H. E. TOWNSEND.

SHEET METAL SPINNING MACHINE.

APPLICATION FILED APR. 11, 1917.

1,320,993.

Patented Nov. 4, 1919.

5 SHEETS—SHEET 1.

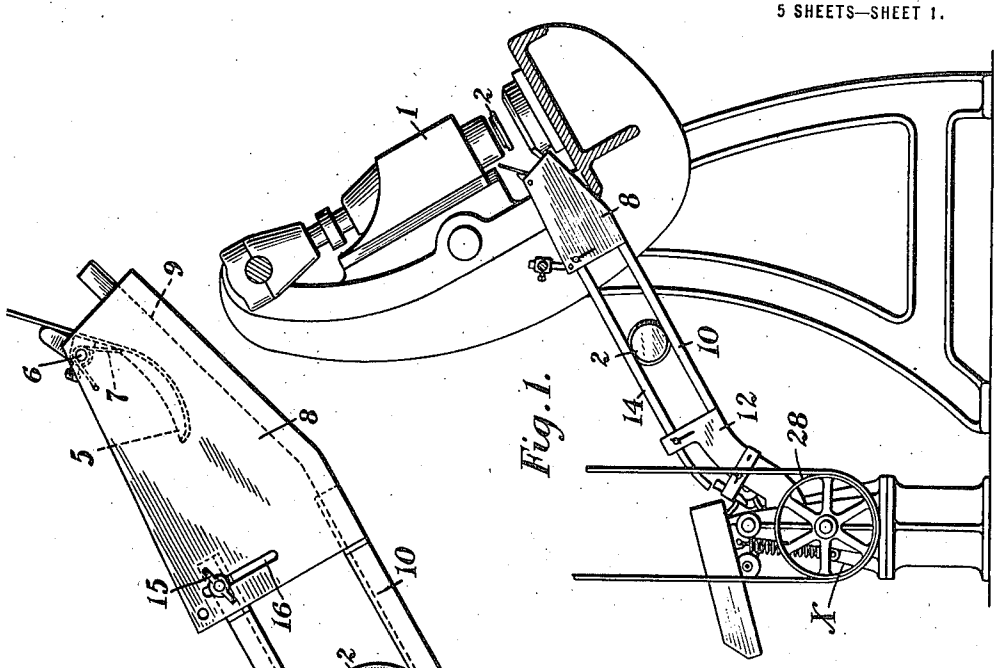


Fig. 1.

Fig. 2.

Fig. 4.

Fig. 5.

Fig. 3.

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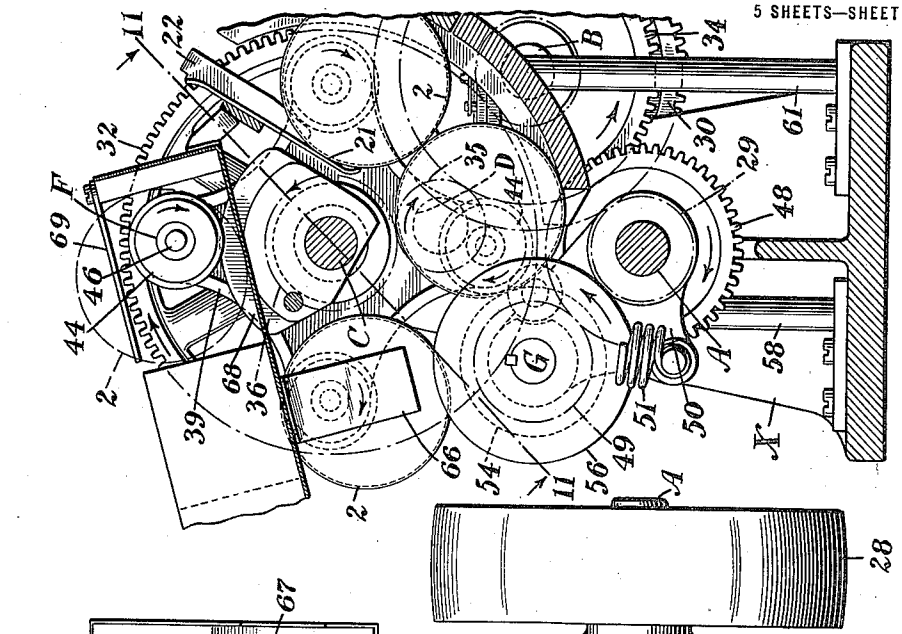


Fig. 10.

