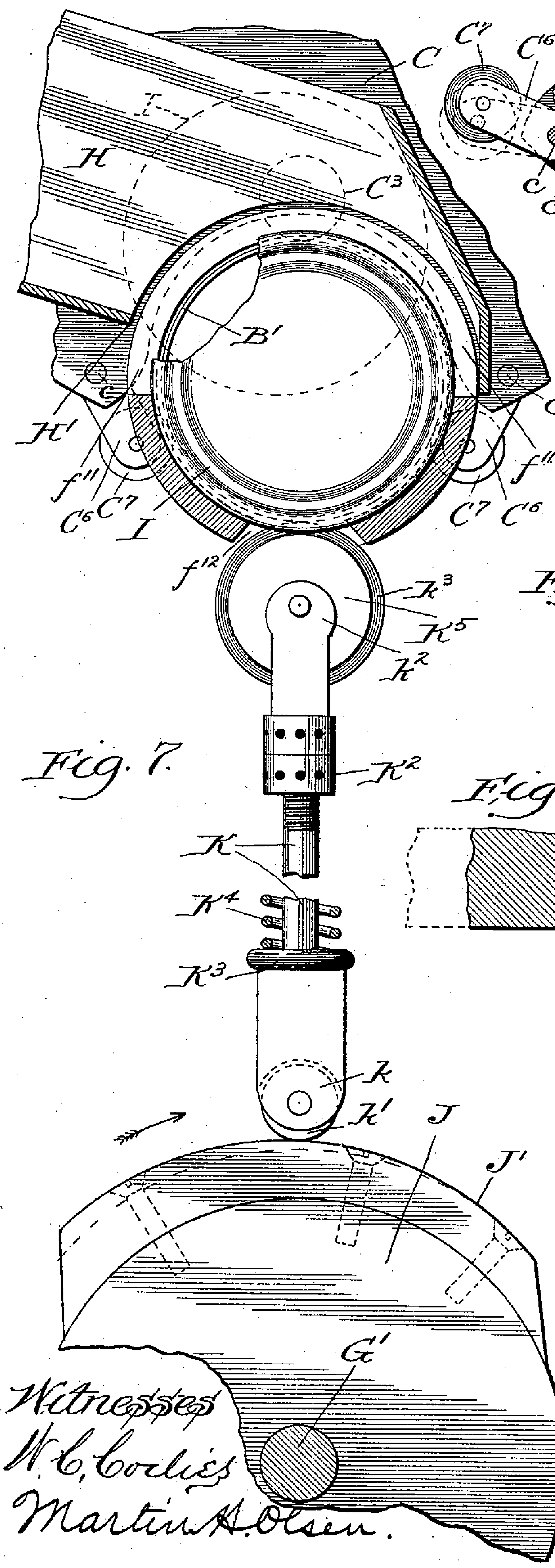


Fig. 7.

