

No. 731,157.

PATENTED JUNE 16, 1903.

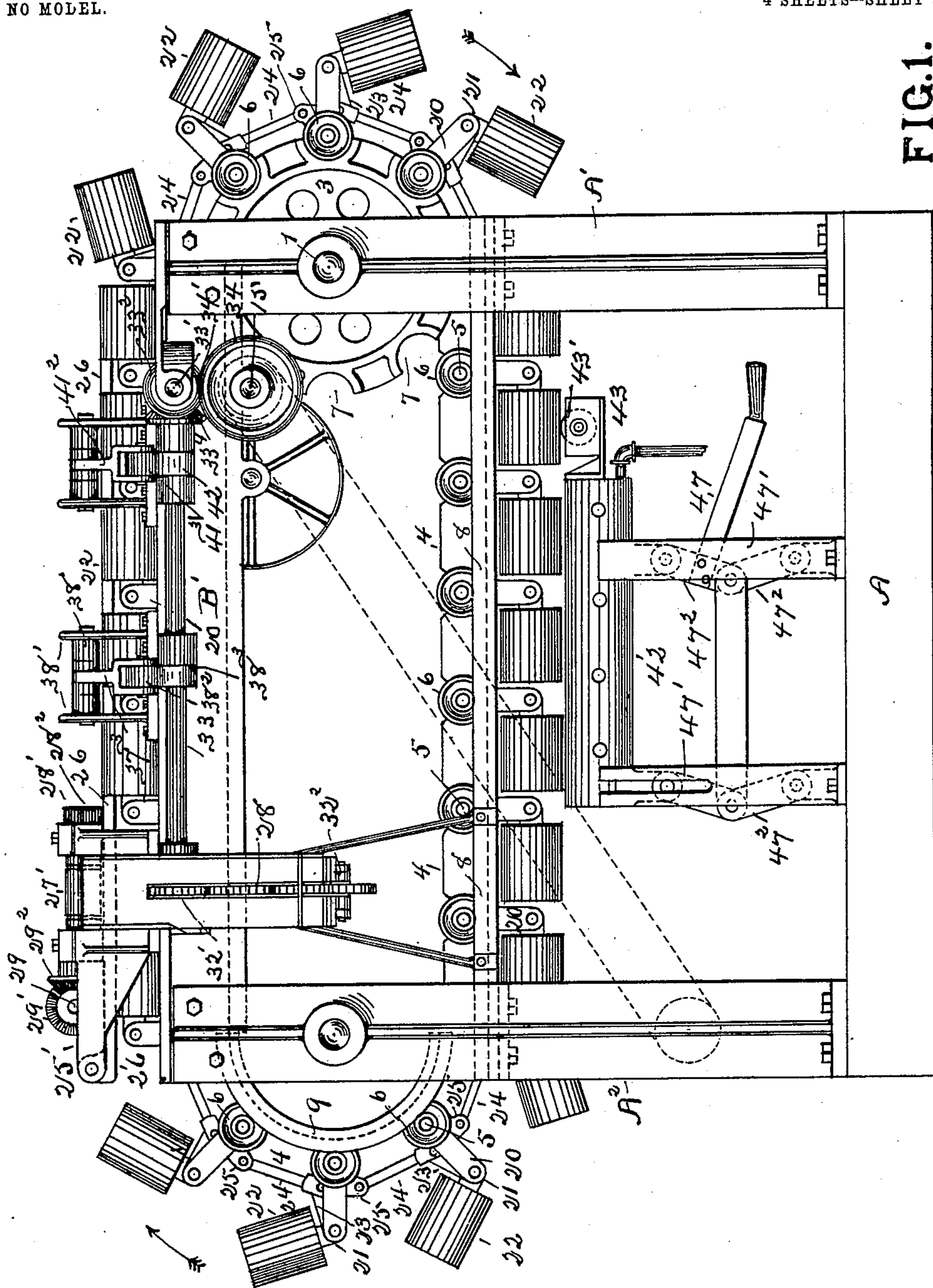
H. C. BLACK.

CAN BODY FORMING AND SEAMING MACHINE.

APPLICATION FILED JULY 25, 1902.

NO MODEL.

4 SHEETS—SHEET 1.



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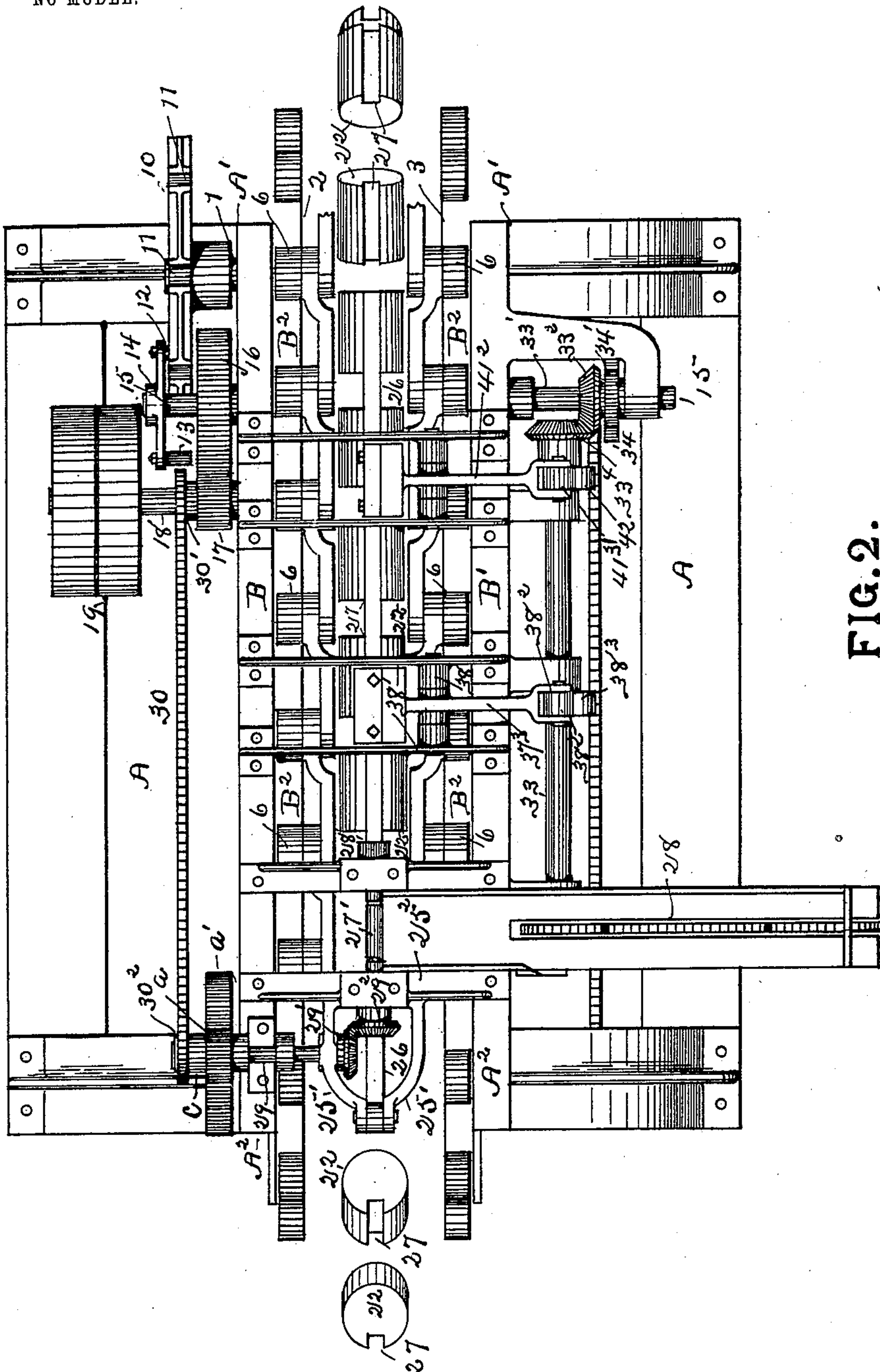


FIG. 2.

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4 SHEETS—SHEET 3.

FIG. 3.