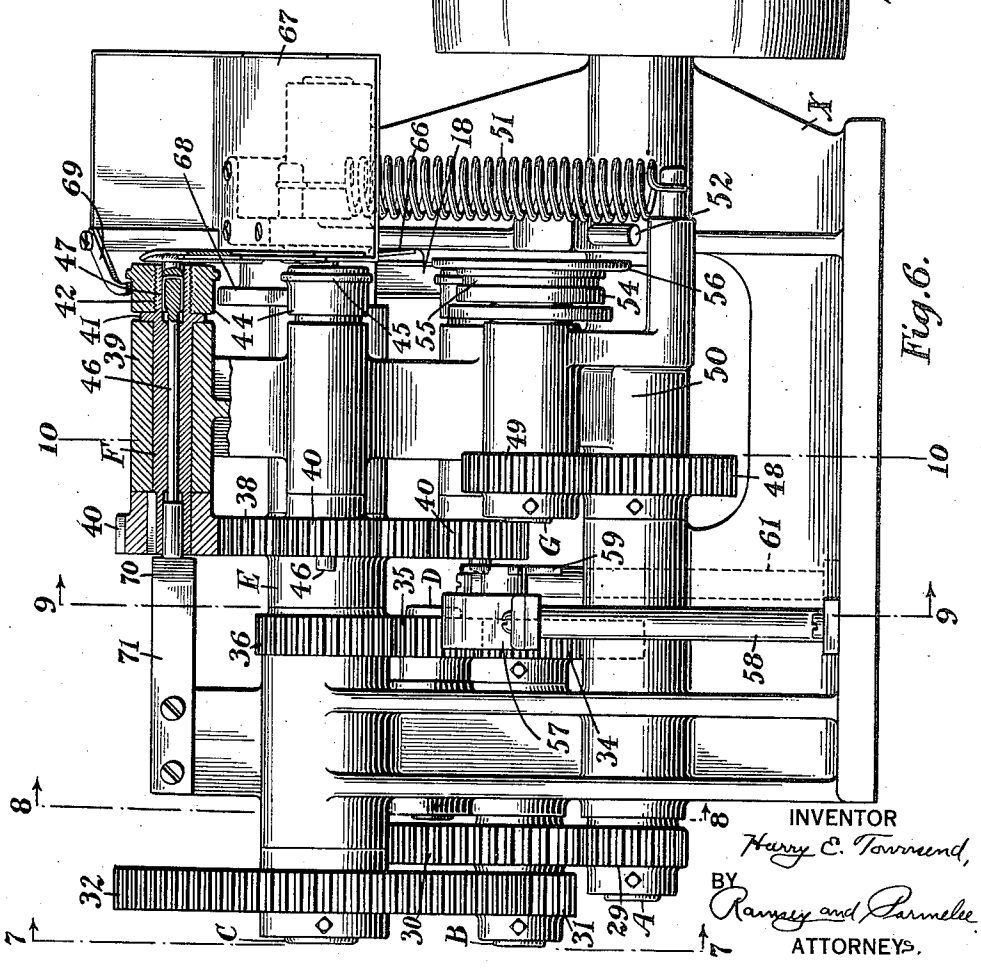


Fig. 6.

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5 SHEETS—SHEET 3.

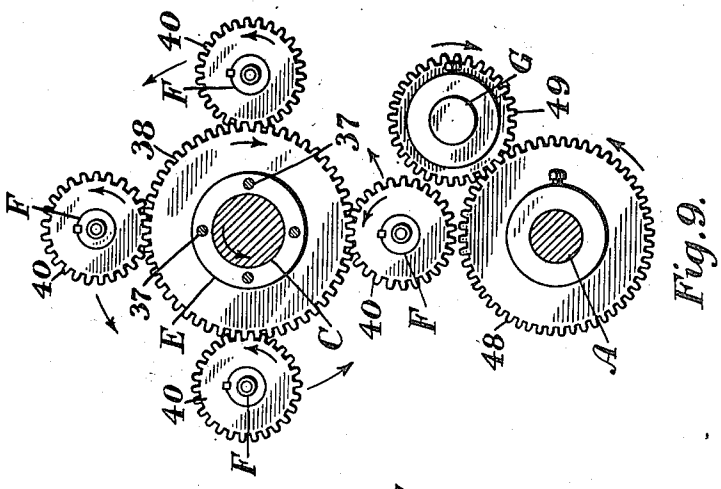


Fig. 9.

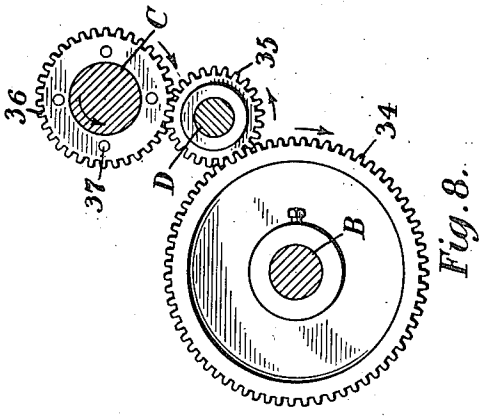


Fig. 8.

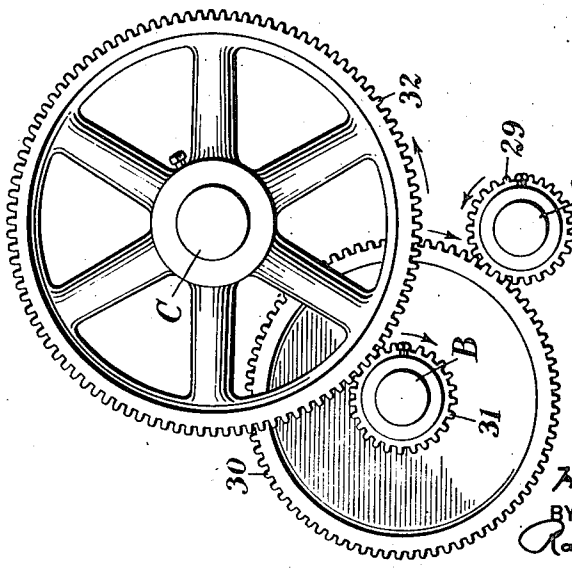


Fig. 7.

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5 SHEETS—SHEET 4.