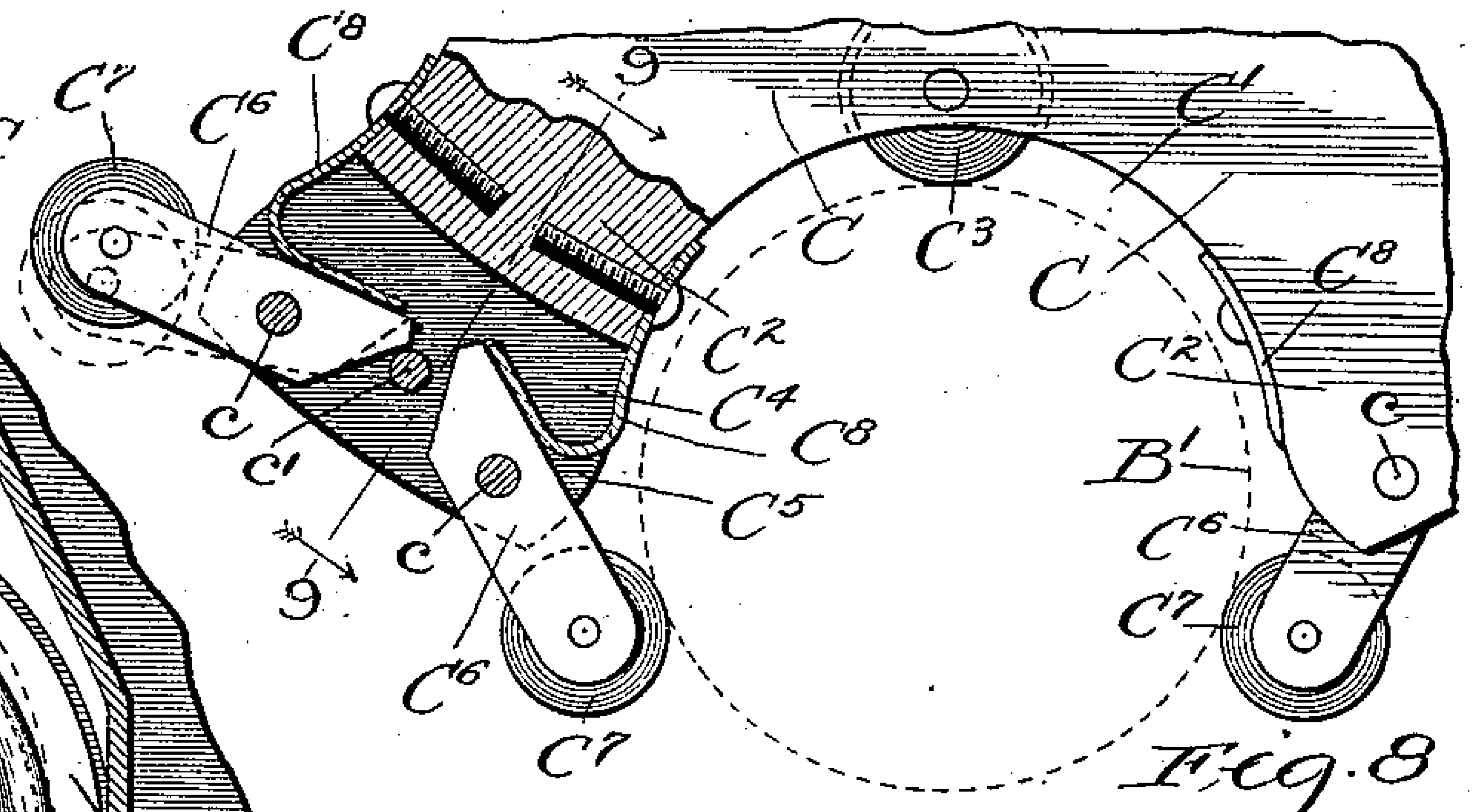


Fig. 8

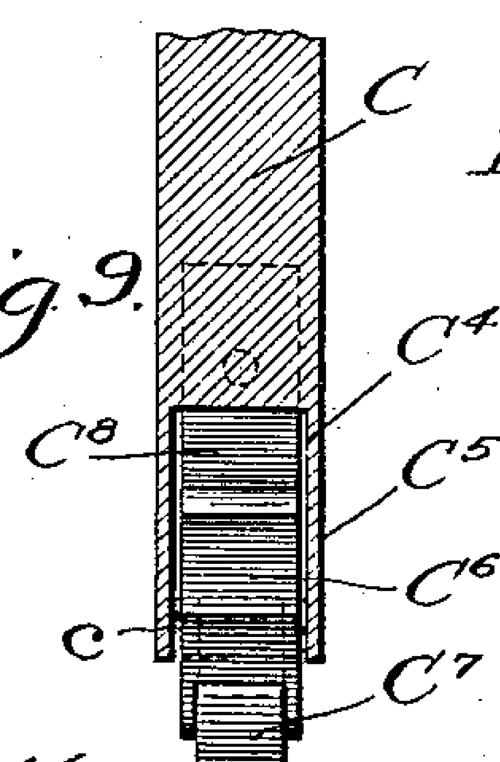


Fig. 9.

Fig. 10.

