No. 818,806. PATENTED APR. 24, 1906.

B. ADRIANCE & A. CALLESON.

CAN HEADING MACHINE.

APPLICATION FILED OCT. 24, 1903.

3 SHEETS—SHEET 1.

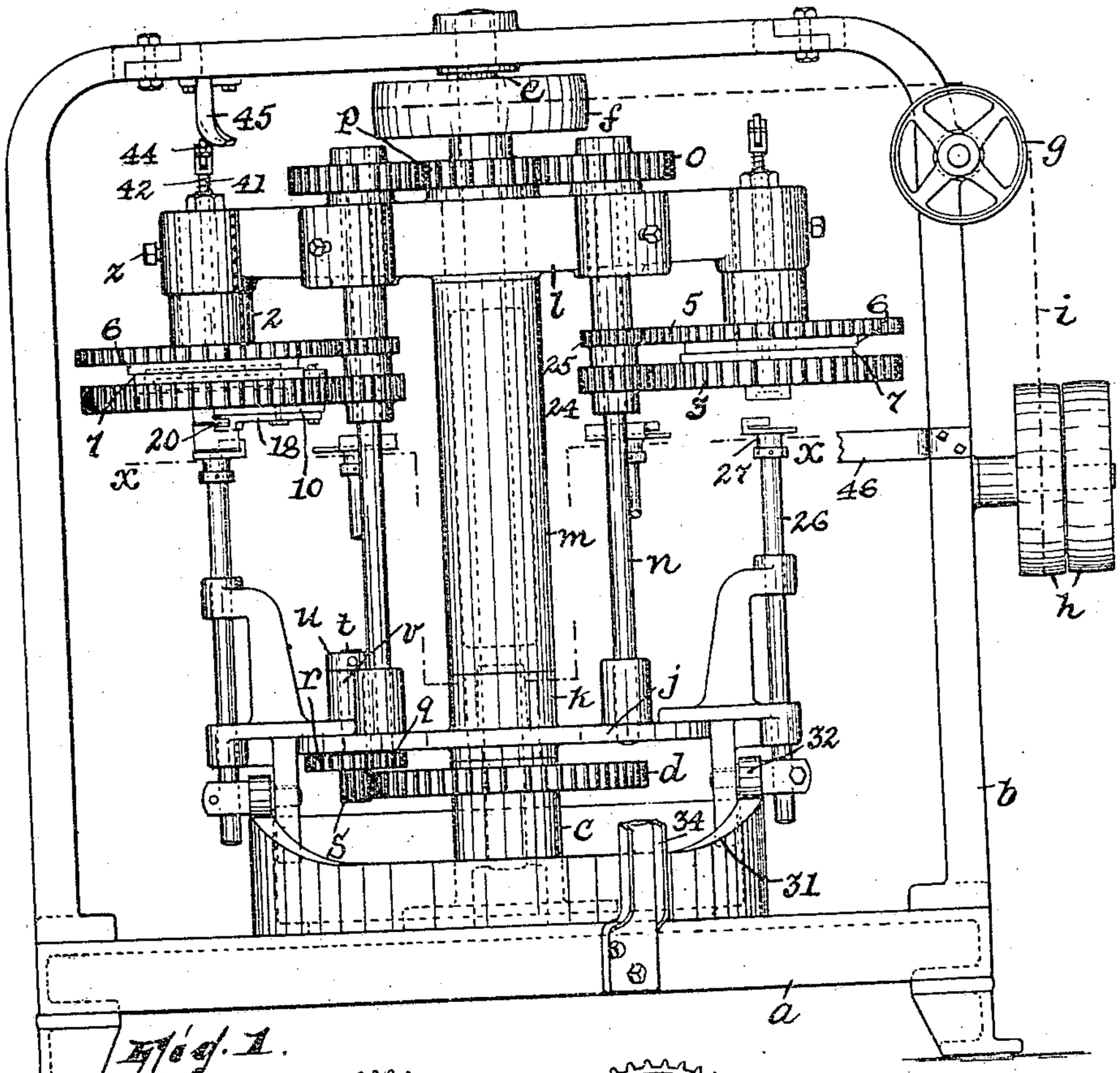

Fig. 1.