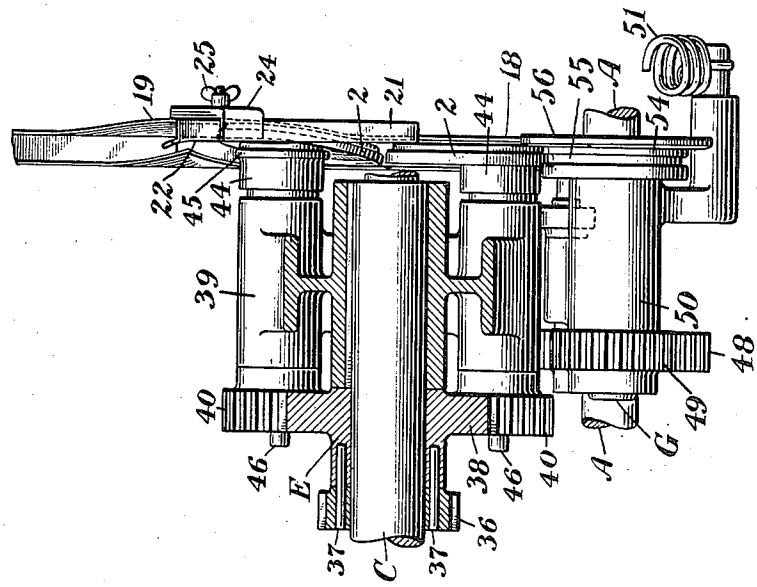


Fig. 11.

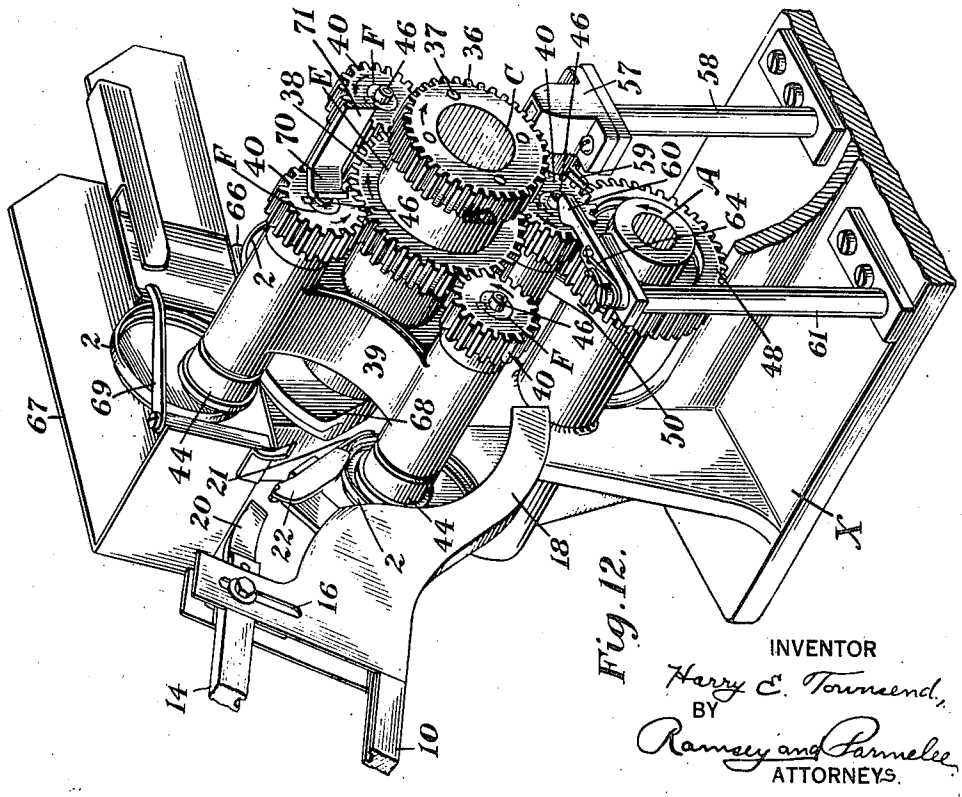


Fig. 12.

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5 SHEETS—SHEET 5.

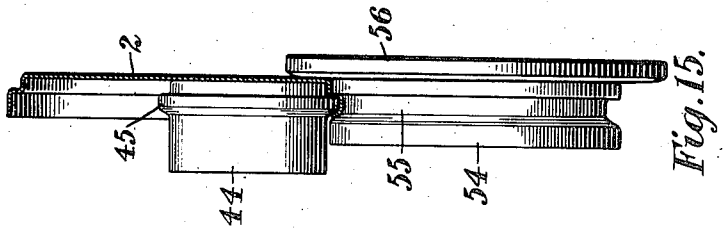


Fig. 15.

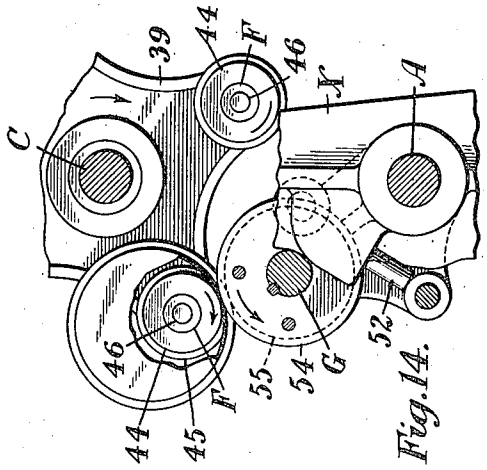


Fig. 14.