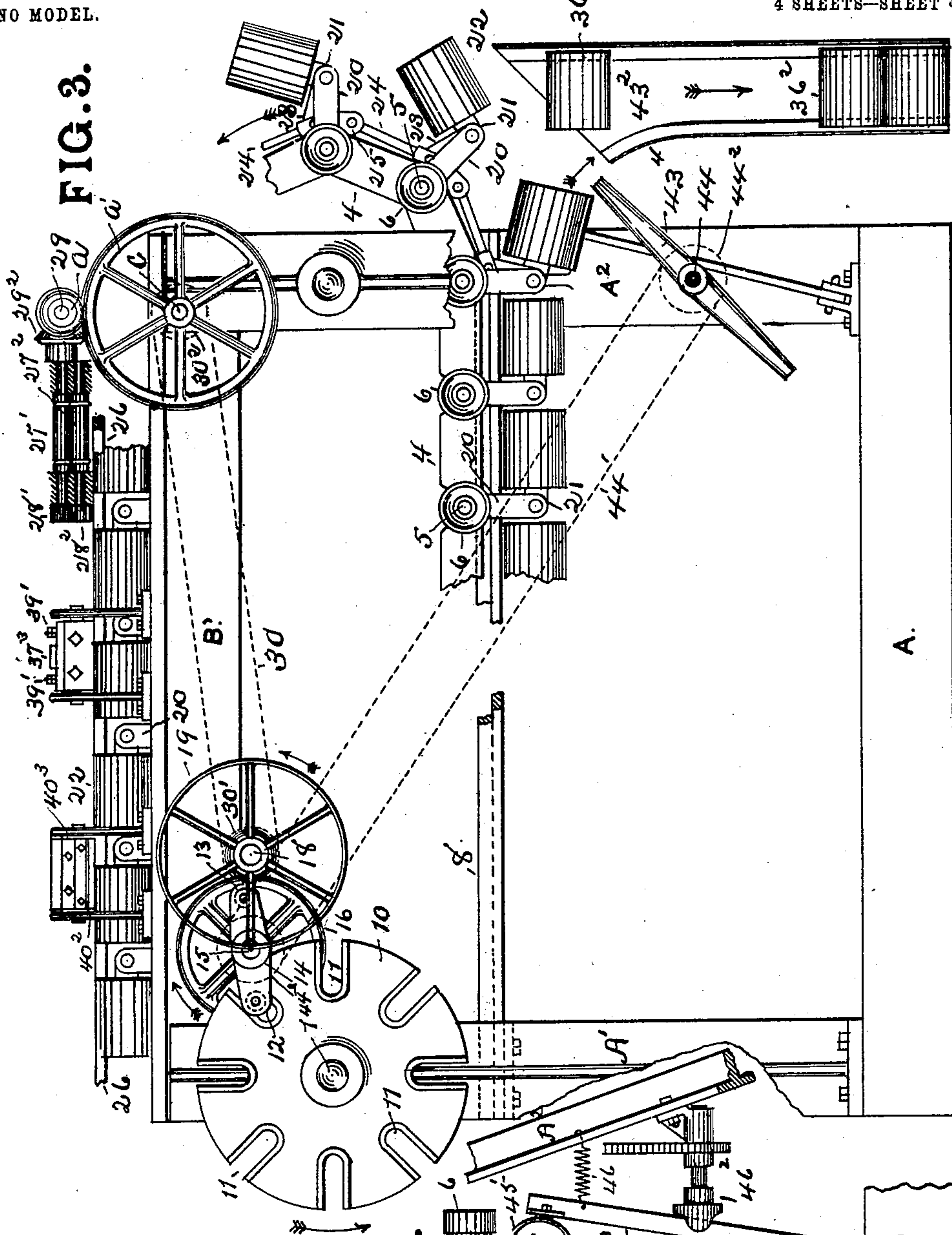
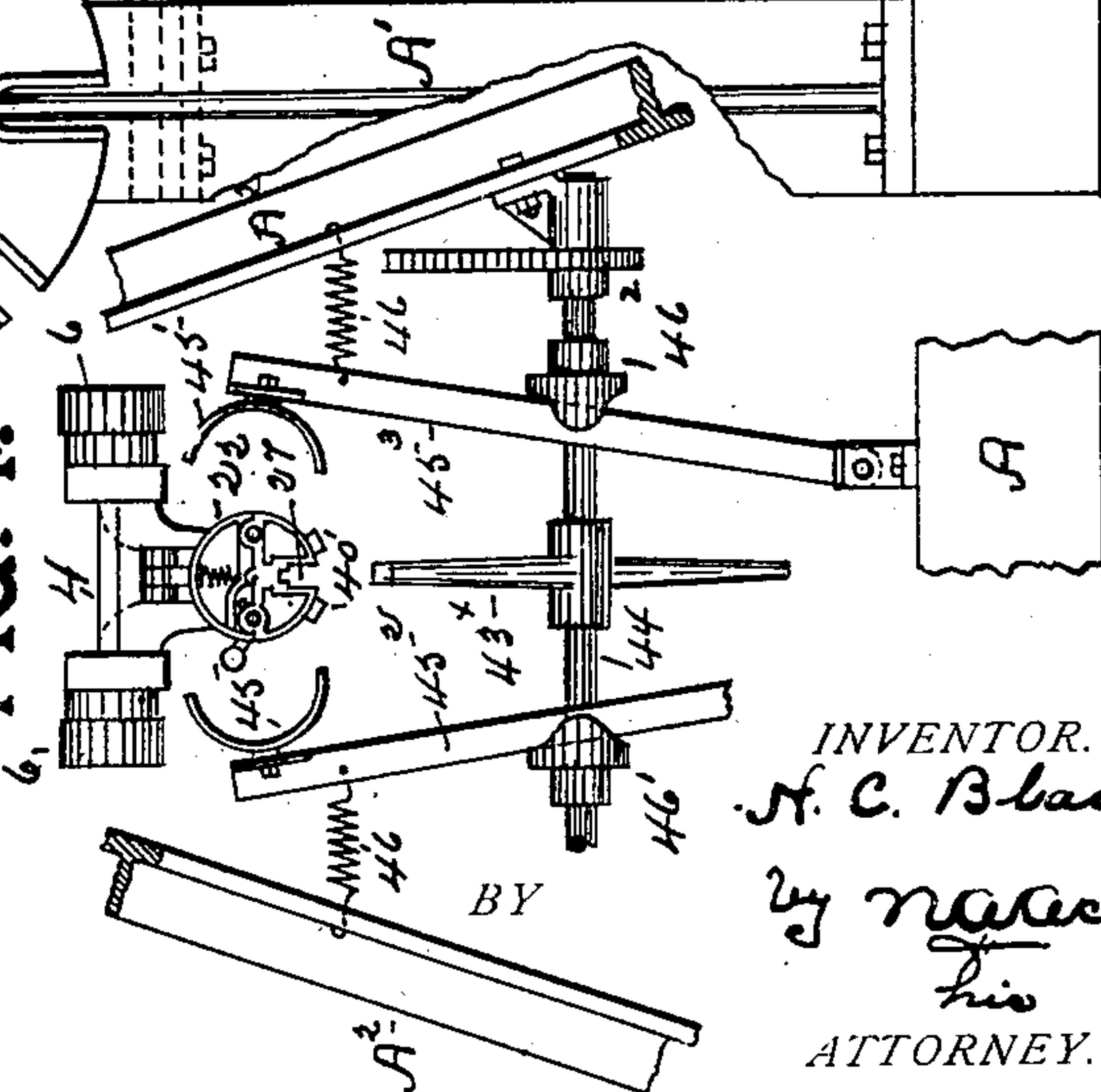


FIG. 4.



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4 SHEETS—SHEET 4.

FIG. 5.