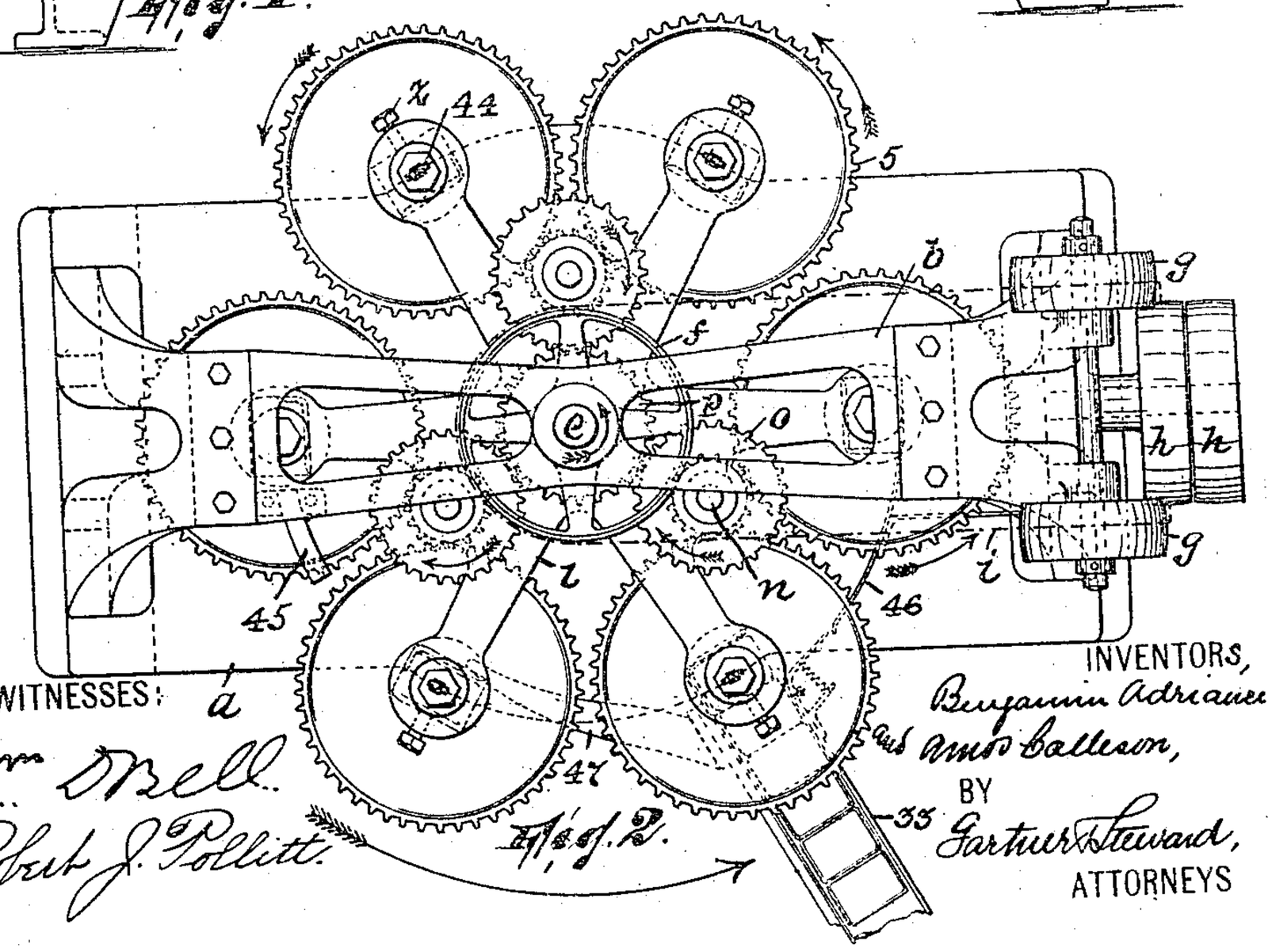

Fig. 2.