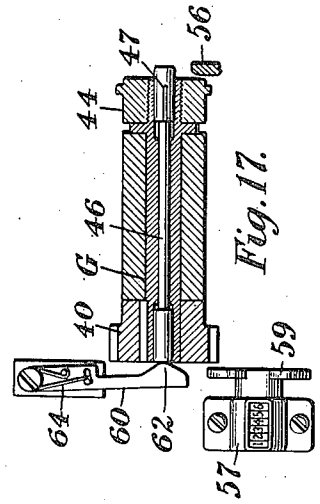


Fig. 17.

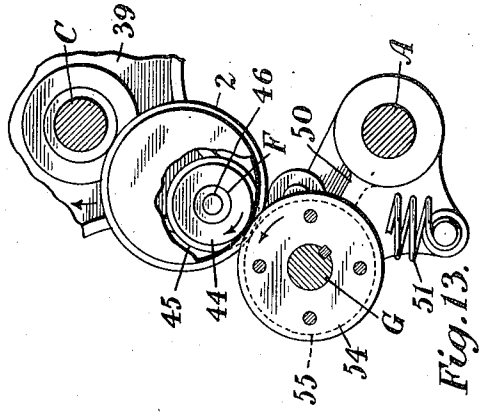


Fig. 13.

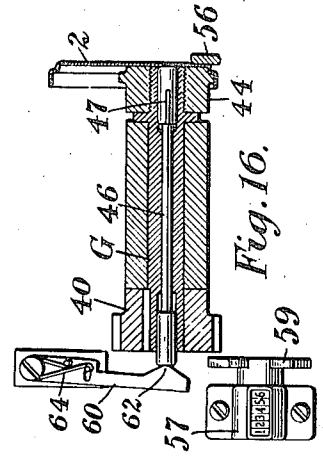


Fig. 16.

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UNITED STATES PATENT OFFICE.

HARRY E. TOWNSEND, OF BROOKLYN, NEW YORK, ASSIGNOR TO ANCHOR CAP & CLOSURE CORPORATION, OF BROOKLYN, NEW YORK, A CORPORATION OF NEW YORK.

SHEET-METAL-SPINNING MACHINE.

1,320,993. Specification of Letters Patent. Patented Nov. 4, 1919.

Application filed April 11, 1917. Serial No. 161,176.

To all whom it may concern:

Be it known that I, HARRY E. TOWNSEND, a citizen of the United States, and a resident of the city of Brooklyn, in the county of Kings, State of New York, have invented certain new and useful Improvements in Sheet-Metal-Spinning Machines, of which the following is a specification.

This invention relates broadly to sheet metal working and more specifically to an automatic metal spinning machine.

The principal object of the present invention is to provide a machine for automatically spinning a bead in the side wall of a closure cap.

A further object of the present invention is to provide an automatic bead spinning machine adapted to effect the spinning operation as rapidly as the caps are delivered from the die press punch.

A still further object of the present invention is an automatic machine for spinning sheet metal and comprising a plurality of spinner heads adapted to coöperate individually with a rotating forming anvil.

A still further and more specific object of the present invention is the provision of an automatic machine for spinning sheet metal articles and comprising a turret head carrying a plurality of spinning forms adapted to carry articles being operated upon and to operate on the articles in series whereby a complete rotation of the turret produces as many finished articles as there are spinning forms carried by the turret.

Other and further objects of the present invention will in part be obvious and will in part be pointed out hereinafter in the specification following by reference to the accompanying drawings wherein like parts are represented by like characters throughout the several views thereof.

Figure 1 is a view illustrating the spinning mechanism directly connected with a die press punch.

Fig. 2 illustrates the chute leading from the press to the spinning mechanism.

Fig. 3 is a detail of the mouth of the chute adjacent the press.

Fig. 4 is a section on line 4—4 of Fig. 2.

Fig. 5 illustrates the disposal of defective articles.

Fig. 6 is a side elevation of the machine showing one of the spinning form mandrels in section.

Fig. 7 is a sectional view taken between section lines 7—7 and 8—8 on Fig. 6.

Fig. 8 is a sectional view taken between the section lines 8—8 and 9—9 on Fig. 6.

Fig. 9 is a sectional view taken between section lines 9—9 and 10—10 on Fig. 6.

Fig. 10 is a view looking at the ends of the forming mandrels carried by the turret and showing parts of the mechanism in section.

Fig. 11 is a sectional view taken on section lines 11—11 on Fig. 10.

Fig. 12 is a perspective view of the spinning mandrels and related mechanism.

Fig. 13 illustrates the relation of parts at the beginning of a spinning operation as one of the spinning mandrels contacts with the rotating former or anvil.

Fig. 14 illustrates the relation of parts at the end of a spinning operation.

Fig. 15 illustrates a specific form of spinning mandrel and rotating former anvil. This figure also illustrates the action of forming the bead on the side of the cap.

Fig. 16 shows a detail of the counting mechanism and illustrates the operation of the cap count detector when a cap is on the spinning mandrel head.

Fig. 17 is a view similar to Fig. 16 and illustrating how the cap detector operates to omit counting mandrels which do not carry caps.

Heretofore in the art of forming metal caps adapted to be used as sealing caps more especially for closures of glass containers and the like, and particularly of the type illustrated in the Hull Patent No. 1,134,067, granted March 30, 1915, it has been the practice to form the cap with substantially straight walls and then subsequently spin a bead in the edge of the cap by a manually controlled spinning mechanism. The difficulty with this type of procedure resided in the multiplication of manual operations particularly the necessity for manually handling the cap a number of times. A further difficulty resides in the fact that the spinning operation must be quickly performed in order to be economical and the manual control under conditions of quick operation does not insure uniformity of the product.