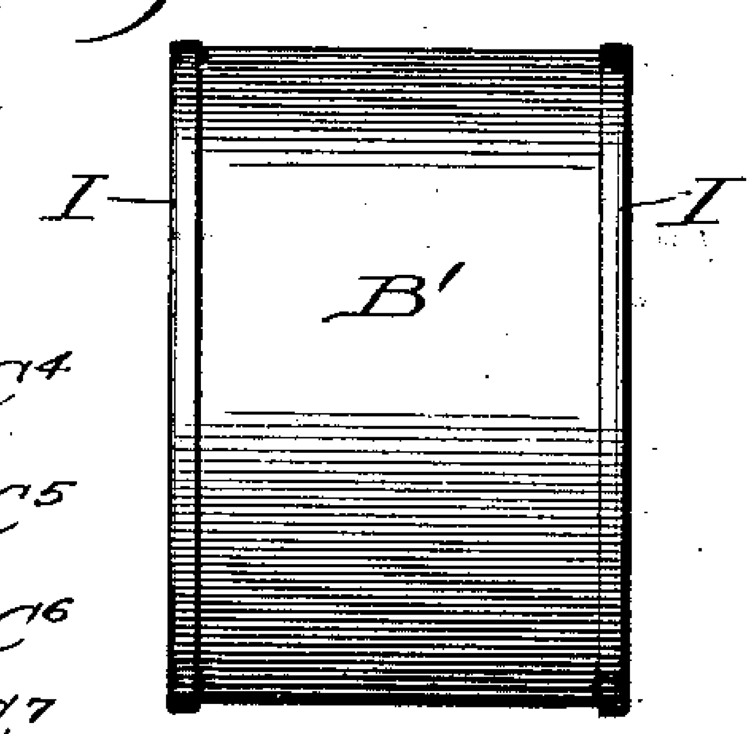
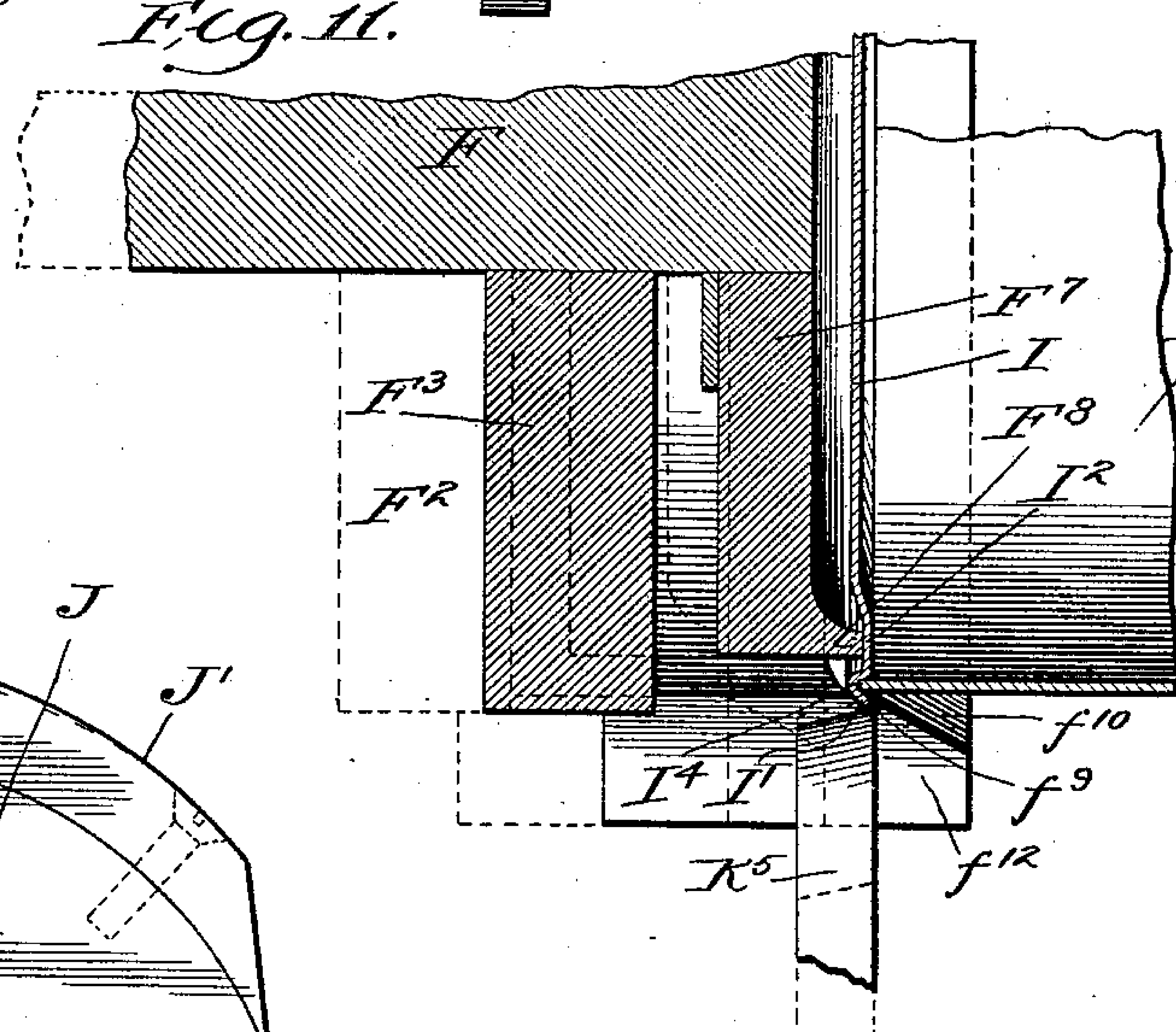


Fig. 11.



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UNITED STATES PATENT OFFICE.

CHARLES B. McDONALD, OF CHICAGO, ILLINOIS.

CAN-HEADING MACHINE.

SPECIFICATION forming part of Letters Patent No. 594,547, dated November 30, 1897.

Application filed September 28, 1896. Serial No. 607,157. (No model.)