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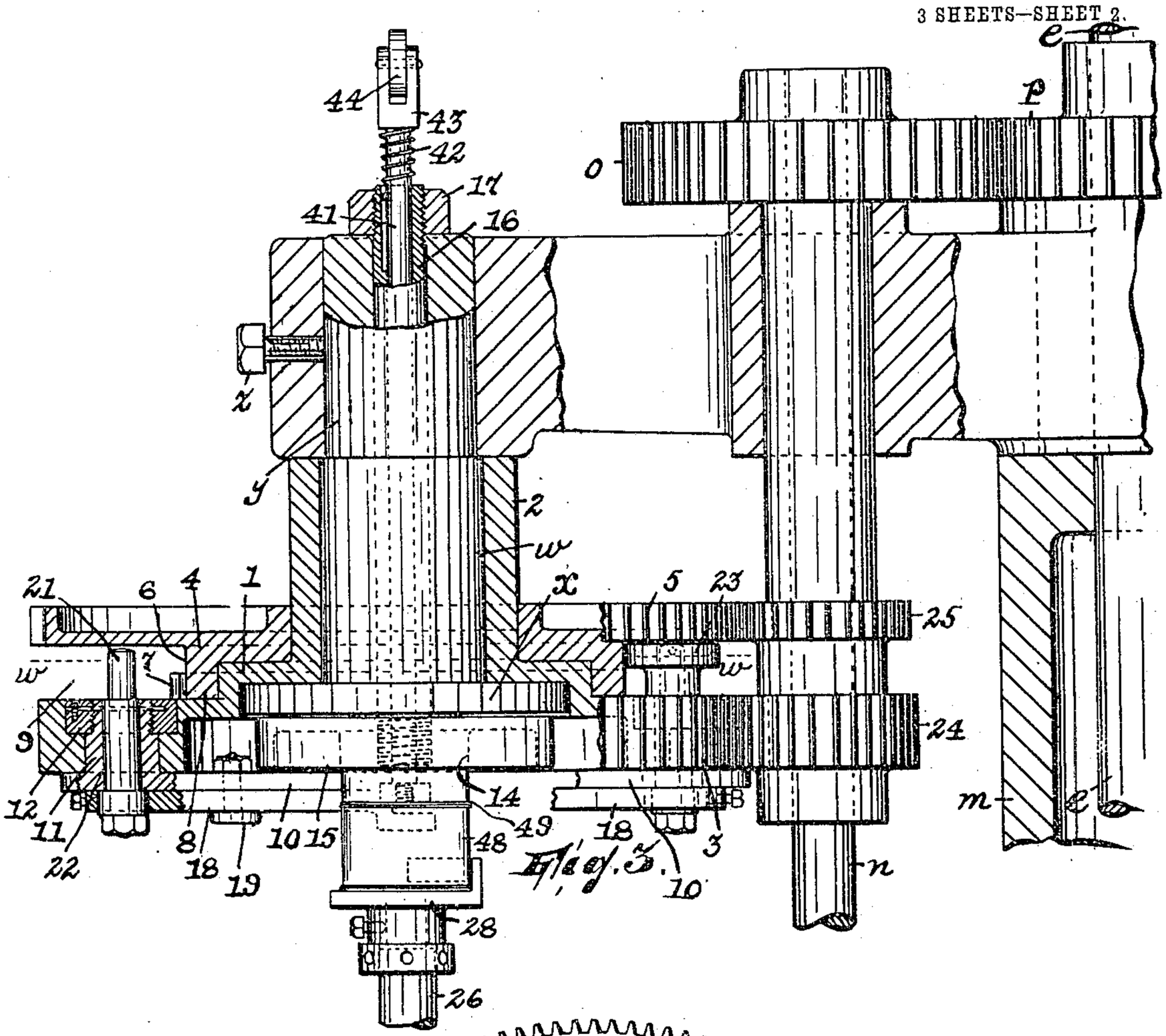

Fig. 3.