To obviate the foregoing and further difficulties the present invention delivers a completed cap entirely automatically and

without the use of manual labor from the time material is fed to the die punch press. This automatic and mechanically controlled machine insures of substantially uniform product and of rapid and economical production.

The invention comprises a chute adapted to change the angle of the caps from a horizontal position to a vertical position as they leave the die press, in which vertical position the caps are delivered to the spinning mechanism. The spinning mechanism includes a rotating turret carrying a plurality of spinning forms or mandrels which have a planetary rotative action. Mechanism is provided for feeding caps in a continuous series into the path of the rotating spinning mandrels or forms in such manner that as each mandrel passes a definite point in its cycle of operations it engages a cap and carries the same forward through the spinning machine. During the progress of the cap through the spinning mechanism it encounters a rotating forming tool or anvil which is complemental in configuration to the form of the spinning mandrels whereby the spinning mandrels are male members and the forming anvil the female member, or vice versa as is desired, dependent upon the type of beading being formed in the edge of the cap. The rotating anvil may be yieldingly maintained in the path of the spinning mandrels by a suitable heavy spring which holds the swinging frame carrying the rotating anvil against a suitable frame stop and permits the anvil to yield outwardly as the forming mandrels pass over the anvil. When the completed caps pass the rotating anvil they are carried to a suitable point in the rotation of the turret where ejector mechanism removes the caps from the spinning mandrels and permits the caps to leave the machine.

It is particularly desirable to maintain an accurate count of the number of caps being completed and to this end a register of a common wellknown type, preferably a "Veeder" counter, is mounted with the actuating wheel for the counter adjacent the path of the ends of the spinning mandrels. The spinning mandrel shafts are provided at their center with a push rod of sligthly greater length than the mandrel shaft so that when a cap is picked up by a mandrel the push rod is forced lengthwise and extends a short distance from the opposite end of the mandrel shaft and into a path which intersects the spoke of the counter wheel. In view of this fact each time a shaft carrying a mandrel that bears a cap passes the counter wheel a count of one cap is registered. In order to prevent a false count and to insure that only the actual number of caps being spun are counted, a spring finger is provided which tests each push rod prior to its reaching the counter wheel. Where a cap is on the former mandrel the spring finger pushes the rod against the cap but no farther. Where no cap is on the former the spring finger pushes the push rod inwardly and out of the path of the operating wheel on the counter so that when such empty mandrel shaft passes the counter no count is registered.

Referring now to the drawings and more particularly to Figs. 1 to 5 inclusive, a die press 1 of the usual construction is illustrated more or less diagrammatically since the die press *per se* does not form a distinct portion of the said invention. This die press 1 forms the closure cap 2 from sheet metal and the caps fall into an outwardly and upwardly inclined apron 4. In order to prevent the cap from tipping over and clogging the chute a guiding plate 5 is pivoted upon a suitable support rod and is lightly held in the desired position by means of a coiled spring 7. The function of these elements is to change the position of the cap from a substantially horizontal position to a substantially vertical position. A side plate 8 is provided opposite the apron 4 and carries a track 9. A grooved lower track 10 extends in an inclined direction from the side plate 8 and is provided with an open space as at 11 to permit caps having defective crowns to fall from the chute. A delivery chute 12 comprises a continuation of the lower track 10. An upper guide rail 14 is adjustably mounted by means of the thumb screws 15 and slots 16 to the side plate 8 and the delivery chute 12. No side plates are provided between the lower track 10 and the upper guide rail 14 but on the contrary an open space is provided between these members to enable defective caps, such as 17, Fig. 5, to fall sidewise out of the chute. The delivery chute 12 is curved at its lower end, as at 18, and is provided with a bulge 19. A guide finger 20 is provided above the bulge portion 19 and a spring clip stop 21 is provided slightly below the bulge. This spring clip stop also carries a side guide plate 22. The spring clip stop preferably is mounted upon a slotted plate 24 which is adjustable by means of a thumb screw 25 and the slots 26. The delivery chute 12 adjacent its lower end is provided with an opening through which extends a lightly spring pressed guide plate 27. It is the function of the bulge portion 19, the guide finger 20, and the side guide plate 22, to deliver a cap to the spring clip stop 21 in an inclined diagonal position (see Fig. 11) so that only the forward edge of the cap will be in the path of a forming mandrel when the rotation of the turret brings the mandrel through the delivery end of the chute, as will be more fully described hereinafter.

Referring now more particularly to Figs. 6, 7, 8, and 9, the spinning mechanism proper will be described. The power or belt wheel 28 is mounted upon the main drive shaft A which extends through the bearings in a suitable machine frame X. This main drive shaft A carries on its opposite end a small gear wheel 29 that meshes with a slightly larger gear wheel 30 fixedly mounted on the intermediate shaft B. This intermediate shaft B likewise carries a smaller cog wheel 31 that drives the turret gear wheel 32 which is mounted upon the turret shaft C. The intermediate shaft B extends through the end of the main frame and carries an intermediate drive gear 34 which meshes with an idler cog gear 35 mounted upon a stub shaft D. This idler cog gear transmits power to a gear 36 which is suitably secured by drive pins 37 with the tubular extension E in the mandrel drive gear 38. The turret 39 is keyed to the turret shaft C and carries a plurality of mandrel shafts F, in the present case four. Each turret shaft has keyed thereon mandrel pinions 40 which mesh with the mandrel drive gear 38. By inspection of Figs. 7 to 9 inclusive it will be noted that as the turret 39 is rotated in counter-clockwise direction the turret driving mandrel gear 38 is rotated in a clockwise direction. This fact imparts a relatively high speed of rotation to the mandrel pinions 40 and the mandrel shafts F. Each mandrel shaft preferably is formed with a shoulder 41 adjacent which is a screw threaded portion 42 adapted to carry the mandrel former heads 44. In the present case these former heads are shown as provided with a male band or rib 45. Push rods 46 are mounted at substantially the center of each mandrel shaft F and are provided preferably with a U-shaped spring 47 which establishes sufficient friction to cause the push rods to remain in any set position until positively displaced from such position. As will be noted from Figs. 6, 16, and 17, the push rods 46 are slightly longer than the mandrel shafts F, and constitute detecting devices as hereinafter described.

