

950,742.

H. C. BLACK.
CAN MAKING MACHINERY.
APPLICATION FILED AUG. 8, 1907.

Patented Mar. 1, 1910.
6 SHEETS—SHEET 1.

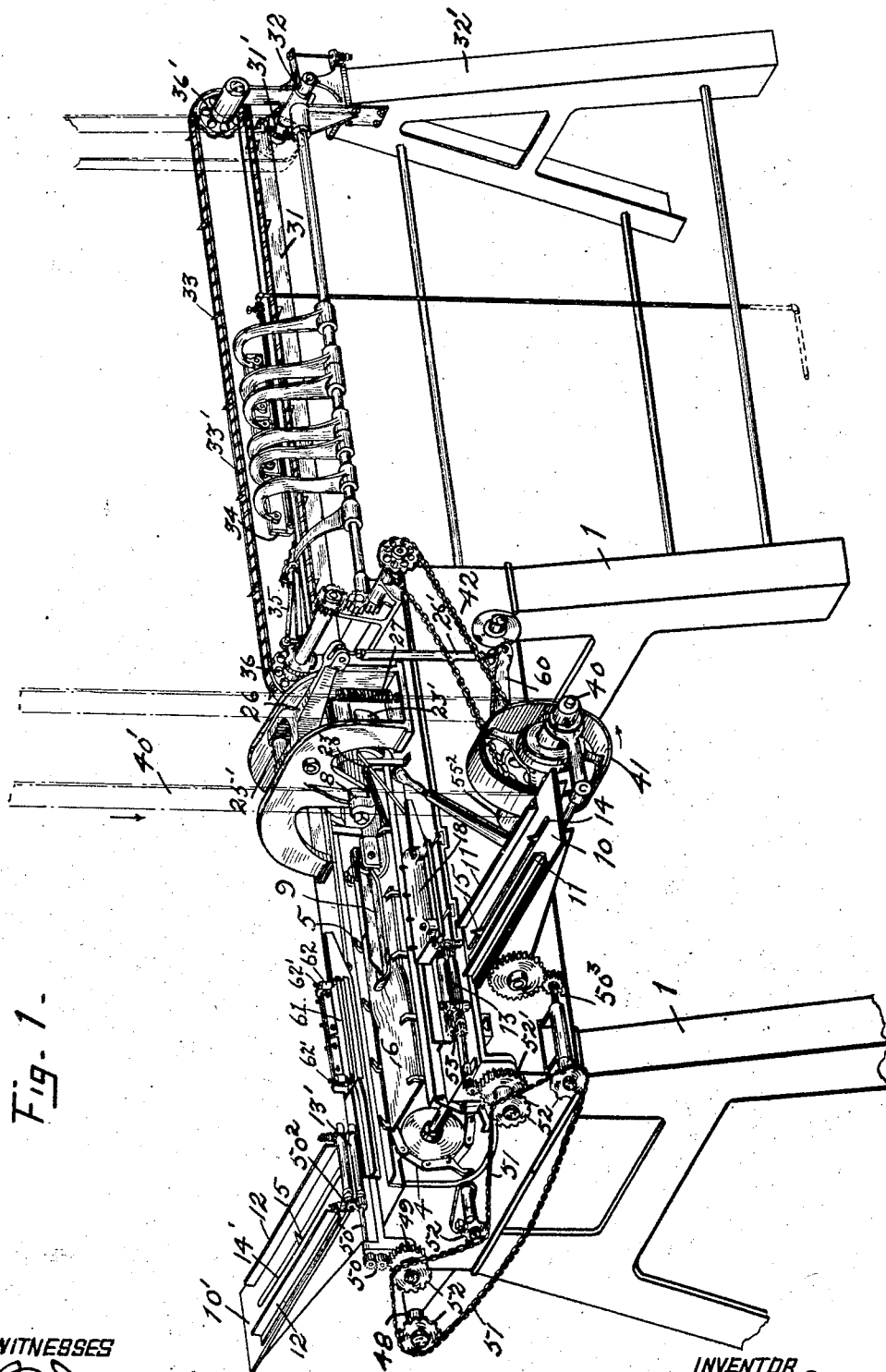


Fig. 1.