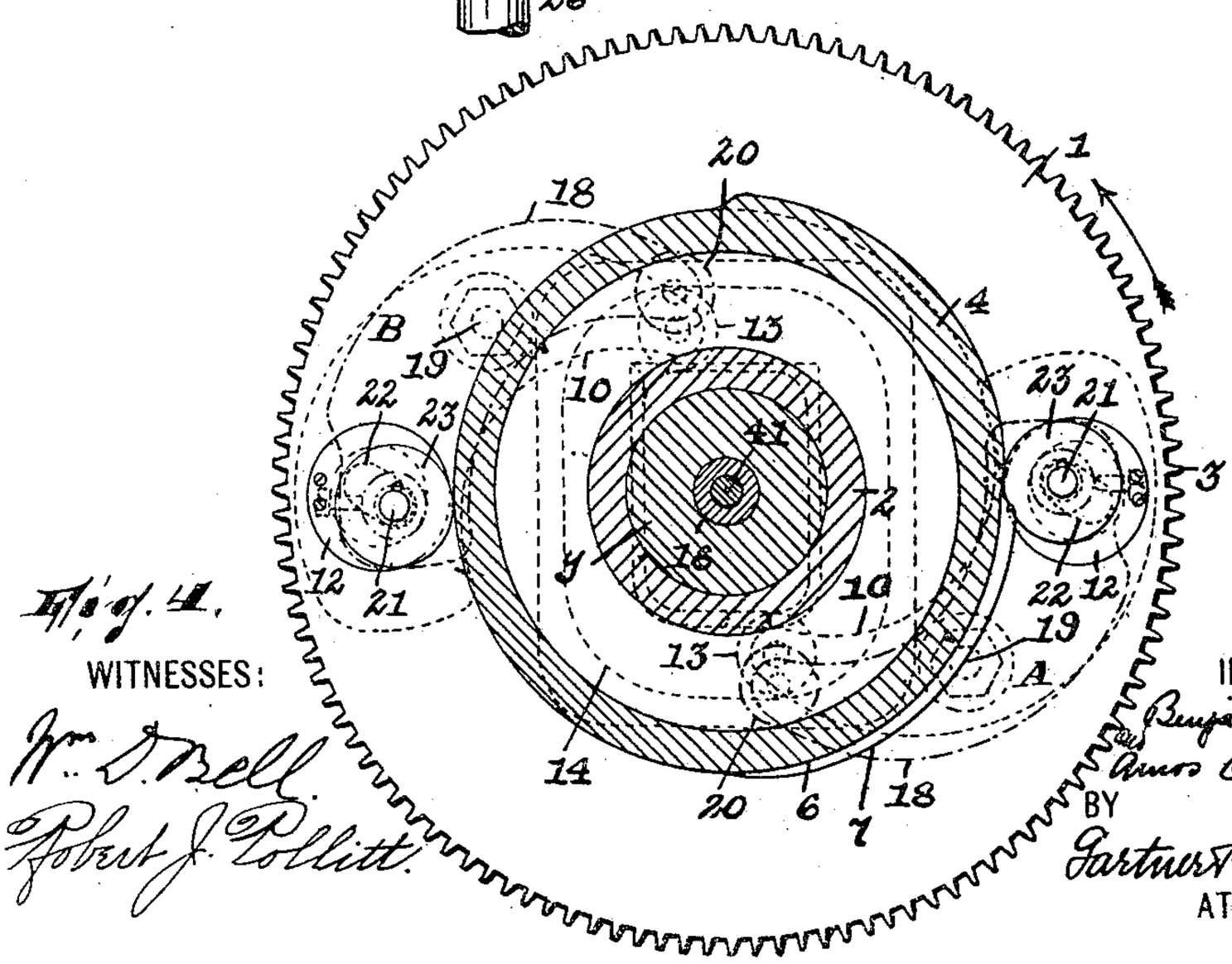

Fig. 4.

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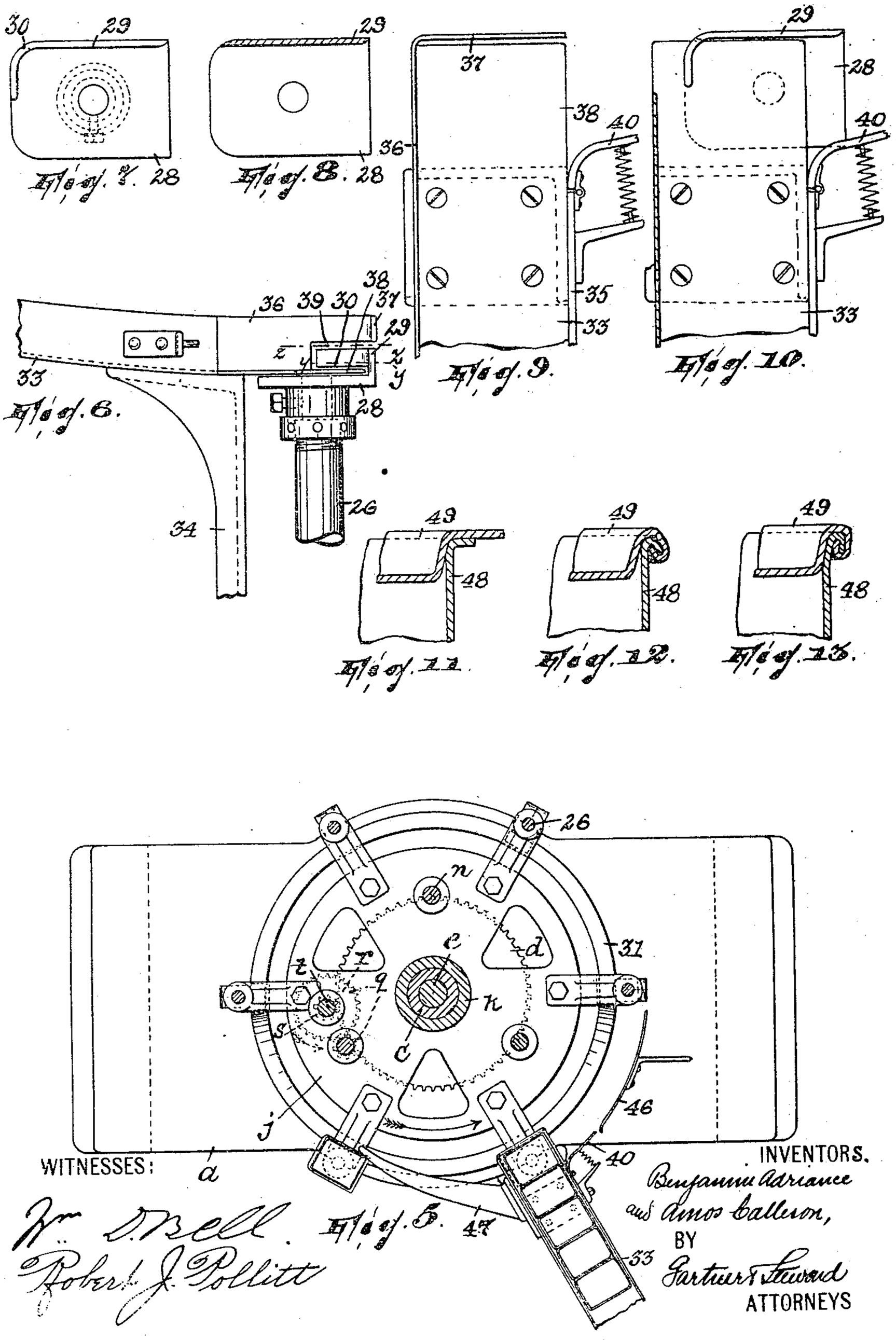
3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