To all whom it may concern:

Be it known that I, CHARLES B. McDONALD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Can-Heading Machines, which is fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of my machine. Fig. 2 is a vertical cross-section on the line 2 2 of Fig. 1, constituting practically an end elevation with the feed and discharge chutes omitted. Fig. 3 is a vertical longitudinal section on the line 3 3 of Fig. 2. Fig. 4 is a vertical cross-section on the line 4 4 of Fig. 3. Fig. 5 is an approximately horizontal section on the line 5 5 of Fig. 3. Fig. 6 is a vertical section on the line 6 6 of Fig. 5. Fig. 7 is a detail view of the crimping mechanism, taken on the line 7 7 of Fig. 2. Fig. 8 is a detail view in elevation of a portion of the feed-wheel. Fig. 9 is a section on the line 9 9 of Fig. 8. Fig. 10 is a detail view of a can which has been headed. Fig. 11 is a detail view, in vertical section, of a portion of a chuck, hood, and crimping-roll, shown in two positions, and of a can and head.

My invention relates to machines adapted to place and secure the flat disks constituting the top and bottom of a can upon the body thereof, this class of machines being commonly known as "can-heading" machines.

My invention has for its object to simplify the construction of such machines and to increase their efficiency in securing the heads upon the can-body.

My invention comprehends various improvements in construction, which will presently be described.

Referring to the drawings by letter, A A A represent the framework of the machine. This framework, near its center, is provided with two upright standards A' A'. Supported from the framework of the machine in any suitable manner is an inclined chute B, down which roll the can-bodies B'. These can-bodies are cylindrical in section and of any size, since the machine may be constructed for cans of greater or less diameter or depth. The chute B preferably leads from the machine where the can-bodies are formed, and thus automatically feeds the said can-bodies to the heading-machine.

From the chute B the can-bodies are taken, one by one, by the feed-wheel C. This feed-wheel is provided around its circumference with a series of recesses C', approximately semicircular in outline and of a somewhat larger radius than the can-body. Between each two recesses C' there is thus left a radial projection C^2. At the bottom of each recess there is loosely journaled in the wheel C a roller C^3, which projects into the recess C', as particularly shown in Figs. 3, 4, and 8. Each of the projections C^2 of the feed-wheel between the recesses C' is cut out near its outer end to form a space C^4, inclosed on either side by a wall C^5. In each space C^4 there are pivoted two short arms C^6, extending in opposite directions and mounted each upon a pin *c*. The outer end of each arm is provided with a roller C^7. The inner end contacts with a leaf-spring C^8, adapted to press the inner end of said arm C^6 outward. A stop *c'*, mounted in the wall C^5, prevents the outward movement of the said inner end of the arm C^6 beyond a given point.

The form of the recesses C' in the feed-wheel and the arrangement of the rollers C^3 and C^7 are such that when by the intermittent revolution of the feed-wheel, later described, one of the recesses C' is brought opposite the feed-chute B the lowest of the can-bodies B' is forced downward into the said recess by the pressure of the can-bodies above in the chute. The two arms C^6 on opposite sides of the recess spring aside to admit the can-body into the said recess, and are thereupon restored by the springs C^8 to a position in which the said rollers retain the can-body within the recess. Thus the can-body is held in the feed-wheel by its three points of contact with the roller C^3 and with the two rollers C^7, respectively, and while thus securely held the can-body is nevertheless perfectly free to revolve, the object of which will be later described.

The feed-wheel C may be partially inclosed by a casing C^9. The said casing, however, is entirely optional. The said wheel is mounted upon the shaft D, journaled in bearings

A^2, formed in the standards A' of the framework. On the said shaft D, at one end, is keyed a ratchet-wheel D', provided on its outer surface with ratchet-teeth d, each of which upon one side slopes off toward the tooth next adjacent. Beyond the ratchet-wheel D' there is loosely mounted on the shaft D a crank D^2, one end of which is provided with a spring-actuated plunger-pawl D^3, the other end of which is pivotally secured to the upper end of the eccentric-rod D^4. The lower end of the eccentric-rod D^4 is secured to the eccentric collar or strap D^5, surrounding the eccentric D^6. The said eccentric is keyed upon the shaft E, journaled in the lower part of the framework of the machine, and is driven through the gear-wheel E', also keyed upon the shaft, as will later be described.

Upon the other end of the shaft D, on which the feed-wheel is mounted, is keyed a friction-pulley D^7, surrounded by the friction-belt D^8, the ends of which are secured to a bracket D^9, carried by the standard A'. According to the operation of these devices, as the shaft E is revolved through the eccentric-rod D^4 the crank D^2 is reciprocated and the ratchet-wheel D' intermittently rotated by the spring-pawl D^3. The feed-wheel is thereby correspondingly rotated and each of the recesses C' is successively brought before the end of the feed-chute. To prevent the momentum of the wheel carrying it past its intermittent positions of rest, the friction-belt D^8 may be tightened upon the friction-pulley D^7, and thus may be made to apply a constant brake to the rotation of the feed-wheel.