WITNESSES

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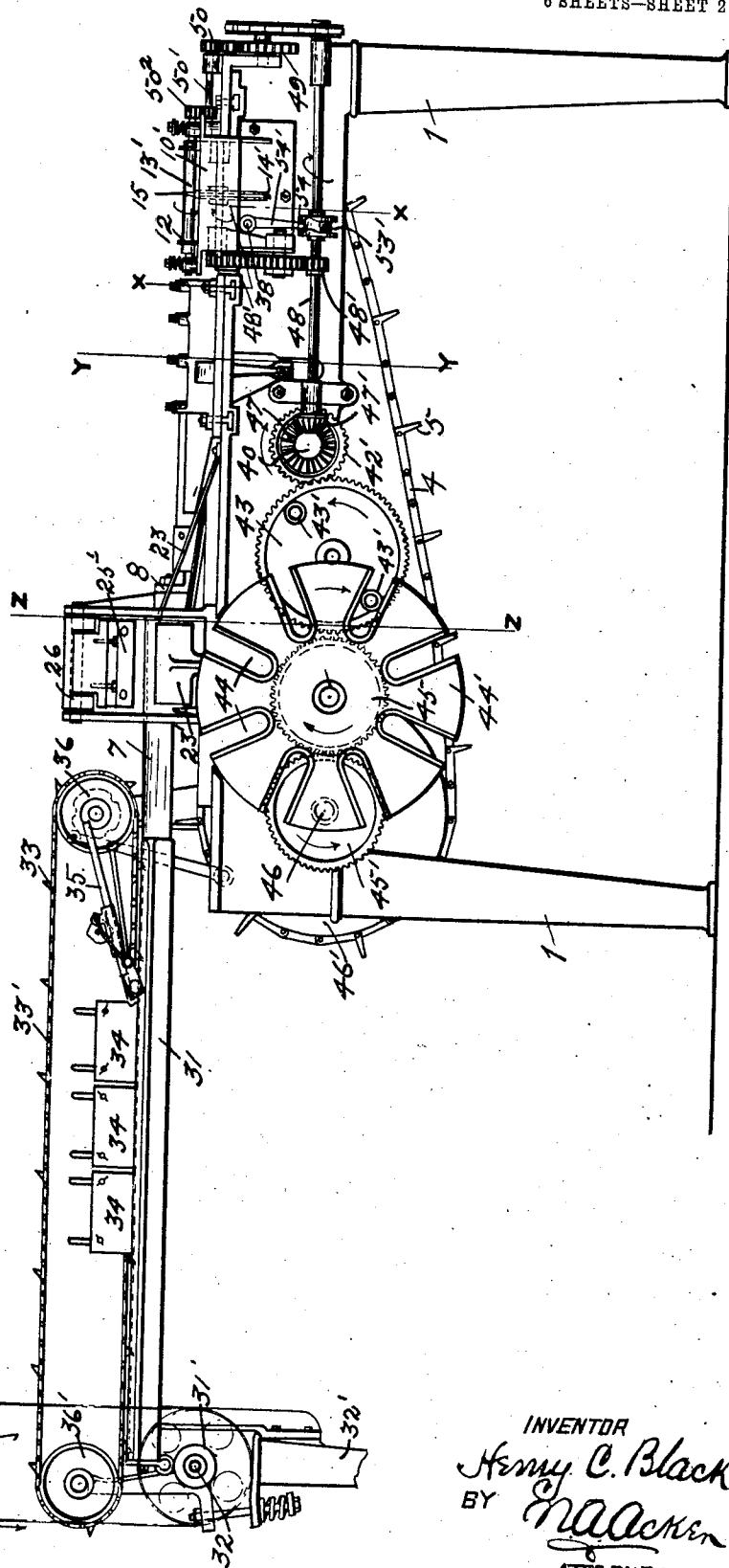
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6 SHEETS—SHEET 2.

Fig. 2.



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6 SHEETS—SHEET 3.

Fig. 3.

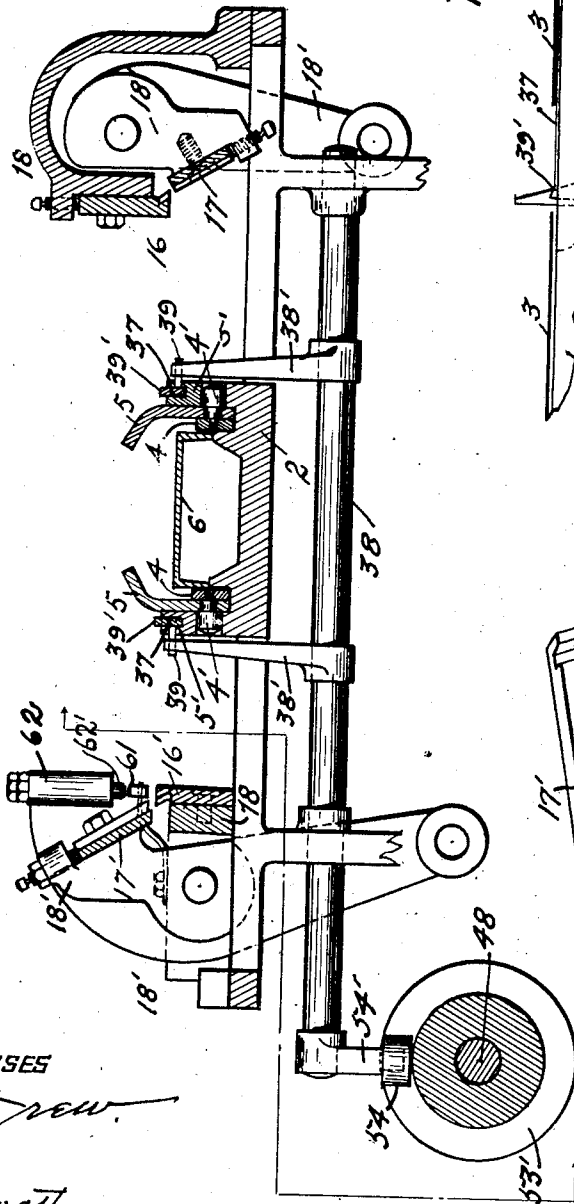


Fig. 7.

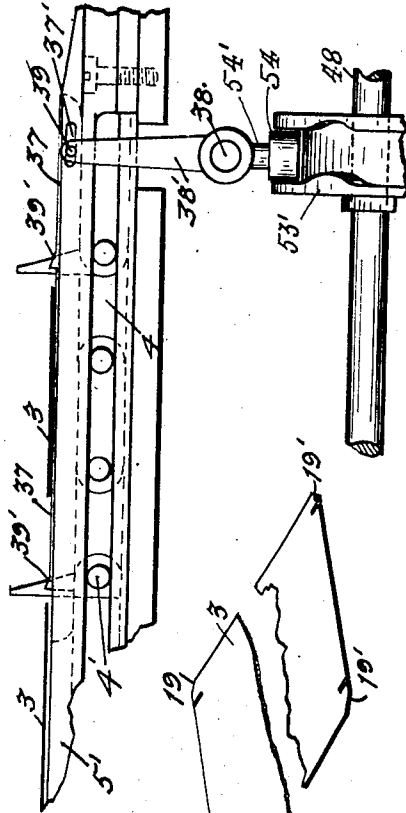


Fig. 9.