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CAN-HEADING MACHINE.

No. 818,806. Specification of Letters Patent. Patented April 24, 1906.

Application filed October 24, 1903. Serial No. 178,380.

To all whom it may concern:

Be it known that we, BENJAMIN ADRIANCE and AMOS CALLESON, citizens of the United States, residing in the borough of Brooklyn, in the city of New York, county of Kings, and State of New York, have invented certain new and useful Improvements in Can-Heading Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

The present invention relates to that portion of the art of manufacturing sheet-metal vessels which has to do with the affixing of the heads to the bodies of cans by mechanism acting to shape the metal of the body and head into a lock-joint.

The invention relates particularly to can-heading machines of the kind where in one organism a plurality of cans at a time are adapted to pass through the several steps going to make up the heading operation.

It contemplates the production of a machine whose construction is relatively inexpensive, simple, and durable, which is as thoroughly automatic as possible, so that the output will be materially augmented and the duties of an operator in running it will be lessened, and the action of which in the forming of the seams or joints is as smooth and perfect as may be, so that wear and tear on the machine itself is materially reduced and the quality of goods turned out improved.

In the accompanying drawings, where the invention is fully illustrated, Figure 1 is a view in side elevation of one form of a machine constructed in accordance with said invention, certain parts being removed. Fig. 2 is a top plan view of the machine as shown in Fig. 1. Fig. 3 is a view, partly in elevation and partly in section, of the mechanism going to make up one of the can-heading units. Fig. 4 is a horizontal sectional view taken on the line *w w* in Fig. 3. Fig. 5 is a horizontal sectional view on the line *x x* in Fig. 1. Fig. 6 is a view in side elevation of a detail, illustrating the manner in which the cans are fed into position for being operated upon. Fig. 7 is a top plan view of the holding member on which each can rests while being operated upon. Fig. 8 is a horizontal sectional view of said holding member on the line *y y* in Fig. 6. Fig. 9 is a top plan view of a certain supply-chute illustrated in Fig. 6. Fig. 10 is a top plan view of the holding member and a horizontal sectional view of the chute on the line *z z* in Fig. 6, showing the arrangement of these parts as the holding member takes a can from the chute; and Figs. 11, 12, and 13 show the can and head in section at various stages of the operation.

The frame of the machine comprises a base *a* and an arch *b*, supported by the base. The base carries a step-bearing *c*, on which is fast a gear *d* and in which is stepped the lower end of the main shaft *e* of the machine, which has an additional bearing at its upper end in the arch *b*. Said shaft carries a sheave *f*, around which and idlers *g* and one or two pulleys *h* a continuous belt *i* extends. Power for rotating shaft *e* is taken in through the other pulley *h*.

j is a disk having a central hub *k* resting on the step-bearing *c* and arranged to rotate about shaft *e*, and *l* is a spider, also arranged to rotate about shaft *e* and sustained at a definite distance above disk *j* by a spacing-cylinder *m*, which is penetrated by shaft *e*. In the spider and disk are journaled three rotary shafts *n*, which are sustained against downward displacement by pinions *o*, fixed on their upper ends and bearing on the top of the spider. Each pinion *o* meshes with a gear *p*, fast on shaft *e*. The lower end of one of the shafts *n* carries a pinion *q*, which meshes with a pinion *r*, which with another pinion *s*, meshing with gear *d*, is fast on a shaft *t*, supported by a collar *u* on a bearing *v* in the disk *j*. Gear *d* being stationary, while the structure comprising the disk, the spider, shafts *n*, the pinions which connect said shafts with pinion *p*, and the pinions which connect shafts *n* intergeared, through gear members *o* and *p*, with gear *d* is rotary, upon rotating shaft *e* not only will the structure referred to be rotated as a whole, but each shaft *n* will be rotated in said structure individually, as will be manifest.