The main drive shaft A at substantially the mid portion of the machine frame carries an anvil driving gear 48 which meshes with the gear 49 on the anvil or forming tool shaft G. This shaft G is mounted in a bearing in the arm 50 which is mounted for rotation about the main drive shaft A. A relatively heavy coiled spring 51 normally maintains the arm 50 against the stop 52. When the arm is in this position the rotating anvil or former 54 is within the path of the former heads 42. This rotating anvil 54 comprises a roller including a groove 55 comprising the female member of the spinning rolls, or as has been explained if desirable the relationship of the male and female members may be reversed dependent upon the type of cap being formed. The rotating anvil 48 preferably carries a supporting disk 56 which maintains the cap in proper position during the spinning operation.

In order to provide for accurately counting the number of caps completed a Veeder or similar register 57 may be mounted upon a pedestal 58 whereby the spokes of the operating wheel 59 will be adjacent the ends of the mandrel shafts F. When a cap 2 is carried from under the spring clip stop 21 by a mandrel the movement of the cap past the guide plate 27 straightens the cap relatively to the mandrel and pushes the push rod inwardly. As the turret further revolves the inwardly extending end of the push rod engages an arm or spoke in the operating wheel 59 and registers. In order to prevent inaccurate registry a spring arm 60 is mounted upon a pedestal 61 in such manner as to be within the path of the ends of the push rods 46 and exerts an endwise pressure on such rods as they pass the projection 62 on the end of the spring arm 60. If a cap is in position on the mandrel (see Fig. 16) the spring 64 is flexed and the push rod remains with the end in the path of the operating wheel 59. If the mandrel head is empty (see Fig. 17) the spring 64 is of sufficient strength to overcome the friction of the U-shaped spring 47 thereby pushing the push rod inwardly and out of the path which intersects the spokes of the operating wheel 59. The supporting disk 56 is so positioned adjacent the point where the spring arm is effective as to prevent the said spring arm from pushing caps 2 from the mandrel heads. After a mandrel head passes the rotating anvil 54 the cap is maintained in position on the head by means of a guide plate 66 secured beneath the delivery chute 67. A guide cam 68 is provided opposite the delivery chute and raises the cap 2 level with the wall of the delivery chute so that the cap comes under the directing arm 69 carried by the upper part of the delivery chute. Adjacent this point in the travel of the turret an ejector cam 70 comprising a plate 71 secured to the main frame forcibly moves the push rods 46 outwardly thereby ejecting the finished cap from the former head and permitting the cap to slide down the delivery chute of the machine.

Realizing that my invention is capable of embodiment in structures other than that specifically disclosed herewith I desire that the herein disclosed structure be considered as illustrative and not in the limiting sense.

Having thus described my invention what I claim is:—

1. In a device of the class described, in combination, cap feeding means to feed a cap to

a cap carrying mandrel, a cap carrying mandrel being provided with a forming member, an anvil in the path of the cap carrying mandrel and being formed complemental to the cap carrying mandrel whereby the mandrel and the anvil are adapted to spin a bead on said cap, a counting mechanism controlled by a cap, and delivery mechanism effective to cause operation of the counting mechanism and to deliver the finished caps from the machine.

2. In a device of the class described, in combination, cap feeding means to present a cap in an inclined angular position in the path of a forming mandrel, a forming mandrel adapted to engage the forward edge of the positioned cap, means to move said mandrel to carry said cap forward, an anvil in the path of said mandrel and adapted to coöperate with said mandrel to spin a bead upon said cap, and delivery mechanism including means to remove said cap from said mandrel.

3. In a machine of the character described, in combination, cap feeding means including separate inclined rails adapted to transmit a complete cap only, a cap carrying mandrel adapted to receive a cap from said feeding means, an anvil coöperating with said mandrel to form a bead upon the cap on the mandrel, and delivery mechanism for removing the cap from said mandrel.

4. In a machine of the character described, cap feeding means comprising devices to turn a cap through substantially ninety degrees from an inclined horizontal position to a vertical position whereby said cap is fed edgewise to a spinning mechanism, a spinning mechanism comprising a cap carrying mandrel, an anvil adapted to coöperate with said cap carrying mandrel to form a bead in the edge of said cap, and delivery mechanism for delivering said caps from said machine.

5. In a machine of the character described, in combination, cap feeding means adaptable to supply caps to a spinning mechanism, said spinning mechanism comprising a cap carrying rotatable mandrel, an anvil adaptable to coöperate with said mandrel to form a bead upon the cap on the mandrel, and means for carrying said mandrel into and out of engagement with said anvil.

6. In a machine of the class described, in combination, a rotatable cap carrying mandrel, means to cause said mandrel to have a continuous planetary movement, an anvil adapted to coöperate with said mandrel to form a bead on the cap on the mandrel, substantially as described.