Upon each side of the feed-wheel C and concentric with each recess C' at the lowest point to which it is brought by the rotation of the said feed-wheel is mounted a shaft F in bearings A^3 and A^4, formed in the standard A' of the frame. The said shaft F is not only free to revolve in these bearings, but also is adapted to reciprocate longitudinally therein. Adjacent to the bearing A^3 the said shaft F carries a collar f, secured thereto so as to move longitudinally with the shaft and to permit the shaft to revolve loosely in said collar. Between this collar and the remaining bearing a coiled spring f' surrounds the shaft. The shaft is thus held in its normal position, with the collar f abutting against the bearing A^3. The shaft is revolved by the pulley F', which is keyed to the said shaft, but free to slide thereon, so as to allow longitudinal movement to the shaft without interfering with the movement of revolution.

The outer end of the shaft F is provided with a head f^2, which fits within a cap f^3, loosely inclosing the said head, so as to permit the revolution of the shaft and also a slight longitudinal movement of the head f^2 within the said cap. A short distance inward from the said head and cap the shaft is provided with a pin f^4, and between said pin and cap with a coiled spring f^5, surrounding the shaft. When the shaft is moved longitudinally inward by the cap f^3, as will presently be described, there is thus provided a certain degree of resiliency. The cap f^3 is provided with two perforated ears f^6, through which there is pivoted to the said cap the upper end of a lever G. The lever G is pivotally mounted in the main frame, as at g, and is provided at its lower end with a roller g'.

In the lower part of the framework A of the machine is journaled a shaft G', upon which is mounted a gear-wheel G^2. The gear-wheel G^2 meshes with the gear-pinion G^3, carried by a second shaft G^4, similarly journaled. Upon the said second shaft is also mounted a driving-pulley G^5. Thus from the driving-pulley G^5 revolution is imparted to the shaft G'. The shaft G' carries a second gear-wheel G^6, which meshes with the gear-wheel E', carried by the shaft hereinabove described. The shaft G' finally at each end carries a cam-wheel G^7, provided along a portion of its outer flat surface with a raised cam projection g^2, adapted to contact with the collar g', carried with the lever G. During a portion of the revolution of the shaft G' the roller g' travels along the flat outer surface of the cam-wheel G^7. The shaft F is then in its normal outward position, with the collar f abutting against the bearing A^3. During the remainder of the revolution of the shaft G' the roller g' travels on the raised cam surface or projection g^2. The shaft F is thus thrown inward and held in its inner position, compressing the spring f'. As above described, this inward throw of the shaft is made somewhat resilient.

The inner end of each of the shafts F carries a circular hood F^2. This hood comprises a disk-shaped back F^3 and an annular inwardly-projecting wall F^4, within which there is thus formed the circular recess F^5. The hood F^2 is loosely mounted on the shaft F, so as not to partake of the revolution of the shaft, but so as to move backward and forward with the same, being retained between the collar $F^{\times}$ (see Fig. 4) and the chuck F^7, to be subsequently described. The guide-rods F^6, secured at one end to the hood, extend through guide-apertures formed in the framework near bearings A^3 and A^4 of the shaft F and permit of the reciprocating of the hood F^2, while preventing its rotation.

On the extreme inner end of the shaft F within the hood F^2 is mounted a disk-shaped chuck F^7, adapted to revolve with the shaft within the rear portion f^7 of the circular recess F^5 of the hood. The working surface of the chuck is provided with an annular rim F^8. The outer portion of the circular recess F^5 of the hood, somewhat larger in diameter than the inner portion f^7, flares outwardly, as at f^8. The inner edge of this flaring concave portion constitutes a shoulder f^9. Behind this shoulder there is thus formed a groove f^{10}. In the upper side of the hood an opening f^{11} is formed through the wall F^4 of the hood adapted to permit the dropping of the can-head into the groove f^{10}. In the lower side of the hood there is formed a second opening f^{12} through the wall F^4, adapted to permit the crimping-rolls later described to contact with the lower edge of the can-head when seated in the groove f^{10}.