w is a post formed at *x* at its lower end with a flange and having its upper portion *y* reduced and secured in one of the arms of the spider by a set-screw *z*. A revoluble disk 1 is supported by this flanged post, its hub portion 2 being journaled on the post between

its flange and the arm of the spider. This disk has peripheral gear-teeth 3. On the disk and penetrated by the hub 2 thereof is journaled an annulus 4, formed with peripheral gear-teeth 5 and having two parallel peripheral camways 6 and 7 on its hub portion 8. Said hub portion is next adjacent to the toothed portion of the disk 1, so that an annular space 9 is formed between said toothed portion of the disk and the toothed portion of the annulus. At diametrically opposite points in the disk 1 are arranged pairs of levers. Since the structures which comprise these two pairs of levers are exactly alike except in a certain particular hereinafter mentioned, reference will be made specifically to but one.

10 is a lever fulcrumed in the disk, its fulcrum being afforded by a boss 11, formed integrally with it, and which carries a nut 12 for maintaining the lever in place. The free end of this lever carries a roller 13, adapted to run in a groove 14, formed in the under face of a block 15, which serves as the chuck portion of the mechanism which holds the can and head assembled, as hereinafter described, while undergoing the uniting operation, said groove, be it remarked, being shaped to conform substantially to the contour of the can to be operated upon. The block 15 has a tubular spindle 16, which projects up through the post *w* and is secured in the same by a nut 17. Said lever 10 and another lever 18 are pivoted together at approximately their middle portion, as at 19. The free end of the lever 18 carries a knurl or shaping-roller 20, while its other end carries a vertical stud 21, which projects up through an arc-shaped slot 22 in the fulcrum portion of lever 10 and acts as a bearing at its upper end for an antifriction-roller 23.

The mechanism above described is duplicated, being marked A and B in Fig. 4, mechanism A being exactly like mechanism B, except that the knurl 20 of the former is shaped so as to impart the primary bending to the metal, as illustrated in Fig. 12, while the knurl of the other, B, is shaped to bend the metal into the form shown in Fig. 13. Levers 18 are the ones which are directly involved in shaping the metal. Levers 10 simply serve as their supports. Levers 18 take their general direction of movement from levers 10; but the direct actuation thereof in order to shape the metal is imparted thereto from the cams 6 and 7, roller 23 of mechanism A being made to engage cam 6, while roller 23 of mechanism B engages cam 7.

It will be observed upon a comprehensive view of the subject-matter of this present application that the mechanism above described is one in which the shaping means is rotatable around the work. No broad claim for a mechanism *per se* of this nature is made in the present instance, provision to that end having been made in a copending application, filed June 17, 1903, Serial No. 161,777.

The parts designated by the reference characters from *w* to 23 will be understood to be multiplied, there being one unit comprising such elements for each arm of the spider *l*.

Each shaft *n* carries two pinions 24 and 25, engaging one with the two adjacent gears 3 and the other with the two adjacent gears 5. The pitch of the gearing here involved is such that the disks 1 rotate faster than the annuli 4, with the consequence that the rollers 23 are actuated by the cams 6 and 7, and so cause the movement of the levers 18. Thus while the levers 18 are rotating about the work they are caused by the cams to approach the work or are permitted by the cams to recede from the same.

The disk *j* carries several plungers 26, on which are mounted the can-holders 27. These are in the form shown in Figs. 6, 7, and 8, where there is a plate 28, having a flange 29 extending around one side and one end of the plate, it being separated from the plate at the end edge thereof by a slot 30. Each can-holder corresponds to one of the arms of the spider *l*.

On the base *a* is arranged a camway 31, on which roll antifriction devices 32, carried by the plungers 26. This camway acts to elevate the plungers and hold each elevated while the can is being operated upon, and when the operation on the can is complete it permits the plunger to fall, so that the can may be removed.

33 is a can-feeding chute having a support 34. This chute is arranged adjacent the high part of the camway 31. One of the side walls 35 of the chute terminates short of the end thereof a distance corresponding with the width of the can, while the other wall 36 is extended around to form an end wall 37 on the end of the chute. This end wall is spaced from the bottom 38 of the chute by a slot 39, corresponding to the height of the flange 29 of the holder 27. In order to insure the can's seating squarely on the holder, a spring-actuated presser 40 is pivoted on the side wall of the chute, through which the can leaves the chute, said presser acting outwardly toward the flange 29 of the holder.

41 is a plunger having a splined connection with the spindle 16, through which it extends, being normally pressed upwardly by a spring 42, taking between a head 43 on the plunger and the upper end of the spindle, said head carrying an antifriction-roller 44. Said roller is adapted to engage a fixed cam 45, carried by the arch *b*, when the roller 32 on the plunger 26 reaches the depression in the camway 31, the function of the plunger being to prevent the can adhering to the chuck 15 after the holder 28 is withdrawn.