7. In a machine of the class described, in combination, a rotating mandrel adapted to carry a cap, a continuously rotating turret carrying said mandrel, means for rotating said mandrel, and an anvil adapted to coöperate with said mandrel to form a bead on the edge of a cap during the rotation of said turret.

8. In a device of the class described, in combination, a continuously rotatable turret, a plurality of mandrel shafts carried by said turret, a mandrel head in each of said mandrel shafts, and an anvil in the path of said mandrel heads so that each mandrel head is adapted to coöperate with said mandrel to form a bead in the edge of the cap carried respectively by each mandrel head.

9. In a device of the character described, in combination, a turret, a plurality of mandrel shafts carried by said turret, gearing to continuously rotate said turret in one direction, a mandrel forming head carried by each mandrel shaft, means rotating in the opposite direction to the rotation of said turret to cause said mandrel heads to have a planetary movement, an anvil in the path of said mandrel heads and adapted to cooperate with said mandrel heads to form beads in the skirts of caps carried by the mandrel heads.

10. In a machine of the class described, in combination, a turret shaft supporting a turret, said turret shaft being continuously rotatable in one direction, a plurality of mandrel shafts carried by said turret, mandrel heads on one end of said mandrel shafts and gear wheels on the other end of said mandrel shafts, a mandrel driving gear rotatably mounted on the turret shaft and in engagement with each mandrel shaft gear, means to rotate said mandrel driving gear in the direction opposite to the rotation of said turret, and an anvil in the path of said mandrel heads and coöperating therewith to form beads on the cap carried by said mandrel heads.

11. In a device of the class described, in combination, a mandrel head arranged for rotative and continuous planetary movement, means to feed caps to said rotating mandrel head, and a positively driven anvil adapted to coöperate with said mandrel to form a bead in the skirt of a cap carried by said mandrel.

12. In a machine of the class described, in combination, a continously rotating turret, a plurality of mandrel heads rotatably mounted on said turret, a rotating anvil adapted to coöperate with said mandrel heads to form beads in caps carried by said mandrel heads.

13. In a machine of the class described, in combination, a turret, a plurality of mandrel shafts carried by said turret, a mandrel head upon each mandrel shaft, means to rotate said turret, means to continuously rotate said mandrel heads, and a rotating anvil in the path of said mandrel heads and adapted to coöperate with said mandrel

heads to form beads on caps carried by the mandrel heads.

14. In a device of the class described, in combination, a continuously rotating turret, a plurality of mandrels mounted upon said turret, means to feed caps to said mandrels, and a driven forming member to whose operation said mandrels are presented during a portion of the rotation of said turret.

15. In a device of the class described, mandrel heads adapted to carry caps, a rotating anvil mounted in the path of said mandrel heads, means to move said mandrel heads past said rotating anvil by a continuous movement, and yieldable devices provided to enable said anvil to maintain a yielding engagement with said mandrels during the passage of the mandrel past the anvil.

16. In a device of the character described the combination of a plurality of mandrels adapted to carry caps, and a rotating anvil yieldingly mounted in the path of said mandrels whereby said anvil is adapted to maintain a yielding pressure on the skirt of a cap carried by one of said mandrels during the passage of the mandrel past the anvil.

17. In a machine of the character described, the combination of a continuously rotating turret, a plurality of mandrel shafts mounted upon said turret, a mandrel head upon each mandrel shaft, devices to rotate said mandrel shafts, means to rotate said turret, a rotating anvil in the path of said mandrel heads, a support for said anvil comprising a bracket radially mounted relative to the drive mechanism for said anvil, and a spring constructed to yieldingly maintain the work face of the anvil in the path of the mandrel heads.

18. A machine of the class described, comprising in combination, a turret, a plurality of mandrel shafts carried by said turret, a mandrel head in each mandrel shaft, means to rotate said turret to revolve said mandrel heads in a common orbit, feed mechanism constructed to feed a cap partly across the orbit of the mandrel heads as each head passes a predetermined point in the rotation of the turret, forming mechanism arranged for coöperation with said mandrel heads to form a bead on the skirt of each cap during the rotation of the turret, and means whereby the caps are ejected from the machine.

19. In a machine of the character described comprising a plurality of forming mandrels, means to move said mandrels past a delivery chute, push rod carried with and extending through said mandrels, and means to move said push rods endwise to project through the mandrels when the mandrels are opposite the delivery chute.

20. In a machine of the character described, a plurality of forming mandrels, a delivery chute, means to move said forming mandrels past said delivery chute, in combination with devices for ejecting articles carried by said mandrels, said ejecting devices comprising push rods movable with said mandrels, and means to move said push rods endwise when said mandrels are opposite the delivery chute.

21. In a device of the character described, in combination, a plurality of mandrel heads adapted to carry caps, a delivery chute, means to position said caps opposite said delivery chute, a guide finger adapted to prevent said caps from falling from said delivery chute, push rods extending through said mandrels, and means to operate said push rods to eject said caps from said mandrels after the upper portion of said caps has passed under said finger.

22. In a device of the character described, in combination, a plurality of forming mandrels, mandrel shafts carrying said mandrels, a turret in which said mandrel shafts are mounted, means to cause said mandrel shafts to have a planetary movement, devices to feed caps to said mandrels during a portion of said planetary movement, and means to eject caps from said mandrels during another portion of said planetary movement, said ejecting means comprising push rods mounted within said mandrel shafts and substantially concentric therewith, and means to move said push rods endwise when said mandrels have reached a predetermined position in said planetary movement.