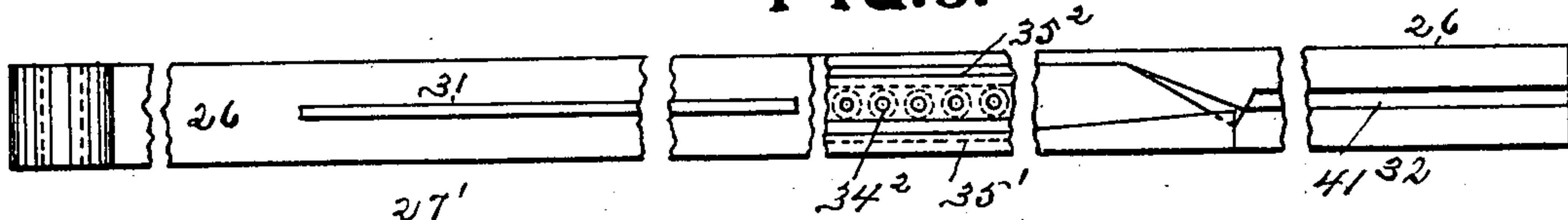


FIG. 6.

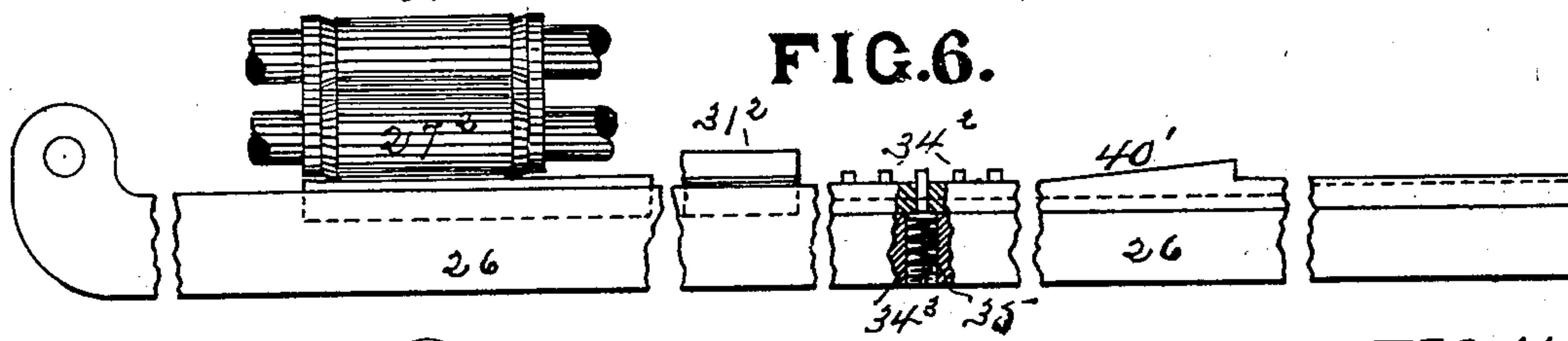


FIG. 7.

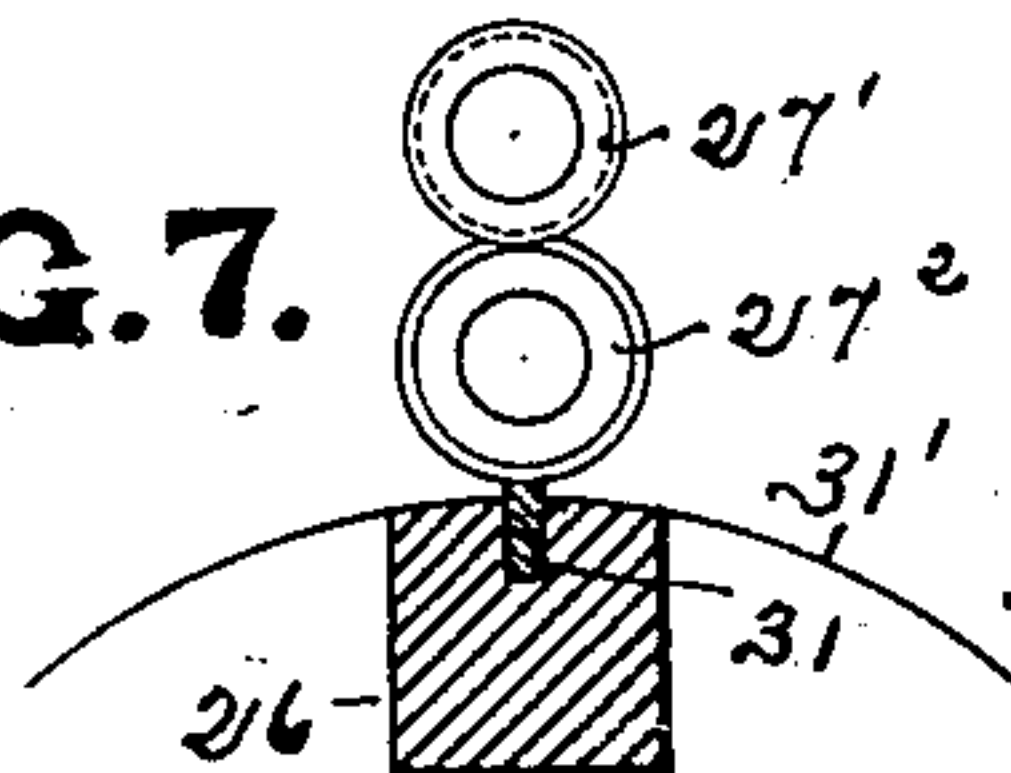


FIG. 8.

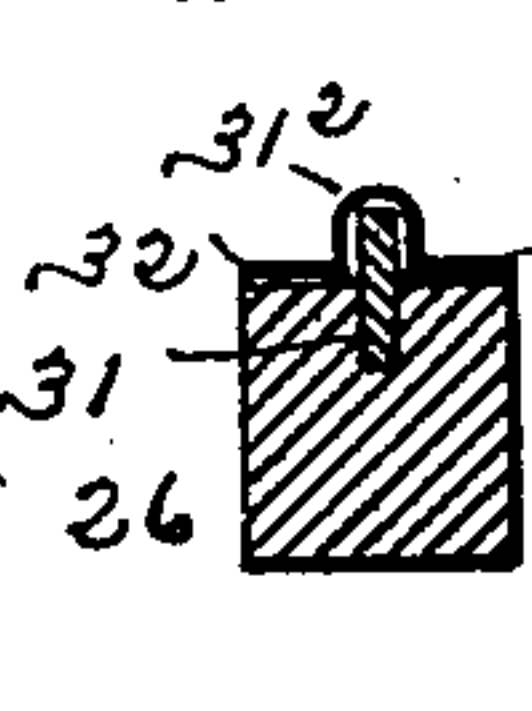


FIG. 9.

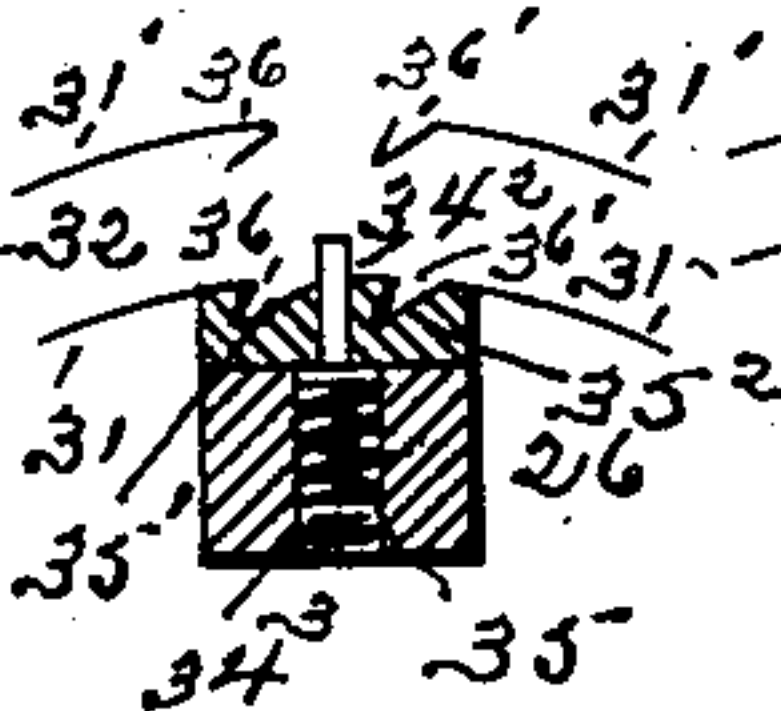


FIG. 10.