46 is an arc-shaped guide carried by the

arch *b* and adapted to insure the true seating of the cans on their holders as the plungers 26 successively rise to force the cans against the chucks 15.

47 is a deflector projecting laterally from the chute in such manner as to cause each can as it approaches completed to be wiped off its holder 27. It will be understood that the can-chute is inclined, so that as fast as a can is removed from the end thereof another is crowded into its place. The cans 48 and their heads 49 are originally shaped as illustrated in Fig. 11, and each head, if desired, is placed in position on its can by an attendant just previously to their being withdrawn assembled from the chute to undergo the jointing operation. Assuming that the shaft *e* rotates in the direction of the arrow adjacent to the same in Fig. 2, the structure comprising the spider *l*, the disk *j*, shafts *n*, journaled in said spider and disk, and the mechanism carried by said shafts and the spider and disk will be rotated bodily in the direction of the large arrow, (shown at the bottom of Fig. 2,) while the rotary parts of the units constituting the several can-heading means proper will rotate in the same direction as indicated by the smaller arrows at the top of Fig. 2.

Regarding first the manner in which the cans are successively taken off from the chute then held while undergoing the "heading" operation and then when the heading operation is completed discharged from the machine, as the structure referred to above is caused to rotate around shaft *e* as a center each can-holder 28 approaches the chute and coacts with the end thereof in the manner clearly illustrated in Fig. 6 to take off a can. As the holder leaves the chute the proper seating of the can on the holder is insured by the presser 40, and when the can leaves the chute it will be understood that the other cans are caused to slide down to place a new can in position to be taken off, owing to the incline of the chute. The can taken off being duly established on the holder, camway 31 causes the plunger 26 to rise and force the can against the corresponding chuck 15, the guide 46 meantime acting to maintain the can in proper position. The can members are now shaped by the mechanism for effecting this, as will be later described, and remain under the action of said mechanism until the above-mentioned structure has passed through a half-revolution, or approximately so. The heading being completed, the plunger 26, which holds the cam up against its chuck, drops down on the low part of the camway 31 and simultaneously roller 44 engages cam 45, and so causes the depression of plunger 41, which acts, as above stated, to cause the can to follow its holder—*i. e.*, to prevent its adhering to the chuck. When the plunger has reached its lowest limit of movement, the structure referred to will have turned far enough so that the deflector 47 is reached, and this being in the horizontal plane of the can wipes the same off into a suitable receptacle.

Regarding now the operation of the mechanism directly effecting the shaping of the metal of the can and head whereby to interlock the same, in one complete revolution of the structure above referred to each disk 1 gains one revolution on the corresponding annulus 4—that is to say, whatever is the number of revolutions imparted to each annulus 4 during one revolution of the entire structure the corresponding disk 1 has one more than that number of revolutions for the same interval. Fig. 4 shows certain parts of one of the can-heading units as they stand at the initiation of the shaping action. In other words, it shows the exact positions of the various parts of the extreme right-hand unit in Fig. 2. At this time the can has been securely clamped between its holder and chuck. The parts being in rotation, as the unit referred to is carried around with the entire structure its disk 1 gains on its annulus 4 in the manner above stated, with the result that roller 23 of mechanism A rides up on the high part of cam 6, thus forcing the knurl 20 up to the work. By the time that the structure has completed a quarter-revolution disk 1 will have gained an annulus 4 one-quarter of the circumference of the latter, and it being remarked that the high part of cam 6 is only ninety degrees in length roller 23 will ride down on the low part of cam 6, with the result that knurl 20 is withdrawn from the work. Meantime it should be understood the knurl referred to has completed several revolutions around the work and leaves the joint to be formed between the can-body 48 and head 49 in the form illustrated in Fig. 12. As knurl 20 of mechanism A recedes from the work knurl 20 of mechanism B begins to engage the work, this because its roller 23 commences to ride up on the high part of its cam 7 just as roller 23 of mechanism A left the high part of its cam 6. During the next quarter-revolution of the entire structure knurl 20 of mechanism B keeps in contact with the work, being caused to revolve several times around the work, and when this quarter-revolution is finished the roller 23 of mechanism B runs off the high part of cam 7 and withdraws the knurl 20 from the work, which is now left in the form illustrated in Fig. 13. Both rollers 23 of mechanisms A and B are now clear of the high parts of their respective cams, and they remain so until the entire structure revolves far enough to bring the unit being particularly referred to back to its extreme right-hand position, Fig. 2, (so that the means for discharging the completed can and the means for thereupon depositing a can to be "headed" will have opportunity to act.) In other words, while the entire struc-

ture is completing the second half of its cycle of rotation each roller 23 of mechanisms A and B is opposite the low part of its respective cam, thus permitting the corresponding knurl 20 to stand clear of the work while the can-discharging and can-supplying mechanisms are operating.