On each side of the feed-wheel C is located an inclined feed-chute H, down one of which pass the tops and down the other the bottoms, constituting the heads I of the cans. The chute H terminates over the hood F^2, and is provided with an opening H′, which registers with the opening f^{11} when the hood is in its normal and outward position. The can-head I falls from the chute H through the said openings H′ and f^{11} into the groove f^{10}. To provide for the regular feeding of a single head to each hood each time that the hood comes into its said outer normal position, I provide an automatic feed device H^2, which is operated by the movement of the hood itself. To the side of the feed-chute H is secured a small bracket H^3, on which is pivotally mounted an escapement H^4, provided at one end with a pin h and at the other end with a similar pin h', which are adapted alternately to project across the top of the feed-chute as the escapement oscillates. The end of the escapement carrying the pin h' is connected with a projection H^5, carried by the bracket H^3, by a spiral spring h^2. The end of the escapement carrying the pin h is provided with a downwardly-projecting arm h^3, which is pressed against the hood F^2 by the spring h^2. When the hood moves inward, the pin h' is withdrawn from across the top of the feed-chute H and permits a head I to roll down the chute and abut against the pin h. When the hood moves back to its normal position, the pin h is withdrawn and permits the head to pass outward and downward through the opening H′ in the chute, as before described. The pin h' prevents the remaining heads in the chute from passing farther down.

The can-heads I, of which those forming the bottom of the can are disk-shaped and those forming the top are annular in shape and provided with a central opening, are as to their edges identical in form. The extreme edge of each head is bent inward to form an annular lip I′. A short distance inside of the said lip is formed an annular ridge I^2 on the inside surface of the head, producing a corresponding annular depression I^3 on the outside surface of the said head. On the inner surface of the head there is thus formed between the lips I′ and the ridge I^2 an annular groove I^4, which registers with the edge of the can-body.

The shaft G′, heretofore described, carries two cam-wheels J, identical in form with each other, each being provided along one portion of its periphery with a raised cam-surface J′. In the framework of the machine, separated by a distance equal to the depth of the can to be headed, are located two upright spindles K, each of which is adapted to reciprocate in guideways K′, formed in said framework. Each spindle is provided with an upper head K^2 and a lower head K^3 on opposite sides of the guideways K′. Between the lower head K^3 and the framework A a coiled spring K^4 surrounds the spindle and holds the same in a normal downward position, with the head K^2 abutting against the framework A. The lower head K^3 is provided with two perforated ears k, in which is mounted a roller k', adapted to travel around the periphery of the cam-wheel J. The upper head K^2, carried by the spindle, is provided with ears k^2, between which is mounted a crimping-roll K^5 with a beveled surface k^3.

In the framework A, between the two crimping-roll spindles K, is mounted a short standard L, in which is journaled a roller L′, the upper surface of the said roller being adapted to contact with the can-body carried by the feed-wheel when in position to be headed.

Below the feed-chute B is arranged an exit-chute M, adapted to receive the headed cans. Secured to the framework of the machine above the end of the chute M, adjacent to the feed-wheel and extending on each side of the said feed-wheel in such manner as to contact with the projecting ends of the cans, is a pair of stripping-arms M′. (Shown particularly in Figs. 1 and 3 of the drawings.)

I shall now explain the operation of my machine the construction of which has been hereinabove described. The can-bodies B′ pass down the chute B and are taken up one by one in the recesses C′ of the feed-wheel C in a manner already referred to, the said feed-wheel C being given an intermittent motion through the ratchet-wheel D′ and connecting mechanism, as has been stated. In time each such can-body is brought by the revolution of the feed-wheel to a position between the two hoods F^2. Each of the hoods contains a can-head I, fed into it automatically by the feed device H^2, as already described. The said hoods are in their outer or normal position. By the revolution of the cam-wheels G^7 the hoods and the chucks revolving within them are brought together upon opposite sides of the can-body, as shown particularly in Fig. 4. The can-heads I are retained in their respective seats or grooves F^{10} by reason of the lip I′ engaging with the shoulder f^9, which forms the inner side of each such groove. As the heads in the hoods approach the body of the can the edges of the can-bodies fit in the annular groove I^4, extending around each head. The annular rim F^8 of each chuck fits within the annular depression I^2 of each head, and thus firmly holds such head with relation to the chuck, and both heads and can-body are rapidly revolved by the revolution of the chucks. The springs f^5 press the chucks inward against the heads and can-body with a yielding pressure. The can-body is readily revolved by its mounting between the three rollers C^3, C^7, and C^7 and the roller L′, with which it comes in contact in this position.

By the time that the chucks have been moved inward by the revolution of the cam-wheels G^7 the raised surfaces J′ on the cam-wheels J contact with the rollers k' and force upward the crimping-rolls K^5. Each crimping-roll crimps down the lip I′ of the can-head I upon the can-body, the crimping-rolls being revolved by contact with the revolving can-body. The continued revolution of the cam-wheels J now permits the spindles and crimping-rolls to drop down to their normal position, and immediately thereafter the continued revolution of the cam-wheels G^7 permits the hoods and chucks to resume their normal outer position. This leaves the can-body, with both its heads, in the feed-wheel. The lip I′ of the head having been crimped down no longer catches upon the shoulder f^9 of the chuck and allows the head, which is crimped on the can-body, to pass out of the chuck as the latter is withdrawn.