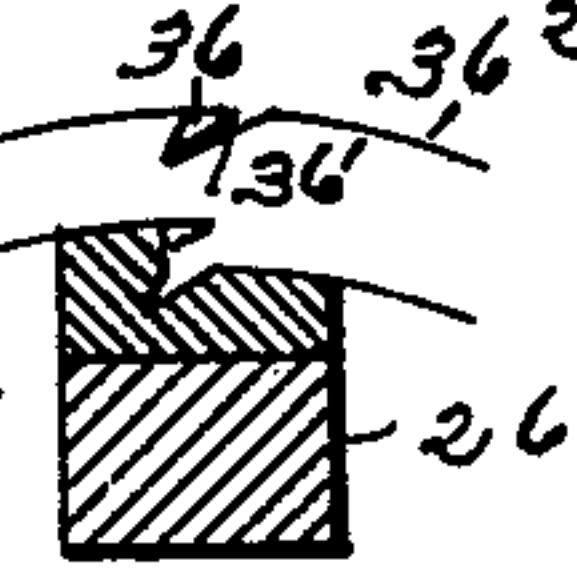


FIG. 11.

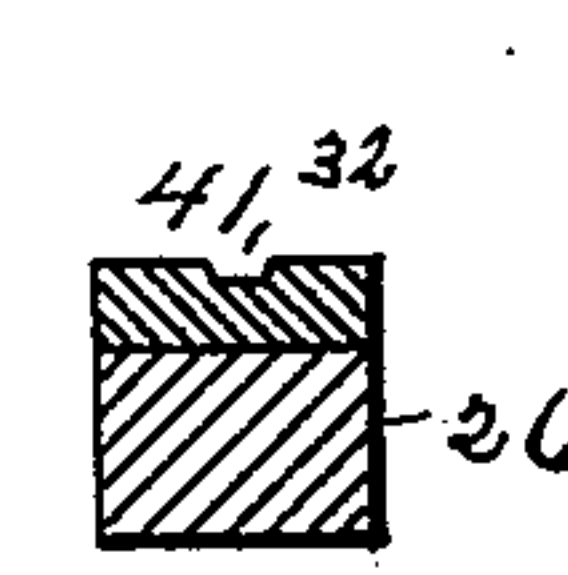


FIG. 12.

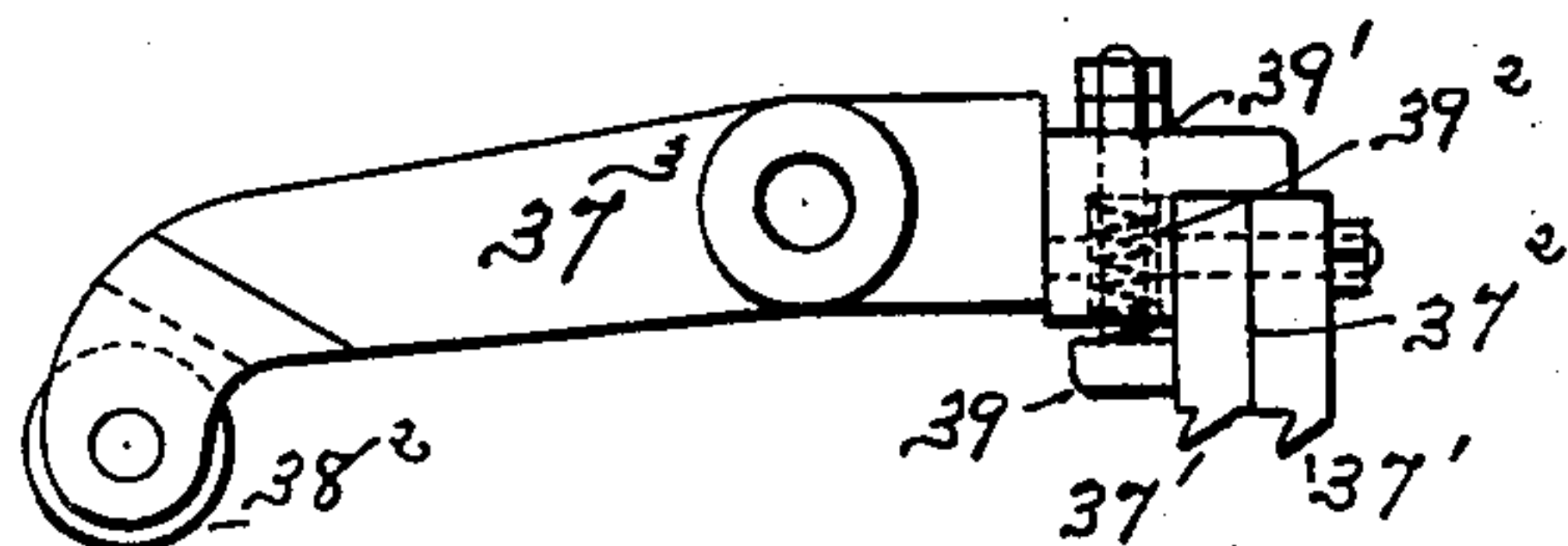


FIG. 13.

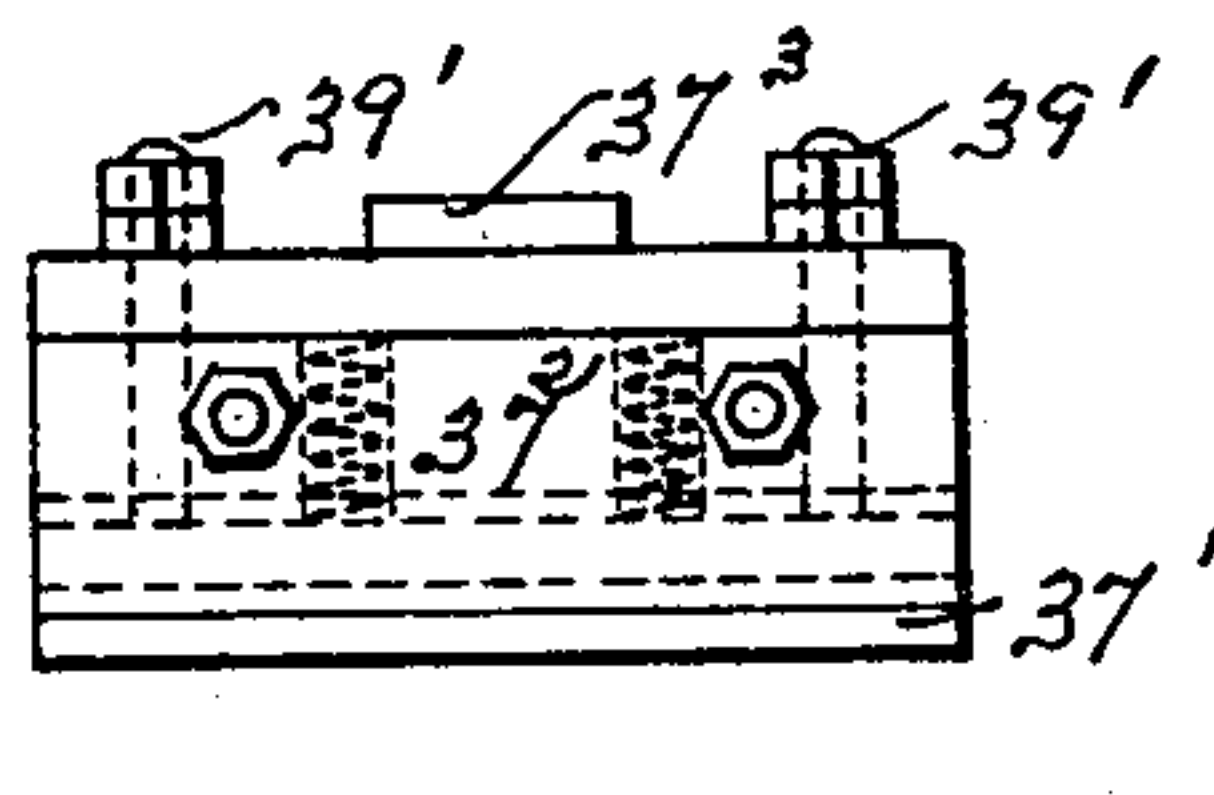


FIG. 14.