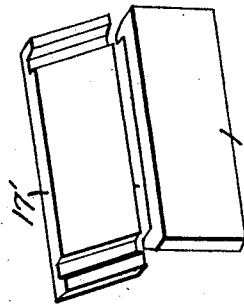


Fig. 8.

WITNESSES

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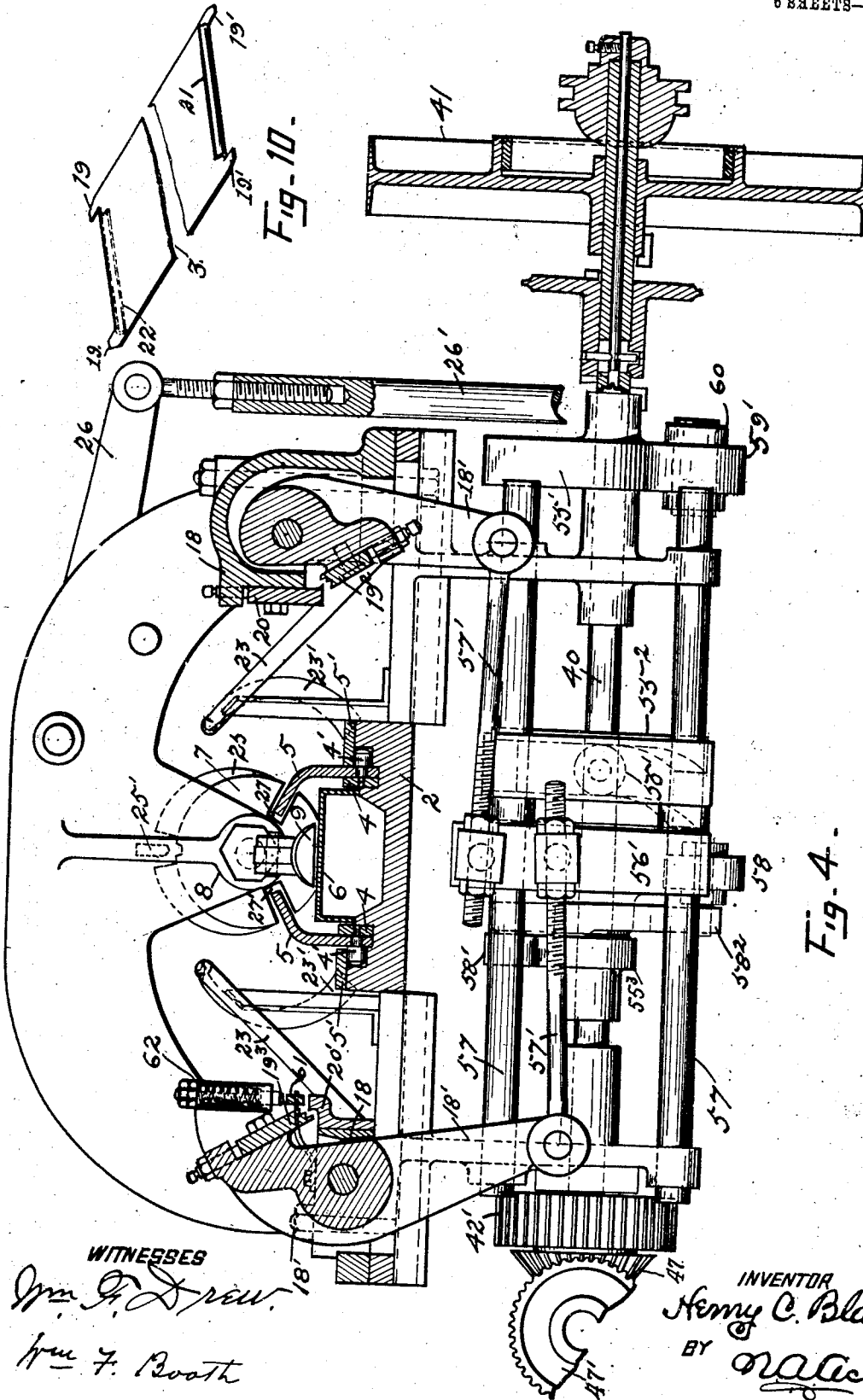
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WITNESSES

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6 SHEETS—SHEET 5.