The continued revolution of the feed-wheel raises the headed can to such a position that it comes in contact with the stripping-arms M′, which force it out from between the yielding rolls C^7, whereupon the can rolls down the chute M.

It will be seen that a can-heading machine made according to the principles of my invention, as hereinabove set forth, is not only simple in construction and efficient in its operation, but also effective in respect of the results produced. The feed-wheel securely holds the can-bodies which it receives from the feed-chute and at the same time permits them to be rapidly revolved when brought in contact with the can-heads and rotating chucks, and also permits them to be easily discharged into the discharge-chute. The hoods which receive the can-heads have but a single back-and-forth movement and may be each in a single integral casting. The chucks have a continuous rotary movement, which is not interfered with by their reciprocation with the hoods. The cam-surface g^2 of each of the cam-wheels G^7 extends over a larger segment of the periphery of the said cam-wheel than does the cam-surface J′ on the cam-wheel J. By this construction the hoods are first carried inward. The crimping-rolls are then forced upward. The crimping-rolls later drop back, and finally the hoods are restored to their outer position, both the two movements of the crimping-rolls taking place between the inward and the outward movement of the hoods. The action of the crimping-rolls firmly binds the heads upon the can-body and the parts are not liable to displacement before the operation of soldering, and this crimping of the edge of the head upon the can-body permits the hoods to be withdrawn without any opening movement on the part of the said hoods.

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

1. In a can-heading machine, the feed-wheel C formed with recesses C′, each such recess being provided with rollers C^3 and C^7 between which the can-body is held.

2. In a can-heading machine, the feed-wheel C provided with semicircular recesses C′; the roller C^3 mounted at the bottom of said recess; and the rollers C^7 mounted upon spring-controlled arms C^6, on each side of said recess.

3. In a can-heading machine, the feed-wheel C, provided with the recesses C′; the roller C^3; the pivoted arms C^6, carrying the rollers C^7; the springs C^8; and the stop-pin c', substantially as described.

4. In a can-heading machine, the feed-wheel C provided with recesses adapted to receive the can-bodies, and mounted upon the shaft D; the ratchet-wheel D′ keyed to said shaft; the crank D^2 provided with the pawl D^3; the connecting-rod D^4; the shaft E; an eccentric connection between the said shaft E and the connecting-rod D^4; the friction-pulley D^7 keyed to the shaft D; and the friction-belt D^8.

5. In a can-heading machine, the shafts F adapted to rotate and reciprocate in their bearings; the hoods F^2 adapted to reciprocate with the said shafts but not to rotate therewith; the chucks F^7 adapted to rotate with the said shafts within the hoods; and means adapted to revolve and intermittently to reciprocate the said shafts.

6. In a can-heading machine, the shafts F adapted to rotate and reciprocate in their bearings; the hoods F^2 mounted upon the said shafts to reciprocate but not to rotate therewith, and adapted to receive the can-heads and carry them into contact with the can-body; the chucks F^7 adapted to rotate with the said shafts within the hoods; and means adapted to revolve and intermittently to reciprocate the said shafts.

7. In a can-heading machine, mechanism adapted to feed and hold the can-bodies; reciprocating hoods F^2 adapted to receive and carry the can-heads into contact with the can-body, and provided with apertures adapted to admit the crimping-rolls; and crimping-rolls adapted to enter the said hoods and crimp the heads upon the can-body while the same are held in contact within the said hoods.

8. In a can-heading machine, mechanism adapted to feed the can-bodies and hold the same; reciprocating hoods F^2 adapted to receive and carry the can-heads into contact with the can-bodies, provided with apertures for the admission of the crimping-rolls; chucks F^8 adapted to rotate the said can bodies and heads while so held in contact; and crimping-rolls K^5 adapted to enter the said hoods and crimp the heads upon the can-body while the same are held in contact within

the said hoods and are rotated by the said chucks.

9. In a can-heading machine, mechanism adapted to feed the can-bodies; the shafts F; means for rotating and for reciprocating the said shafts; chucks mounted thereon adapted to revolve and to reciprocate therewith; hoods upon the said shafts adapted to reciprocate but not to revolve therewith, and further adapted to receive and carry the heads into contact with the can-body; and crimping-rolls adapted to crimp the said heads while so held in contact by the said hoods.