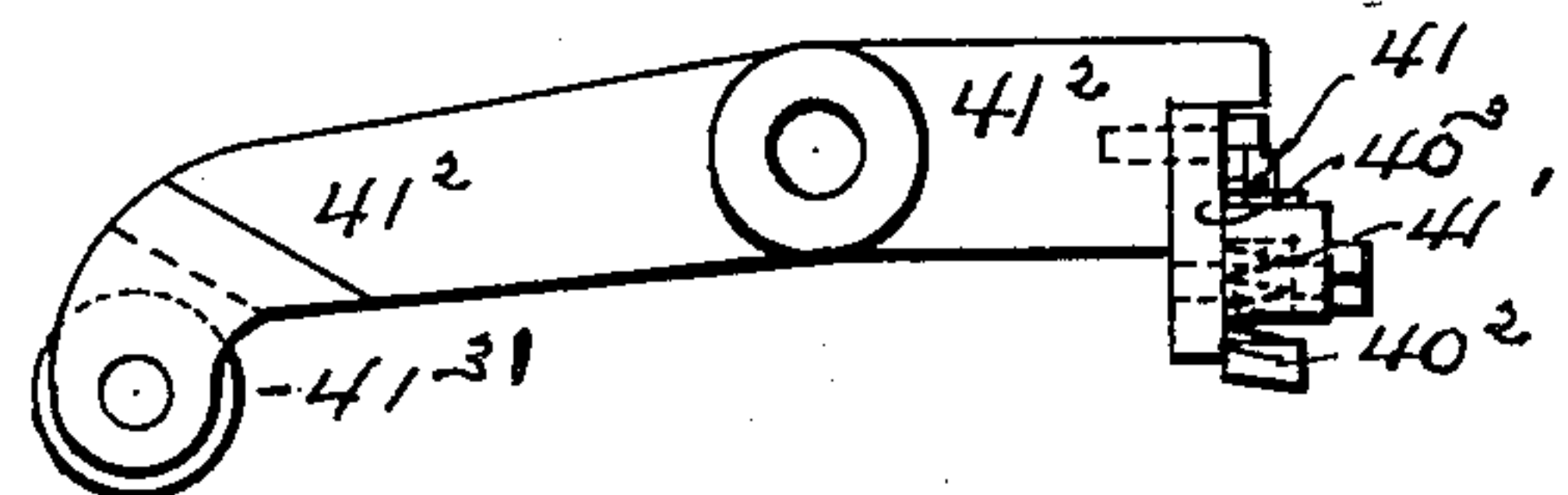


FIG. 15.

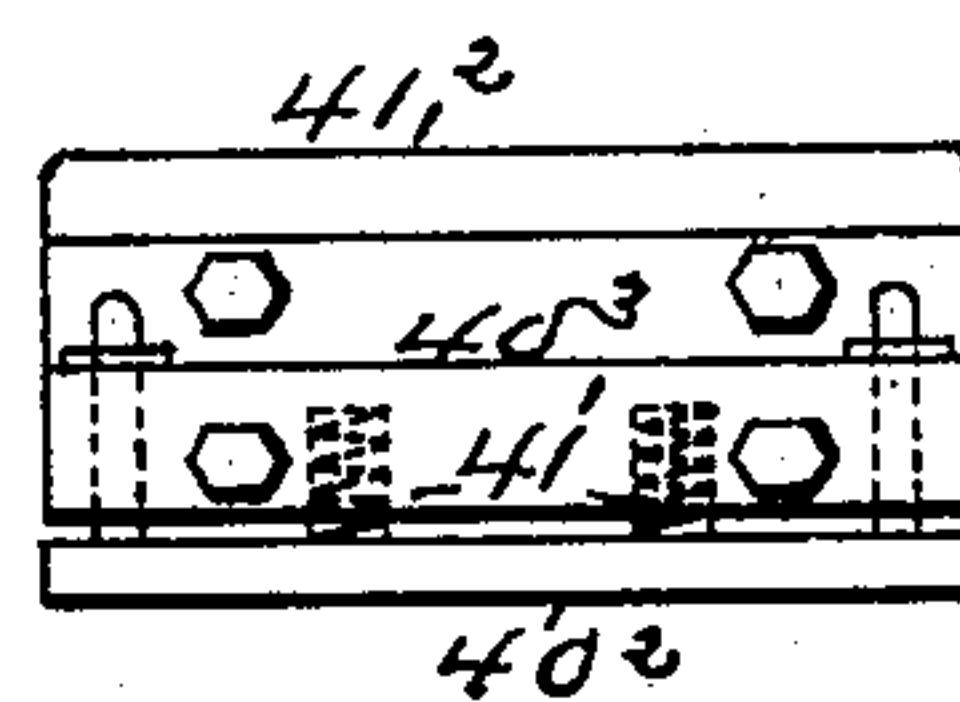


FIG. 16.

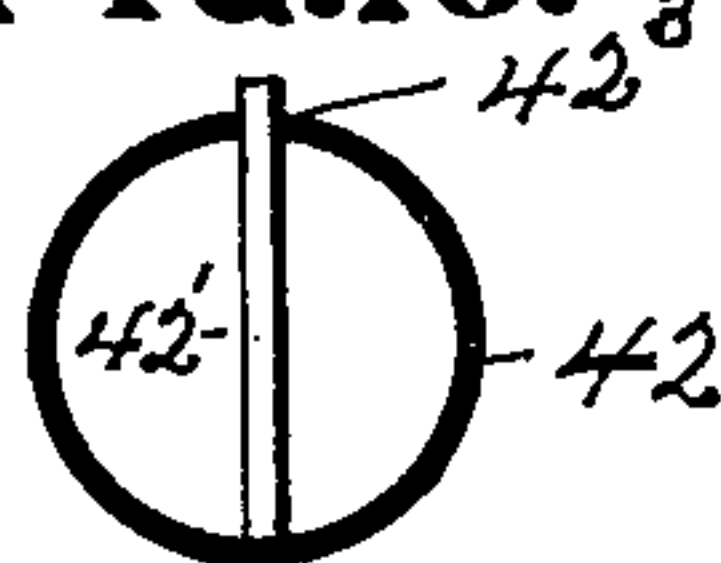
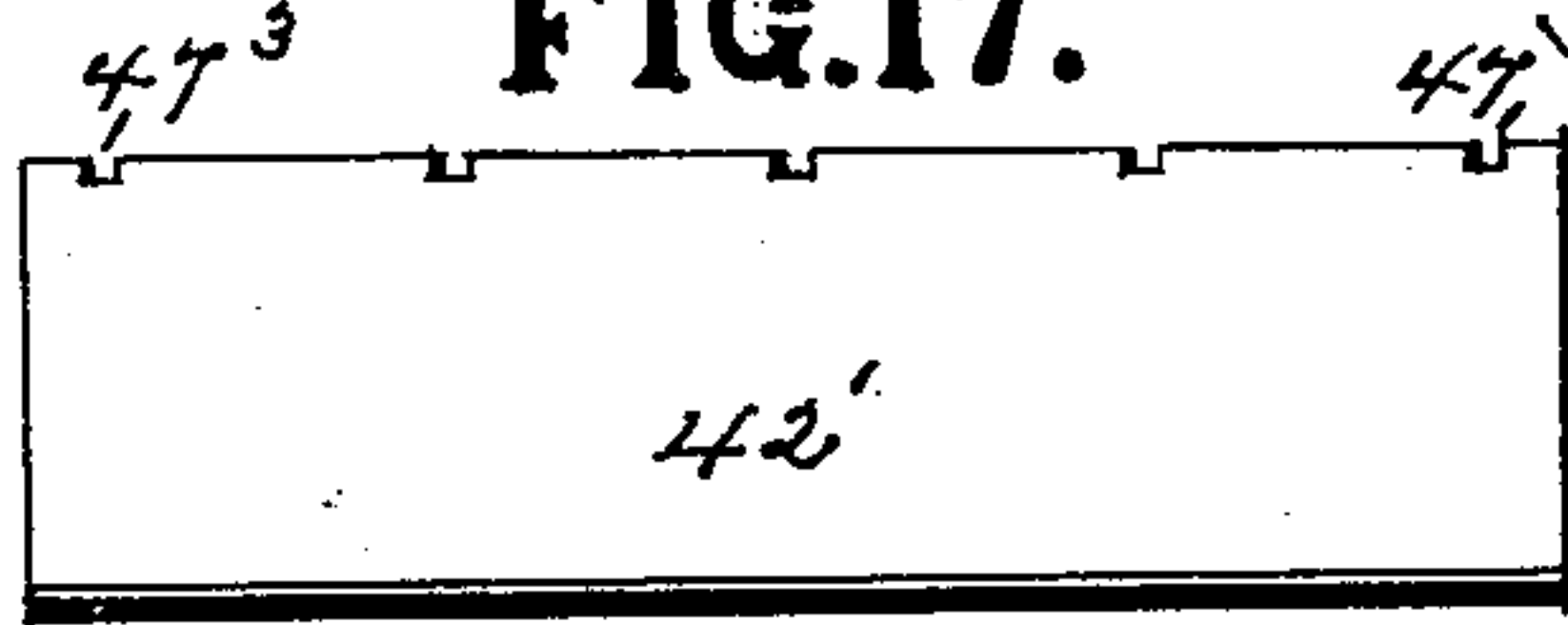