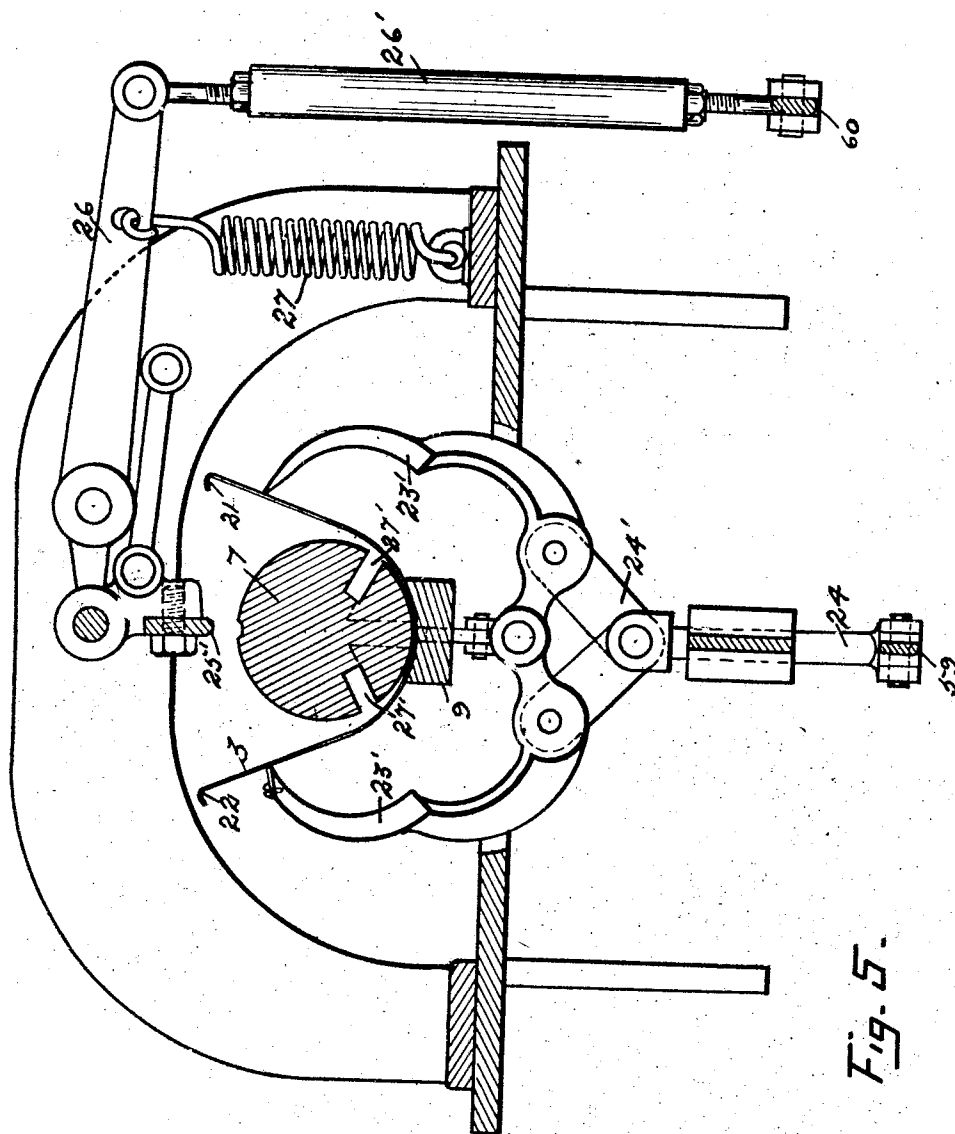


Fig. 5.

WITNESSES

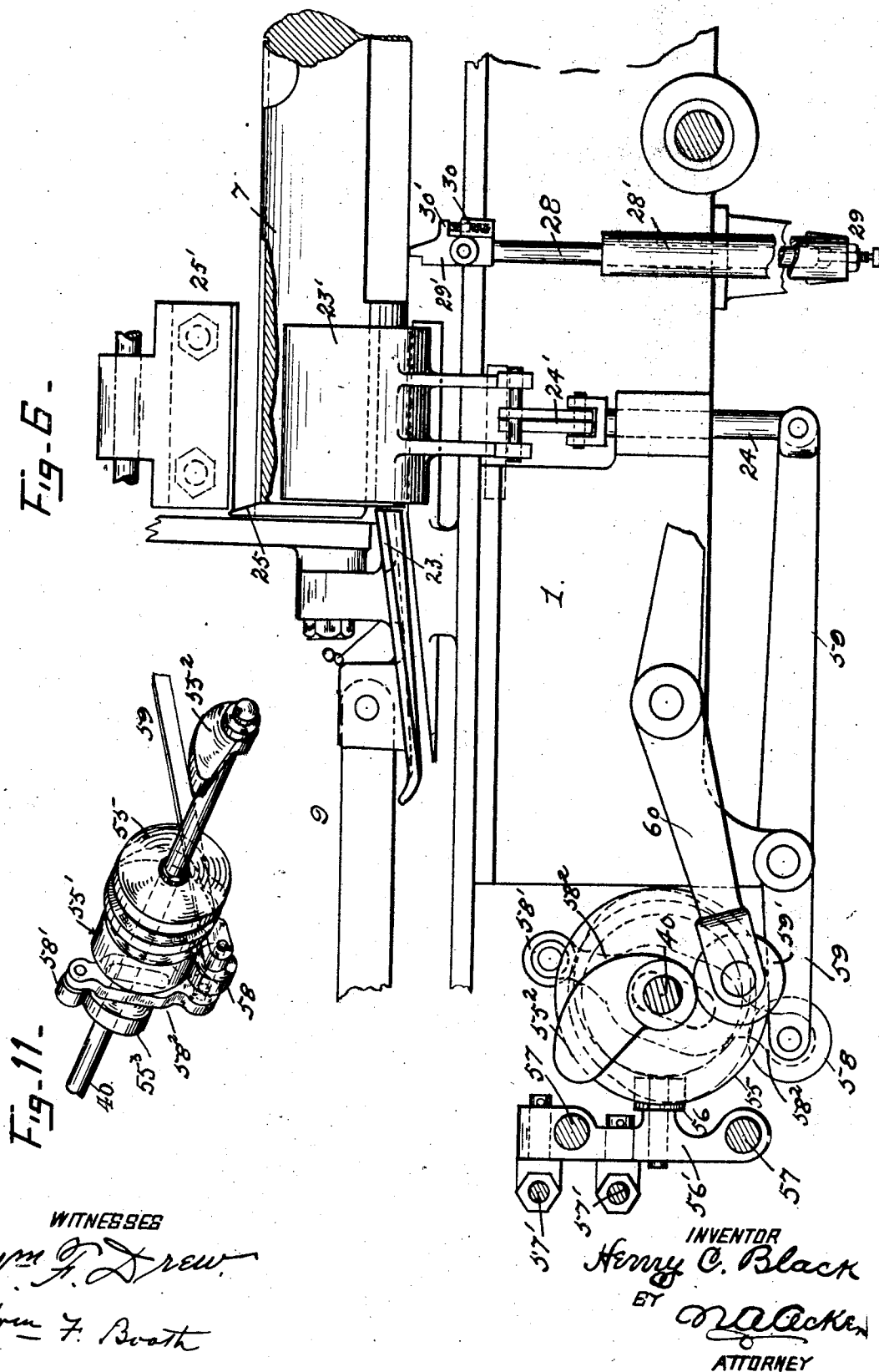
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APPLICATION FILED AUG. 8, 1907.