23. In a device of the class described, in combination, a plurality of mandrels, mandrel shafts carrying said mandrels, a turret supporting said mandrel shafts, a substantially horizontal shaft carrying said turret, feeding means adapted to feed caps to said mandrels whereby said caps are slightly inclined to the path of rotation of said mandrel heads with the leading edge of said caps in the path of the mandrel heads, a rotating anvil in the path of said mandrel heads, a resilient mount for said anvil whereby said anvil may yield while coöperating with a mandrel to form a bead on a cap, and means for ejecting caps from said mandrels when the mandrel head passes a predetermined point during the rotation of the said turret.

24. In a spinning machine the combination of a bodily movable cap carrying mandrel, means coöperating with said mandrel to form a cap thereon, and a detecting device disposed for operative association with a cap on the mandrel.

25. In a metal spinning machine, the combination of a spinning mandrel arranged for planetary movement, a forming device disposed in association with said mandrel, and operable to form a metal cap thereon, and a detecting device disposed for opera-

tive association with a cap carried on the mandrel.

26. In a metal spinning machine, the combination of a turret member, spinning mandrels carried on said turret member, means for moving said turret member to change the position of said mandrels, means arranged to coöperate with said mandrels to spin caps thereon, and detecting devices arranged for operative association with caps formed on the mandrels.

27. In a device of the character described, the combination of a bodily movable cap carrying mandrel, means for revolving said mandrel in an orbit, means for guiding a cap across the path of said mandrel, and means for detaining a cap with its forward portion in the path of the mandrel, whereby the latter may engage it to carry it forward from said detaining means.

28. In a metal spinning machine, the combination of a spinning mandrel arranged for planetary movement, means for revolving said mandrel continuously in an orbit, means for guiding a cap into the orbit of the mandrel, and means for detaining a cap with a portion thereof in the path of the mandrel.

29. In a metal spinning machine, the combination of a spinning mandrel arranged for planetary movement, means for revolving said mandrel continuously in an orbit, means for guiding a cap into the orbit of the mandrel, and means for releasably detaining a cap with a portion thereof in the path of the mandrel.

30. In a metal spinning machine, the combination of a spinning mandrel arranged for planetary movement, means for revolving said mandrel continuously in an orbit, means for guiding a cap into the orbit of the mandrel, means for releasably detaining a cap with a portion thereof in the path of the mandrel, whereby the mandrel may engage it to carry it forward in its planetary movement, and means disposed for coöperation with said mandrel to spin a bead in a portion of a cap carried on the mandrel.

31. In a metal spinning machine, the combination of a spinning mandrel, means for revolving said mandrel in an orbit, a conveyer device for conducting caps to the orbit of the mandrel, and means for detaining the foremost cap in said conveyer device with a portion thereof in the path of the mandrel whereby it may be engaged by the latter and carried forward in its planetary movement.

32. In a metal spinning machine, the combination of a spinning mandrel, means for revolving said mandrel in an orbit, a conveyer device for conducting caps to the orbit of the mandrel, means for detaining the foremost cap in said conveyer device with a portion thereof in the path of the mandrel whereby it may be engaged by the latter and carried forward in its planetary movement, and means disposed for coöperation with said mandrel in a portion of its revolution to spin a bead in a portion of the cap carried thereby.

33. In a metal spinning machine, in combination, a plurality of spinning mandrels, means for moving said mandrels continuously in a given orbit, a conveying device arranged to conduct caps to the orbit of said mandrels, and means associated with said conveying device adapted to detain the foremost cap with a portion thereof in the path of a mandrel.

34. In a metal spinning machine, in combination, a plurality of spinning mandrels, means for moving said mandrels continuously in a given orbit, a conveying device arranged to conduct caps to the orbit of said mandrels, means associated with said conveying device adapted to detain the foremost cap with a portion thereof in the path of a mandrel, and a forming device disposed to coöperate with said mandrels at a portion of their orbit to form portions of caps carried by said mandrels.

35. In a metal spinning machine in combination a forming mandrel, means for giving said mandrel orbital movement, means for detaining a cap in the path of the mandrel whereby it may be engaged there to be carried forward in its orbital movement, and means for conducting caps successively to said detaining device.

36. In a metal spinning machine in combination a plurality of forming mandrels, means for imparting orbital movement to said mandrels, a detaining device disposed to support a cap in the path of said mandrels whereby it may be engaged by a mandrel to be carried forward in the orbital movement thereof, and means for conducting caps successively to said detaining device.

37. In a metal spinning machine in combination a plurality of forming mandrels, means for imparting orbital movement to said mandrels, a detaining device disposed to support a cap in the path of said mandrels whereby it may be engaged by a mandrel to be carried forward in the orbital movement thereof, means for conducting caps successively to said detaining device, and a forming means disposed for coöperation with said mandrels at a point in their orbit to form portions of caps carried by them.

38. In a metal spinning machine, the combination of a mandrel, means for imparting orbital movement to said mandrel, means for releasably supporting a cap with a portion thereof in the path of said mandrel whereby it may be engaged by the latter

and carried forward in the orbital movement, and means disposed for coöperation with said mandrel at a point in its orbit to form a portion of the cap carried by the mandrel.

39. In a spinning machine, in combination, a cap carrying mandrel, a forming device arranged to coöperate therewith to form a portion of a cap carried by the mandrel, means for moving the mandrel into coöperation with the forming device, a counting device, a detecting device carried with the mandrel, and means for controlling the detecting device to accomplish the operation of the counting mechanism and to discharge a cap from the mandrel.

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