FIG. 17.



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UNITED STATES PATENT OFFICE.

HENRY C. BLACK, OF OAKLAND, CALIFORNIA.

CAN-BODY FORMING AND SEAMING MACHINE.

SPECIFICATION forming part of Letters Patent No. 731,157, dated June 16, 1903.

Application filed July 25, 1902. Serial No. 116,951. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. BLACK, a citizen of the United States, residing at Oakland, county of Alameda, State of California, have invented certain new and useful Improvements in Can-Body Forming and Seaming Machines; and I do hereby declare the following to be a full, clear, and exact description of the same.

The present invention relates to an improved machine whereby rolled can-body blanks while upon the seamer have formed in their free side edges interlocking hooks, which hooks are interlocked during travel of the seamer-horns and thereafter the locked side seam closed, the hook-forming mechanism and seaming or closing mechanism being so timed as to act while the seaming-horns are at a state of rest. The improvement therefore belongs to that class of can machinery known as "lock-joint body-making machines," in contradistinction to the lap-joint can-body-making machines.

The invention consists, essentially, in the mechanism for forming interlocking side edge hooks to the can-bodies, means for locking the hook-formed side edges, and mechanism for closing the locked edges or side seam of the can-bodies, said mechanisms acting as one continuous operation with the formation of the can-bodies. In other words, these operations take place during the travel of a single seamer-horn from the can-body-blank-feed mechanism toward the discharge mechanism or discharge-point for the seamed can-body.

The term "seamed" in the present case is not employed to indicate the soldering of a side seam, but in the sense of closing the side seam preparatory to soldering the same. This explanation is deemed necessary, inasmuch as the present invention contemplates the delivery of either a soldered or an unsoldered can-body. Hence the expression "seaming-machine" is to be understood as meaning a machine for forming either a soldered or unsoldered can-body.

To comprehend the invention, reference must be had to the accompanying sheets of drawings, wherein—

Figure 1 is a side view in elevation of the machine. Fig. 2 is a top plan view of a por-

tion of the mechanism disclosed by Fig. 1 of the drawings. Fig. 3 is a view similar to Fig. 1 viewed from the opposite side of the machine. Fig. 4 is a broken end view disclosing the extractor and the guide device, which works in conjunction with the extractor mechanism for the removal of the can-bodies from the seamer-horns of the endless carrier. Fig. 5 is a broken plan view of the anvil-bar; Fig. 6, a side view thereof with the forming rolls for the can-body blank located thereabove. Fig. 7 is a vertical sectional end view taken through the anvil-bar with the forming rolls in position, a can-body blank being illustrated as resting above the anvil-bar. Figs. 8, 9, 10, and 11 are detail sectional views of the anvil-bar. Fig. 12 is a side view of the arm carrying the male members of the hook-forming die; Fig. 13, a front view thereof in elevation. Figs. 14 and 15 are views similar to Figs. 12 and 13, illustrating the mechanism for closing the side seams of the can-body. Fig. 16 is a vertical sectional view of the solder-holding trough and soldering-iron, and Fig. 17 is a detail view of the soldering-iron removed from the soldering-trough.

The frame of the machine in the present case consists of the bed A, from which extend the end supports A' A², to which are bolted or otherwise secured the side pieces B B'. These side pieces have attached to their inner face the supporting-rails B². However, any suitably-constructed frame may be utilized.

Within bearings of end supports A' works a cross-shaft 1, to which are attached the disks 2 3. These disks serve as drive-disks for the endless carrier, which carrier consists of a series of truck-frames 4, hinged together by bolts or pins 5. To the ends of these connecting bolts or pins 5 the rollers 6 are secured, which rollers fit within the circular sockets 7, cut in the periphery of the drive-disks 2 3, and ride upon the guide-rails 8, so as to support the under run of the endless-chain carrier. These guide-rails are attached to supports A' A², which guide-rails terminate at a point approximately immediately below the lower end of the curved tracks 9. These tracks are secured between the supports A², the upper end of each track being in line with the supporting-rails B². Upon

the curved portion of these guide-rails 8 the rollers 6 ride as the endless carrier works over the rear end of the machine.

An intermittent non-reciprocating movement or step travel is imparted to the endless carrier by means of the disk 10, secured to drive-shaft 1. This disk is formed with a series of radial slots 11, into which alternately work the rollers 12 13, projecting one from each arm of the double-crank cam 14, secured to cam-shaft 15. This cam-shaft carries a gear 16, which meshes with pinion 17, attached to shaft 18, carrying belt-pulley 19. The rotation of belt-pulley 19 is thus imparted to shaft 15, which in turn, through the medium of the projecting rollers 12 13 of cam 14, imparts a step or intermittent rotation to the radially-slotted disk 10. This disk being attached to the drive-shaft 1 gives a step rotation to drive-disks 2 3. Inasmuch as the rolls 6 fit within the circular sockets 7, it is obvious that with each movement of the drive-disks the endless carrier is advanced or moved a given distance, which in the present case is equal to the length of one of the truck-frames. These frames as the endless carrier moves from the curved tracks 9 onto the guide-rails 8 toward the drive-disks 2 3 slide upon the supporting-rails B². The rollers 6 of the endless carrier move into the sockets 7 of the drive-disks 2 3 just prior to the truck-frames moving off of the supporting-rails B².

Each truck-frame 4 of the endless carrier is formed with upwardly-extending ears 20, between which is fulcrumed the bell-crank lever 21. To the upper arm of each lever is secured a seamer-horn 22, around which the can-body blanks are rolled or loosely formed. The lower arm 23 of each crank-lever is attached by link 24 to a stud or projection 25 of the truck-frame immediately in advance thereof. By this manner of attaching the seamer-horns a toggle connection is made, which permits of the seamer-horns automatically swinging or turning as the endless carrier travels over the ends of the machine-frame.

Between brackets 25' projecting from cross-plate 25², attached to supports A², is hinged the anvil-bar 26, Figs. 1 and 2 of the drawings, which bar rests within the longitudinal groove or channel 27, cut in each seamer-horn 22, as said horns move over supporting-rails B² toward the drive-disks 2 3. The traveling seamer-horns thus support and hold in line the outer end portion of the anvil-bar 26.

Immediately above this anvil-bar 26, near its hinged end, the forming-rolls 27' 27² are arranged, which rolls receive the can-body blanks fed onto endless conveyer 28 and roll the same around the seamer-horn 22, located thereunder. Roll 27² is driven from roll 27' by means of the intermeshing pinions 28' 28², Fig. 1 of the drawings. Roller 27' derives its rotary motion from cross-shaft 29 through the medium of the intermeshing bevel-pinions 29'

29². To the outer end of shaft 29 is secured the pinion *a*, which meshes with gear *a'*, secured to projecting stud C. This stud is driven from pulley-shaft 18 by means of endless chain 30, which chain works over sprocket-wheels 30' 32², secured, respectively, to shafts 18 and stud C, Figs. 2 and 3 of the drawings.