6 SHEETS—SHEET 6.



UNITED STATES PATENT OFFICE.

HENRY C. BLACK, OF SAN FRANCISCO, CALIFORNIA.

CAN-MAKING MACHINERY.

950,742.

Specification of Letters Patent.

Patented Mar. 1, 1910.

Application filed August 8, 1907. Serial No. 367,628.

To all whom it may concern:

Be it known that I, HENRY C. BLACK, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented certain new and useful Improvements in Can-Making Machinery, of which the following is a specification.

The hereinafter described invention relates to that class of can making machinery used for the formation of can bodies from blanks, and more particularly for the manufacture of can bodies to which the top and bottom are secured by means of a double seam joint, which style of cans is utilized in connection with what is known to the trade as the "sanitary" canning of goods.

The essential features of the invention may be said to reside in the means arranged at each side of the apparatus for alternately delivering can body blanks to the endless carrier which conveys the same by a step movement to the knives for trimming the corner edges of the blanks and to the hook forming dies, and thence to the horn or mandrel around which the said blanks are formed into can bodies; in the construction of the body forming horn or mandrel, which, as the can body blanks are formed around the same, trues the ends of the can body blank prior to the closing of the side seam thereof in order to produce a can body having even ends; in the means for releasing the can bodies as withdrawn from the horn or mandrel, and in the longitudinally movable reciprocating bars or devices for gaging the can body blanks as delivered beneath the trimming knives and hook forming dies.

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

Figure 1 is a perspective view of the complete apparatus with a well known form of soldering mechanism connected therewith, the longitudinally movable reciprocating gage bars being removed from said view for clearness of the drawings. Fig. 2 is a view in elevation of the mechanism illustrated by Fig. 1 of the drawings looking at the machine from the opposite side to that disclosed by said Fig. 1 of the drawings. Fig. 3 is a detail sectional enlarged view taken on line *x—x* of Fig. 2 of the drawings, there

being illustrated the endless carrier for conveying the can body blanks through the machine, the position of the longitudinally movable reciprocating bars relative to the endless carrier for the body blanks, and the means for actuating the said gage bars, is a view also disclosing the knives for trimming and slitting the can body blanks prior to the same being placed beneath the hook forming dies. Fig. 4 is an enlarged sectional view on line *y—y* Fig. 2 of the drawings, showing the relative position of the horn or mandrel around which the can body blanks are formed, the clamping jaws which close the can body blanks around the said horn or mandrel, which clamping jaws are also shown closed by dotted lines, the endless carrier for conveying the can body blanks to the horn or mandrel, the dies for forming hook flanges in the side edges of the can body blanks as conveyed toward the horn or mandrel by the endless carrier, the mechanism for actuating said dies, and the main drive shaft which actuates the various cooperating features of the apparatus. Fig. 5 is an enlarged sectional view taken on line *z—z* Fig. 2 of the drawings, illustrating a can body blank positioned beneath the horn or mandrel and about to be acted on by the clamping jaws for closing the same around the said horn or mandrel, the hammer for closing the side seam of the can body, and the connection for actuating said hammer. Fig. 6 is an enlarged detail broken side view of the horn or mandrel, illustrating the clamping jaws being positioned thereon, and showing in addition the mechanism for actuating the said clamping jaws, the hammer for closing the side seam of the can body, the collar on the horn or mandrel for truing the ends of the can body blank as formed about the said horn or mandrel, together with the support for the outer end portion of the horn or mandrel, likewise by dotted lines the cams on the main drive shaft for successively bringing into operation the mentioned knives and hook forming dies, the clamping jaws for the can body blank, and the hammer for closing the side seam of the can body. Fig. 7, Sheet 3 of the drawings, is a broken detail enlarged view in side elevation of the endless carrier with a can body blank being acted thereon, and one of the longitudinally movable recipro-

cating bars for gaging the can body blank, the connecting mechanism for actuating said gage bar being illustrated. Fig. 8 is a perspective view of a pair of trimming and slitting knives removed from the apparatus. Fig. 9 is a broken perspective view of one of the can body blanks after having been acted on by the trimming and slitting knives. Fig. 10 is a similar view of the can body blank after having been acted on by the hook forming dies. Fig. 11 is a perspective view of the main drive shaft with its cams arranged thereon for successively operating the trimming and slitting knives, the hook forming dies, the clamping jaws for the can body blanks, and the hammer for closing the side seam of the can body blank formed around the horn or mandrel.

To facilitate an understanding of the apparatus, the successively operated features will be described first without reference to the detailed mechanism which bring into operation the said several features.

Referring to Figs. 1, 2, 3 of the drawings, the numeral 1 is used to designate any suitably constructed frame for the apparatus, and 2 a central bed secured to the top plate of the said frame. Within and over this bed 2 works the endless carrier 4 for the can body blanks 3, which carrier comprises preferably two linked chains provided with a series of supporting rolls 4', which work within the channels or grooves formed by the longitudinal plates 5' attached to the bed plate 2, and each endless chain of the endless carrier 4 is in turn provided with a series of upwardly projecting spaced inwardly curved projections or fingers 5, which said fingers bear against the edge of the can body blanks delivered onto the supporting plate 6, and by means of said engaging fingers the said blanks are propelled through the apparatus and delivered to and beneath the horn or mandrel 7 secured to the head block 8. To this head block 8 is hinged the weight bar 9, which bar projects forwardly so as to bear on the can body blanks as propelled toward the horn or mandrel 7, the weight of the bar 9 being sufficient to hold down the can body blank as it approaches the said horn or mandrel in order that the blank may move beneath the same. The arrangement of the weight bar 9 and its connection with the head block 8, will be understood by reference to Figs. 5 and 6 of the drawings.