This machine is differentiated from any of which we are at present aware in at least one salient feature—*i. e.*, that the heading means as a part of a moving structure whereby the can parts are taken up at one position, jointed, and then discharged is complete in itself. Thus, as against, say, a machine in which the cans are rotated both individually and as a group and are successively brought against fixed joint-forming tools, the present machine has the advantage that the driving means is only subjected to the retarding effect of the various tools on their work and not this retarding effect plus that of the tools on the entire rotating structure as the cans are moved past the tools. This means not alone an economy of power and a saving of sudden applications of load on the source of power, but an avoiding of the consequent sacrifice of smoothness in running. Again, the feature referred to makes it possible to increase the output of the machine to an extent only limited by the number of units—*i. e.*, as the units are increased so the output may be proportionately augmented.

In a machine of the kind, for instance, above mentioned, where each unit is not complete in itself, but has to coact with a stationary part or parts, there is a limit to increasing the output for a given size of machine. This is due to the impossibility of getting a given number of units past the coacting part or parts with the same practical effects of operation, as a less number of units could be made to operatively pass said part or parts.

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

1. In a machine for producing lock-joints between the component parts of sheet-metal vessels, the combination, with the frame, of a rotary structure, a plurality of joint-forming means each movable with and in said structure, means for holding the parts to be jointed while being operated upon, a source of power, and means, operatively connecting said source of power with the joint-forming means, for causing said joint-forming means to operatively engage and rotate about the work, substantially as described.

2. In a machine for producing lock-joints between the component parts of sheet-metal vessels, the combination, with the frame, of a rotary structure, a plurality of joint-forming means each movable with and in said structure, means for holding the parts to be jointed while being operated upon, a source of power, and means, movable with and in said structure and operatively connecting said source of power with the joint-forming means, for causing said joint-forming means to operatively engage and rotate about the work, substantially as described.

3. In a machine for producing lock-joints between the component parts of sheet-metal vessels, the combination, with the frame, of a rotary structure, a plurality of joint-forming means each movable with and in said structure, means for holding the parts to be jointed while being operated upon, a drive-shaft journaled in said frame and constituting the axis of said structure, and means, operatively connecting said shaft with the joint-forming means, for causing said joint-forming means to operatively engage and rotate about the work, substantially as described.

4. In a machine for producing a lock-joint between the component parts of a sheet-metal vessel, the combination, with the joint-forming means, of a stationary holding means forming a part of the supply for the can parts to be operated upon, and another holding means movable past the first and adapted to hold said can parts while being operated upon, said last-named holding means having a part movable through the space occupied by the can parts when on said first-named holding means, substantially as described.

5. In a machine for producing lock-joints between the component parts of sheet-metal vessels, the combination, with the frame, of a rotary structure, a plurality of joint-forming means each movable with said structure, means for holding the parts to be jointed while being operated upon, a rotary source of power, power-transmitting mechanism operatively connecting said structure and the source of power whereby to rotate said structure, each joint-forming means comprising a shaping device and an actuating-cam for said shaping device, one of which is rotatable with reference to the other, and power-transmitting mechanism operatively connecting said source of power with said joint-forming means whereby to effect the aforesaid relative rotation with regard to their respective cams and shaping devices, substantially as described.

6. In a machine for producing lock-joints between the component parts of sheet-metal vessels, the combination, with the frame, of a rotary structure, a rotary shaft journaled in said frame axially of said structure, a plurality of joint-forming means each movable with said structure, means for holding the parts to be jointed while being operated upon, each joint-forming means comprising a shaping device and an actuating-cam for said shaping device, one of which is rotatable with reference to the other, and gearing operatively connecting said shaft and the structure and said shaft and the joint-forming means whereby to rotate said structure and

to effect the aforesaid relative rotation with regard to their respective cams and shaping devices, substantially as described.

7. The combination of a frame, a rotary structure, a plurality of joint-forming means arranged in said structure and each comprising a work-holding means, a shaping means and a means for actuating the shaping means, two of said three elements of each joint-forming means being rotary relatively to each other and to the third element around a common axis to effect the actuation, and progress around the work, of the shaping means, and means for rotating said structure and the rotative elements of said joint-forming means, substantially as described.

In testimony that we claim the foregoing we have hereunto set our hands this 19th day of October, 1903.

BENJAMIN ADRIANCE.
AMOS CALLESON.

Witnesses:
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W. F. HORN.