There is no essential novelty in the manner of rolling the can-body blank about the can-body seamer-horns, for substantially the same mechanism for this purpose will be found fully set forth and described in United States Letters Patent No. 697,785, granted me on the 15th day of April, 1902, for an improved "Can-body forming and soldering machine."

Inasmuch as the present invention relates to the formation of a lock-joint can-body in contradistinction to a lap-joint side seam, it is required that the ends of the can-body blank, or side edges of the rolled blank be held apart or separated. For this purpose the anvil-bar 26 is formed with a longitudinal shoulder 31, Figs. 5 and 6, against which the side edges of the rolled can-body 31' abut. This shoulder holds the side edges of the rolled can-body apart, thereby preventing the edges overlapping. The moment the can-body blank has been loosely rolled or formed around the seamer-horn a step rotation is imparted to the endless carrier. To prevent the free side edges of the rolled can-body from moving upward or away from its seamer-horn, a guide-plate 31² is fitted over the shoulder 31 of the anvil-bar, Fig. 8 of the drawings. As the can-body is carried forward by its seamer-horn toward the hook-forming mechanism its free side edges are held down by the side flanges 32 of the guide-plate 31².

The endless conveyer 28 for delivering the can-body blank to the forming rolls 27' 27² works over sprocket-wheels 32' 32², the former of which is secured to one end of longitudinal shaft 33. This shaft works in suitable bearings secured to the frame of the machine and is driven from stud 33' by bevel-gear 33² thereon meshing with bevel-gear 33⁴, secured to the end of longitudinal shaft 33. The stud 33' has rotary motion imparted thereto from the cam-shaft 15 by means of the gear 34, mounted thereon, meshing with pinion 34', secured to the said stud 33', Figs. 1 and 2 of the drawings.

To the anvil-bar 26, immediately beyond the guide-plate 31², a series of spring-studs 34² are arranged, which studs or pins are normally held upward or beyond sockets 34³ by means of the springs 35. These pins serve as gage-pins for holding the side edges of the rolled can-body, separated after leaving or being carried beyond the shoulder 31. To each side of this line of gage-pins is formed a groove 35' 35², which corresponds in shape to the male and female hook-sections 36 36' to be given unto the side edges of the rolled can-body 36², Fig. 9 of the drawings. This grooved portion of the anvil-bar 26, which, if

so desired, may consist of an independent block inserted in the bar, may be said to constitute the female portion or bed of the die for forming the hooks 36 36'. The male members 37 37' of the die project from the die block or blocks 37², bolted or otherwise secured to the inner end of the curved arm 37³. This arm is fulcrumed to the rigid rod 38, supported by brackets 38' above the frame of the machine. To outer end of said curved arm 37³ is attached a roller 38², which roller rides upon the elliptical cam 38³, attached to longitudinal shaft 33. During the rotation of said shaft the elliptical cam 38³ causes the outer end of arm 37³ to rise and lower, imparting an opposite movement to the inner end of the curved arm. This inner end of the curved arm forces the male member 37 37' of the die into the grooves 35' 35². The movement of the arm 37² is so timed that the male members 37 37' of the die are not forced downward into registry with the grooves 35' 35² until the rolled can-body has been brought into such position as to place its side edges immediately above the grooves 35' 35². When thus positioned, the downward movement of the inner end of curved arm 37³ causes the members 37 37' to force the side edges of the rolled can-body 36² into the grooves 35' 35², thereby forming the male and female hooks 36 36', the male hook 36 of which when the edges of the rolled can-body are brought together interlocks with the female hook 36'. The shape of the hooks is dependent upon the shape given to the grooves 35' 35² and die members 37 37'. To prevent slippage of the rolled can-body during the operation of forming the hooks, there is provided a presser-plate 39. This plate is attached to the inner end of arm 37³, in front of die member 37, by pins 39', being held normally below said member by springs 39². As the inner end of curved arm 37³ is depressed the presser-plate 39 bears against the rolled can-body and holds same firmly against its horn. During the continued movement of the arm 37³, the springs 39² give to the pressure thereof in order that the arm may take its full downstroke, and thereby cause the hook-forming members 37 37' to force the metal of the can-body into the grooves 35' 35² to form the hooks 36 36'. The pins or studs 34² give to the pressure of the blocks 37², and are depressed so as to permit of the hook-forming members 37 37' moving into the groove 35' 35².

It will be understood that the seamer-horn, with its rolled can-body, stands at a state of rest during the operation of forming the side edge hooks of the rolled can-body.

To prevent the rolled can-body slipping upon the seamer-horns during forward travel of the endless carrier, each horn is provided with stop-lugs 40. (See Fig. 4 of the drawings.) Against these lugs the rear end of the rolled can-body rests. The moment the hooks 36 36' have been formed the endless carrier proceeds to move forward, carrying the seamer-

horn with its rolled and hook-formed can-body therewith. As the seamer-horn is thus advanced the male hook 36 is gradually raised by riding upon the upwardly-beveled surface of the inclined cam 40', attached to the anvil-bar. This cam is inclined toward the axial line of the anvil-bar. Consequently as the can-body is carried forward the male hook 36 is gradually drawn over toward the female hook 36', into which it moves. The step movement of the endless carrier places the seamer-horn and its rolled can-body with formed and loosely-locked side seam directly beneath the lock-hammer 40², secured to head 40³ by pins 41. This hammer is held outward by the pressure of springs 41', which springs surround the pins 41, Figs. 14 and 15 of the drawings. The head 40³ is attached to the inner end of curved arm 41², which arm is fulcrumed between supporting-brackets 41³. To the outer end of the curved arm 41² is secured a roll 41³¹, which roll rides upon the surface of the elliptical cam 42. This cam, like cam 38³, is attached to the longitudinal shaft 33, and during its rotation causes the arm 41² to rise and lower. The outer end of arms 37³ and 41² overbalances the weight of their inner end, so that, unless raised by the cams 38³ and 42, the outer end of each arm is held down by its own weight. As the outer end of arm 41² is raised its inner end is lowered, so as to force the hammer 40² down onto the side seam of the loosely-locked can-body. Immediately below and in line with the hammer 40² there is formed in the anvil-bar a depression or groove 41³², into which the longitudinal or side seam of the can-body rests as the loosely-interlocked hooks are firmly compressed by the downward pressure of the hammer 40². As the hammer is raised, after compression of the side seam, the endless carrier makes another step advance, which carries the seamer-horn with its locked can-body beyond the seam-lock mechanism. It will be understood that the movement of the parts are so timed or regulated that while one can-body is having its side seam closed or locked the hook-forming mechanism is operated upon a second rolled can-body, while at the same time the feed-rolls are rolling a can-body blank around a third mandrel. From the lock mechanism for the side seam the can-body is carried toward the extracting mechanism.

In case the can is to be used for packing of coffee, spices, powder, or similar dry articles it is not required that the side seam be soldered. For such use the can-body as it leaves the lock mechanism may be considered as a finished can-body. However, where the can is to be utilized in connection with the packing of fruit, fish, or vegetables it is necessary that the side seam be soldered in order to make the can air-tight. For this purpose there is located beneath the machine a solder-bath trough 42, in which is located a soldering-iron 42'. This iron fits within an elongated opening 42³ in the trough, its upper edge projecting a slight distance above the surface of the

trough. In advance of the soldering-trough is arranged a flux-receptacle 43, within which works the flux-applying wheel or disk 43'. As the can-body is carried toward the extractor mechanism the longitudinal seam thereof is drawn over the flux-applying disk 43' in order to have the necessary flux applied thereto. Thereafter the fluxed seam is drawn over the upper edge of the soldering-iron 42', which applies thereto from the solder-bath within trough 42 the requisite quantity of solder to properly solder the locked seam of the can-body. The locked and soldered can-body is then conveyed toward the extracting mechanism, which removes the can-body from the seamer-horns and ejects the same into the discharge chute or runway 43².