At each side of the machine, near the forward end thereof, is located a feed for the can body blanks, the same consisting of the tables or platforms 10—10', slightly inclined, which are secured to the sides of the frame 1, and to the respective tables or platforms the guide plates 11—12 are secured, which guide plates hold the can body blanks in position as moved toward the feed rolls

13—13' for delivering the said can body blanks onto the supporting plate 6 to be received by the endless carrier 4.

The can body blanks are advanced toward the respective feed rolls 13—13' by means of the conveyers 14—14', each carrier being provided with a series of projecting fingers 15 which extend and work within a slot cut in each of the tables or platforms 10—10'. These said projecting fingers bear against one end of the can body blanks delivered to the tables or platforms 10—10' by operators stationed at each side of the machine for the feeding of can body blanks, and during the movement of the said endless conveyers 14—14' propel the said can body blanks toward the respective feed rolls 13—13', the spacing of the projecting fingers 15 being such and the travel of the endless conveyers 14—14' so timed that the can body blanks are delivered alternately onto the supporting plate 6 from each side of the machine. By this arrangement the can body blanks are fed to the machine with greater rapidity than is possible by a single feed mechanism,—hence the delivery of the blanks is in proportion to the working capacity of the machine.

To the frame 1 a slight distance in advance of the feed rolls 13—13', the trimming and slitting devices are located, under which devices the can body blanks are placed by the first movement of the endless carrier 4 after having received the same from the feed rolls 13—13'. It will be understood that the travel of the endless carrier 4 for propelling the can body blanks toward the horn or mandrel 7 is an intermittent or step movement. The trimming and slitting devices consist of the fixed knives 16—16' and movable knives 17—17', which knives are secured respectively to the immovable or fixed heads 18 and the swinging brackets 18'. The side edges of the can body blanks when brought under the trimming and slitting knives rest on the fixed knife 16' and the movable knife 17, when the said can body blank is at rest. The construction of the trimming and slitting knives will be understood by reference to Fig. 8 of the drawings. As the movable knives are forced toward the fixed knives, the same bear on the four corner ends of the can body blank 3, and cut and trim the said corners thereof at an incline, at the same time slitting the blank at the side edges thereof a slight distance inwardly from the ends of the said blank, thereby forming projecting tongues 19—19' which overlap when the can body blank is formed around the horn or mandrel 7.

The shape of the can body blank after having been acted on by the trimming and slitting knives is represented by Fig. 9 of the drawings. This trimming and slitting of the can body blank may be said to constitute

the second step in the formation of the can body, the first step being the delivery of the can body blank to the endless carrier 4 and the placing of the same for the action of the described knives.

The next step in the operation of the apparatus is the forming engaging hooks in the side edges of the can body blanks, in order that the same may interlock when the prepared body blank is formed around the horn or mandrel 7.

The location of the hook forming mechanism will be apparent by an inspection of Fig. 4 of the drawings, wherein the movable hook forming dies are represented by the numerals 19²—19³, and the fixed dies by the numerals 20—20'. These dies are mounted respectively in the fixed heads 18, and the swinging brackets 18', which heads and brackets carry the before described fixed knives 16—16' and the movable knives 17—17'. The hook forming dies, carried by the swinging brackets as swung toward the fixed dies bear onto the side edges of the can body blank intermediate the slitted portions thereof and compress the material to form the upwardly and downwardly projecting hooks 21—22, Fig. 10 of the drawings. The can body blank is carried within the hook forming dies by the endless carrier 4, after the said blank has been acted on by the trimming and slitting knives.

From the hook forming dies, the can body blank is advanced toward the horn or mandrel 7, the can body blank as propelled toward said horn or mandrel passing beneath the weight bar 9, which bears thereon to hold the central portion thereof on the supporting plate 6. This weight bar by bearing onto the moving can body, prevents the said can body being raised from the supporting plate 6 while the side portions of the said blank ride over and upon the upwardly inclined bars 23, which partially roll the can body blank as delivered to the horn or mandrel 7, Fig. 5 of the drawings, while at the same time the said weight bar 9 guides the central portion of the can body blank beneath the mandrel or horn. The can body blank when positioned beneath the said horn or mandrel 7, will be within the clamp jaws 23', which are connected to the operating rod 24 by the toggles 24'. As the can body blank 3 is closed around the horn or mandrel 7, the side edge hook 21 of the said body blank engages with the opposing side edge hook 22, while the projecting end tongues 19' will overlap the opposing projecting end tongues 19. As the can body blank is formed around the horn or mandrel 7 by the closure of the hinged clamp jaws 23', the inner end of the can body blank rides on the inclined collar 25, secured to the inner end portion of the said horn or mandrel, Fig. 6 of the drawings, until the said blank is brought into its final position or

down onto the horn or mandrel. The function of the said inclined collar 25 is to true or even the end of the can body blank in order that the end of the formed can body may be true, thereby providing against an uneven end which is frequently found to exist in can bodies and prevent the accurate placing of tops and bottoms thereon. After the can body blank has been formed around the horn or mandrel 7, the hammer 25' is forced downward under pressure to close the side seam of the can body by closing the hooked edges thereof, thereby producing a lock joint seam at such portion of the can body as is united by the hooked side edges of the can body blank, the can body at such portion being held by a joint composed of four thicknesses or layers of metal or material. At the same time the overlapping end tongues are firmly pressed down by the hammer 25', giving a double thickness of material at such portions of the body side seam joint. This double thickness extends a distance from the end of the can body equal in length to the depth of a flange of a top and bottom which is secured onto the can body by having its flange crimped onto the end portion of the can body which is outwardly flanged by suitable mechanism adapted for this purpose and which forms no portion of the present invention.