10. In a can-heading machine, mechanism adapted to feed the can-bodies; the shafts F; means for rotating and for reciprocating the said shafts; chucks mounted thereon adapted to revolve and to reciprocate therewith; hoods upon the said shafts adapted to reciprocate but not to revolve therewith, the said hoods being provided with apertures above for receiving the heads, and with apertures below for the admission of the crimping-rolls thereto; and crimping-rolls adapted to crimp the said heads while so held in contact by the said hoods.

11. In a can-heading machine, means for feeding the can-bodies; the shafts F adapted to reciprocate and rotate in their bearings; means adapted to reciprocate the said shafts; a spring f^5 interposed between the said reciprocating means and each said shaft; a chuck F^7 fixedly mounted upon each said shaft, and adapted to rotate and reciprocate therewith; the hood F^2 also mounted upon the said shaft to reciprocate but not to rotate therewith, and adapted to receive the can-head and carry the same into contact with the can-body; and means to rotate the said shaft.

12. In a can-heading machine, the combination of the hood F^2 provided with an annular recess in its interior of a size adapted to retain the can-head admitted thereto before its edges are crimped and to carry the can-head into contact with the can-body, with mechanism for reciprocating said hood to and from the can-body and for crimping the can-head thereby fastening it to the can-body and reducing its diameter sufficiently to release it from said recess, said crimping mechanism being so located as to be applicable to the can-head when the hood is in its innermost position.

13. In a can-heading machine, a hood adapted to receive a head and carry the same into contact with the can-body, provided on its interior surface with a recess of a size adapted to retain the head before the edges of the same are crimped upon the can-body, and to release the same when its edges are so crimped, and provided with an aperture adapted to admit the crimping-roll to contact with the said head; and a crimping-roll adapted to crimp the head upon the can-body while the same is held by the hood in contact.

14. In a can-heading machine, a hood adapted to receive a head and carry it into contact with the can-body, provided with an annular recess upon its inner surface of a size adapted to retain the head before the edges of the same are crimped upon the can-body, and to release the same when its edges are so crimped, and provided with an upper aperture adapted to admit the can-head, and with a lower aperture adapted to admit the crimping-roll, both opening into the said recess; a chuck mounted within the hood adapted to revolve the can head and body; and a crimping-roll adapted to crimp the said head upon the said body while so revolved.

15. In a can-heading machine, the hood F^2 mounted upon the shaft F and adapted to reciprocate horizontally therewith, the said hood being provided with an interior circular recess; a chuck F^7 keyed to the said shaft adapted to revolve and reciprocate therewith, within the said recess of the hood; a shoulder f^9 upon the inner wall of the hood-recess, forming a groove f^{10} behind the same adapted to receive the can-head, the said groove f^{10} being provided with an opening to admit the can-head, and with a second opening to admit the edge of a suitable crimping-roll.

16. In a can-heading machine, the shaft F; the hood F^2; the chuck F^7; means adapted to revolve the said shaft; the lever-arm G; the cam-wheel G^7 provided with a cam-surface g^2; the crimping-roll K^5 mounted upon the spindle K; and the cam-wheel J provided with the cam-surface J′, constructed and operating substantially as described.

17. In a can-heading machine, the shaft F, mounted in bearings A^3 and A^4; the collar; the spring f' adapted to retain the shaft in its normal outer position; the pulley F′ keyed to the said shaft; the hood F^2 adapted to move longitudinally with the said shaft, provided with guide-rods F^6; the chuck F^7 keyed to the shaft F within the said hood; the cap f^3 inclosing the end of the shaft F; the pin f^4; the spring f^5 between the said pin and the said cap; and connections with the cap f^3 adapted to move the shaft inwardly intermittently, substantially as described.

18. In a can-heading machine, the inclined chute H mounted fixedly upon the framework adapted to feed forward the can-heads I; the reciprocating hood F^2 adapted to receive the can-head; and an automatic feed device H^2 operated by the movement of the hood, adapted to admit a can-head to the said hood each time the said hood is reciprocated.

19. In a can-heading machine, the feed-chute H, the escapement H^4 provided with the pins h and h' adapted alternately to project across the chute H; the arm h^3 carried by the escapement; and the spring h^2 adapted to hold the said arm in contact with the hood, substantially as described.

20. In a can-heading machine, the hood F^2 provided with an interior circular cavity; the rib f^9 on the inner wall of said cavity form-

ing the groove f^{10}, the said groove opening through the top of the hood by the aperture f^{11}; means adapted to reciprocate said hood backward and forward; a feed-chute H fixedly mounted on the framework and provided with a downward opening H′ registering with the opening f^{11} in the hood, when the hood is in its outer position only; and an automatic feed device H^2 operated by the movement of the hood adapted to admit a single can-head into the said hood when the same is in its outer position.

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Witnesses:

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