The extractor for removing the can-bodies 36² from the seamer-horns 22 may consist of any suitable mechanism capable of accomplishing the desired result. A simple and efficient device for this purpose is that illustrated in Figs. 3 and 4 of the drawings, wherein is disclosed a revoluble ejector-arm 43⁴. This arm is attached to rotary shaft 44, working in bearings of supports A², which shaft is driven from cross-shaft 15 by means of the endless chain 44', working over sprocket-wheels 44² 44³, secured, respectively, to shafts 44 15. As the shaft 44 is rotated the ends of the ejector-arm alternately engage with the edge of the forward can-body 36² and gradually force the same from off its seamer-horn 22. The speed of movement of the ejector-arm is so timed as to remove the can-body during the pause of the intermittently-moving endless carrier. The ends of the ejector-arm work through the longitudinal slot, groove, or channel 27, cut in the seamer-horn 22, which groove, slot, or channel appears as in the under face of the seamer-horns as the horns travel toward the extractor mechanism after being carried beyond the drive-disks 2 3.

To provide against the can-bodies tilting and binding upon the seamer-horns as removed therefrom, a suitable guide is arranged to receive the can-bodies as forced or slipped off of the seamer-horns. This guide in the present case consists of two cylinder-sections 45 45', which sections when brought together form approximately a cylinder to receive and guide the can-bodies as moved from off the seamer-horns. These cylinder-sections are secured to the uprights 45² 45³, which uprights are hinged to the frame-bed A, Fig. 4 of the drawings. Said uprights near their upper ends are connected to the supports A² by springs 46, the pressure of which springs maintain the uprights a distance apart in order to separate the cylinder-sections 45 45'. The cylinder-sections are brought together to loosely encircle the can-body as discharged from the seamer-horns by means of the cams 46' 46², secured to cross-shaft 44, which cams bear against the outer face of uprights 45² 45³ and force same inward or toward each other. The moment the inclined face of said cams pass

beyond the uprights the tension of springs 46 draw the uprights apart to separate the cylinder-sections, so as to permit of the seamer-horn being carried upward by the intermittent movement of the endless carrier. It will be understood that the inward and outward movement of the guide-cylinder sections and the operation of the ejector-arm take place while the endless carrier is at a state of rest.

When it is not desired to flux and solder the side seam of the can-bodies, the solder-holding trough and flux-receptacle are lowered a distance away from the traveling carrier by means of the lever 47. This lever is fulcrumed to frame 47' and connected to the solder-trough 42 by means of the links 47². By simply raising or lowering the lever 47 the soldering and fluxing mechanism is lowered or raised.

In the edge of the solder-iron 42' is formed a series of notches 47³, which when the iron is within the soldering-trough come below the level of the solder-bath. By thus constructing the soldering-iron a close fit of the same within the longitudinal opening 42³ is permitted, as the solder will flow onto the edge of the iron from within the notches or seats 47³.

Unless the bar or soldering-iron be thus cut away it is required that the slot or opening 42³ be made somewhat wider in order to give a clearance at each side of the bar or iron for the flow of solder.

Having thus described the invention, what is claimed as new, and desired to be protected by Letters Patent, is—

1. A can-body forming and seaming machine comprising an endless carrier, means for imparting intermittent or step movement thereto, a series of seamer-horns carried by the endless carrier, an anvil-bar supported by the seamer-horns, mechanism whereby can-body blanks are rolled directly upon the seamer-horns, means whereby interlocking hooks are formed in the side edges of the rolled can-body blank, and devices whereby the hooked edges of the rolled can-body blanks are closed.

2. A can-body forming and seaming machine comprising an endless carrier, a series of seamer-horns carried thereby, mechanism whereby can-body blanks are fed to and rolled onto the seamer-horns, an anvil-bar supported by the seamer-horns, and means coacting with the said anvil-bar whereby the side edges of the rolled can-body blanks are interlocked and the side seam thus formed closed as the seamer-horns are carried through the machine.

3. A can-body forming and seaming machine consisting of an endless carrier, of means for imparting a step movement thereto, a series of seamer-horns carried by the endless carrier, an anvil-bar supported by the seamer-horns, means for feeding can-body blanks toward and rolling the can-body blanks onto the seamer-horns, devices for forming interlocking hooks in the side edges of the rolled can-

body blanks, means whereby the hooked edges are interlocked, and mechanism for closing the interlocked side seam thus formed.

4. In a can-body forming and seaming machine, the combination with the traveling seamer-horns, of means whereby can-body blanks are rolled directly upon the seamer-horns, and mechanism for interlocking the side edges of the rolled can-body blanks and closing the side seam thus formed without removing the rolled can-body blank from its seamer-horn.

5. A can-body forming and seaming machine consisting of an endless carrier, means for imparting a step movement thereto, a series of seamer-horns carried thereby, mechanism whereby can-body blanks are fed to and rolled directly onto the seamer-horns, and means for interlocking the side edges of the can-body blanks rolled onto the seamer-horns without disturbing the position of the rolled can-body blank upon its horn.

6. A can-body forming and seaming machine consisting of an endless carrier, means for imparting movement thereto, a series of seamer-horns hinged to the endless carrier, an anvil-bar supported by the seamer-horns, mechanism whereby can-body blanks are fed to and rolled directly onto the seamer-horns, means for interlocking the side edges of the rolled can-bodies while on the seamer-horns, and mechanism by means of which the locked or seamed can-bodies are automatically extracted from the seamer-horns.

7. In a can-body forming and seaming machine, the combination with the endless carrier, of a series of seamer-horns hinged thereto, means whereby can-body blanks are fed to and rolled directly onto the seamer-horns, an anvil-bar supported by the seamer-horns, devices coacting with the anvil-bar for forming interlocking hooks in the side edges of the rolled can-body blanks, a gage-plate for holding down onto the seamer-horns the side edges of the rolled body-blanks, devices whereby the hooked side edges are interlocked, and means for closing the interlocked side seam of the can-body.

8. A can-body forming and seaming machine consisting of a frame, an endless carrier working therein, means for imparting a step movement thereto, an anvil-bar secured to the frame above the endless carrier, a series of seamer-horns hinged to the endless carrier, a longitudinal groove cut in each seamer-horn and in which the anvil-bar rests, mechanism whereby can-body blanks are fed to and rolled directly onto the seamer-horns, and means coacting with the anvil-bar for interlocking the side edges of the rolled can-body blanks.

9. In a can-body forming and seaming machine of the described character, an endless carrier, a series of seamer-horns hinged thereto, an anvil-bar secured to the frame of the machine so as to rest in a longitudinal groove cut in the face of the seamer-horns, means whereby can-body blanks are fed to and rolled directly upon the seamer-horns, hook-forming mechanism for the side edges of the can-bodies, and means whereby said mechanism is operated to coact with the anvil-bar while the seamer-horns of the machine are at a state of rest.

10. In a can-body forming and seaming machine of the described character, an endless carrier, a series of seamer-horns hinged thereto, an anvil-bar secured to the frame of the machine so as to rest in a longitudinal groove cut in the surface of the seamer-horns, hook-forming mechanism for the side edges of the can-bodies, means for interlocking the hook-formed edges during travel of the seamer-horns, mechanism for closing the side seam of the interlocked can-bodies, and means for actuating the hook-forming mechanism and the seam-closing mechanism so as to coact with the anvil-bar while the seamer-horns are at a state of rest.

11. In a can-body forming and seaming machine, the combination with an endless carrier, of a series of seamer-horns hinged thereto, means whereby can-body blanks are fed to and rolled upon the seamer-horns, mechanisms for forming hooks in the side edges of the can-bodies, interlocking the hooks thus formed and closing the locked side seam, an extractor for automatically removing the seamed can-bodies from the seamer-horns, and a guide device working in conjunction with the extractor, said device serving to prevent the can-bodies from binding upon the seamer-horns during their removal.

12. A can-body forming and seaming machine comprising an endless carrier, a series of seamer-horns hinged thereto, means for imparting an intermittent movement to the endless carrier, mechanism whereby can-body blanks are fed to and rolled upon the seamer-horns, an anvil-bar, means coacting therewith whereby interlocking hooks are formed in the side edges of the can-bodies, the hooked edges interlocked and the locked side seams thus formed closed, means for applying flux to the closed seams and mechanism whereby the side seams of the can-bodies are soldered prior to their removal from the seamer-horns.

In witness whereof I have hereunto set my hand.

HENRY C. BLACK.

Witnesses:

N. A. ACKER,

WALTER F. VANE.