The hammer 25' is secured to the inner end of a fulcrumed lever 26, Fig. 5 of the drawings, the outer end of said lever being connected to a vertically movable operating rod 26'. However, the said hammer 25' is normally held upward or away from the horn or mandrel 7 by the tension of the spring 27, which connects the outer portion of the said fulcrumed lever 26 to the frame 1 of the apparatus. The can body blank is propelled onto the mandrel or horn 7, and the formed can body along and over the said horn or mandrel by the before mentioned endless carrier 4, the projecting fingers 5 of which move within the longitudinal grooves or channels 27' in the face of the horn or mandrel, Fig. 4 of the drawings. The outer end portion of the horn or mandrel 7 is supported by the vertically disposed rod 28, which is fitted within the barrel 28' secured to the frame of the machine. This rod may be adjusted vertically by means of an adjusting screw 29, Fig. 6 of the drawings.

In order that the formed can body may be removed or stripped from off the horn or mandrel 7, it is required that the same be permitted to pass beyond the supporting end of the rod 28, on which bears the lower face of the horn or mandrel, Fig. 6 of the drawings. To this end, the said rod 28 is provided with a hinged outwardly movable section or extension 29', which is normally held up against the face of the horn or mandrel

by the spring held bolt 30, which bolt at its upper end bears against a projecting portion 30' of the hinged section 29'. As the forward end of the formed can body during its withdrawal from the horn or mandrel 7 bears against the inner face of the hinged section 29', the same gives to the pressure exerted thereon and swings outwardly, permitting the can body to be forced from off the horn or mandrel.

The formed can body with its locked seam uppermost is delivered from the horn or mandrel 7 onto the solder bar 31, the outer end of which rod is loosely supported and upheld by a roll 31', secured to a transverse shaft 32 working in suitable bearings carried by an auxiliary frame 32', Figs. 1 and 2 of the drawings. The can body as delivered onto the said bar 31 is engaged by the projecting fingers 33 of an endless carrier chain 33', which propels the can body along the said bar and beneath the soldering irons 34, which irons melt the solder applied to the seam of the can body from the solder feed mechanism. This solder feed being the usual wire solder feed mechanism, detailed description thereof is unnecessary, it being understood that the wire solder is delivered from a reel, and passes through the tube 35 onto the seam of the can body as passed thereunder. The endless carrier 33' works over the sprocket wheels 36—36', motion being imparted for the driving of the said sprocket wheels in any suitable manner, said endless carrier removing the soldered can bodies from off the bar 31.

Inasmuch as the can body blanks are subjected to the action of the before described knives and the described hook forming dies as propelled toward the horn or mandrel 7, it is required that the can body blanks advance a given distance with each step movement of the endless carrier 4 in order to position the can body blank with absolute accuracy beneath the movable knives and dies. For this purpose longitudinally movable reciprocating bars 37 are provided, Figs. 3 and 7 of the drawings. These bars are located at each side of the endless carrier 4, and the same are operated from a rock-shaft 38 by means of the arms 38' secured thereon, which arms are connected by pins 39 to the bars 37, said pins extending through and working in slots 37' in the longitudinally disposed plates 5'. Each of the said longitudinally reciprocating bars 37 is provided with a series of raised projections 39', which extend above the supporting plate 6 sufficiently to engage the rear end of the can body blank 3 resting on the said supporting plate 6, when the bars 37 are reciprocated forwardly during the period of rest of the endless carrier 4. The said endless carrier advances the can body blank a given distance to place the said blank beneath, say

the trimming and slitting knives. The chances are that by reason of the slack or loose play of the links composing the endless carrier, that the can body blank is not brought at rest so positioned as to be properly acted on by said knives, likewise when the blank is advanced to be acted on by the hook forming dies, for accurate positioning of the can body blank is essential when first subjected to the action of the mentioned knives, followed by the action of the hook forming dies. During the interval of rest of the endless carrier 4, the longitudinally reciprocating bars 37 are given a forward stroke of predetermined movement, the projections 38' thereof engaging the rear end of the body blank 3 and positively advancing the same to its required position with absolute accuracy. The reciprocating bars 37 make their return stroke during the forward movement of the endless carrier 4.

The detail mechanism for actuating the various features thus set forth will now be described, each being driven from the main drive shaft 40. The said shaft 40 is driven by the belt 40' working over the pulley 41, Fig. 1 of the drawings, and the motion of the said drive shaft 40 is transmitted by the chain 42 for actuating the before mentioned solder feed mechanism. To the opposite end of the drive shaft 40 is secured a gear 42', which meshes with and imparts motion to the gear 43, Fig. 2 of the drawings. This gear 43 carries the projecting rolls 43', which alternately move in and out of the radial slots 44 of the disk 44', so as to impart an intermittent or step rotation to the said disk 44', which motion in turn is transmitted by the intermeshing gears 45—45' for imparting rotation to the shaft 46 on which is mounted within the frame of the machine the drive roll 46', over which roll works the endless carrier 4 for conveying the can body blanks through the machine. There is also secured to the drive shaft 40 in advance of the gear 42', a bevel gear 47, which gear meshes with the bevel pinion 47', secured to the longitudinal shaft 48, working in suitable bearings attached to one side of the frame 1. The motion of the drive shaft 40 is thus imparted to the longitudinal shaft 48 in order to actuate the train of intermeshing gears 48' for actuating the endless conveyor 14' for the feeding of can body blanks to the feed rolls 13', which rolls are driven by the gear 49, which actuates the pinions 50, one of which is mounted on the outer end of the shaft 50'. This shaft operates the pinions 50², which impart motion to the said feed rolls 13'.

Referring to Fig. 1 of the drawings, it will be noted that the motion of the shaft 48 is transmitted to the shaft 50³, for operating the feed conveyer 14 by means of the chain 51, which chain works over a series of

sprocket gears 52. By means of the gear 52' which is actuated by the drive chain 51, motion is imparted to the intermeshing pinions 53 for operating the feed rolls 13.

To the longitudinal shaft 48, Figs. 2 and 3 of the drawings, is secured a cam 53', which is engaged by a roll 54 carried by the arm 54' depending from the rock-shaft 38. During rotation of the cam 53', the said rock-shaft 38 is actuated to impart reciprocating motion to the gage bars 37, through the medium of the connecting arms 38', Fig. 3 of the drawings.

On the drive shaft 40 and within the frame of the machine, four cams 55, 55', 55², 55³ are secured, Figs. 4, 6, 11 of the drawings. The first mentioned cam 55 acts against a roll 56 inwardly projecting from a slide-head 56', slidably mounted on the cross-rods 57, Fig. 4 of the drawings. To this slide-head 56', the inner end of the rods 57' are secured, the outer end of said rods being connected to the swinging brackets 18' carrying the knives 17—17² and the dies 19²—19³. As the slide-head 56' is reciprocated transversely during the rotation of the cam 55, the brackets 18' are thrown to move the mentioned knives and dies toward and from the can body blanks resting thereunder. The cams 55' and 55³ work against the roll 58, carried by the slotted hanger 58² loosely mounted on the shaft 40, which hanger at its upper end carries the roll 58' Fig. 6 of the drawings. The roll 58 is of a diameter slightly greater than that of the roll 58', and the said roll 58 and the lower end of the hanger 58² is secured to the outer end of the fulcrumed lever 59. This lever in turn is connected at its inner end to the rod 24 which operates the clamp-jaws 23', Fig. 6 of the drawings. As the cam 55' acts against the roll 58, the outer end of the said lever 59 is depressed, which raises its inner end to lift the operating rod 24 to close the clamp-jaws 23' around the mandrel 7. The moment the incline portion of the cam 55' is carried beyond the face of the roll 58, the cam 55³ mounted on the shaft 40, proceeds to act against the roll 58' to gradually raise the hanger 58², lifting therewith the roll 58 and the outer end of the fulcrumed lever 59, which gradually lowers the inner end thereof and depresses the rod 24 to open the clamp-jaws 23' to release the clamped can body on the horn or mandrel 7.

While the clamp-jaws are in closed position, the cam 55² works against the face of the roll 59', carried by the outer end of the fulcrumed lever 60. This lever at its inner end is connected with the lower end of the vertically movable rod 26', which rod is attached at its upper end to the outer end of the lever 26, carrying the hammer 25', Figs. 1, 4, and 5 of the drawings. During the throw of the lever 60, the lever 26,

through its connecting rod 26' is operated to move the hammer 25' toward and from the horn or mandrel 7.

The can body blank 3 is held against displacement during the action of the before mentioned knives and hook forming dies, by means of the spring held clamp plates 61, which plates are depressed to clamp the can body blanks by means of the plunger rods 62', said rods being located at each end of the swinging brackets 18' and working in the barrels 62. These plunger rods as the brackets 18' are swung inwardly bear onto the said plates and force the same against the can body blanks. The swinging brackets are hinged within the fixed heads 18.

It will be understood that the movement of the described cams 55, 55', 55² and 55³ are timed to successively bring into action the trimming knives and hook forming dies, then the clamping-jaws to fold the can body blank around the horn or mandrel, and finally to force the hammer onto the partially formed can body to close the side seam thereof.

In case it should be desired to form the can body with a lock seam its entire length, it is only required to remove the trimming knives and replace the hook forming dies with the ones of sufficient length to act against the side edges of the can body blanks the entire length thereof.

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

1. In an apparatus for the described purpose, the combination with the frame thereof, of an intermittently traveling carrier for the can body blanks, of a horn or mandrel to which the blanks are delivered by the said carrier, of inclined bars for gradually raising the side edge portions of the body blanks as delivered to the said horn or mandrel, of a hinged weight bar which bears onto the central portion of the can body blanks to cause the same to move beneath the horn or mandrel, and of mechanism for clamping the can body blanks around the horn or mandrel and closing the side seam thereof.

2. In an apparatus for the described purpose, the combination with the frame thereof, of an intermittently traveling can body blank carrier working therein, of devices for feeding can body blanks to said carrier, of a horn or mandrel to which the can body blanks are delivered, of devices for trimming the corners of the said blanks and slitting the side edges thereof a slight distance from the ends of the blank, of means for forming projecting hooks in the opposing side edges of the blanks intermediate the slitted portions thereof, of clamp-jaws which form the body blanks around the

horn or mandrel to place the opposing hook edges thereof into engagement, and means for locking the engaged hook edges of the can body blanks.

- 5 3. In an apparatus for the described purpose, the combination with the frame thereof, of a series of knives for trimming the corner edges of the blanks and slitting the side edges thereof adjacent the corners, of
10 dies to form hook side edges to the blanks acted on by the knives, of an intermittently traveling carrier for delivering can body blanks to the said knives and dies, of means located at each side of the machine for
15 alternately feeding can body blanks to the said carrier, of longitudinally reciprocating gage bars for positively positioning the blanks relative to the mentioned knives and dies, of a horn or mandrel on which the
20 can body is formed, of clamping jaws for closing the can body blanks around the said

horn or mandrel, and of means for locking the side seam of the loosely formed can body.

4. In an apparatus for the described purpose, the combination with the horn or mandrel, of mechanism for delivering can body blanks to said horn or mandrel, of clamp-jaws for closing the blanks around the horn or mandrel, of an inclined collar
30 secured to the inner end portion of the said horn or mandrel for gradually evening or truing the end of the body blanks as closed around the same, and of means for closing the side seam of the formed can body.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY C. BLACK.

Witnesses:

N. A. ACKER,
D. B. RICHARDS.