No. 757,080. PATENTED APR. 12, 1904.

E. J. YALE.

MACHINE FOR FORMING COLLAR BUTTONS.

APPLICATION FILED MAY 6, 1903.

NO MODEL. 4 SHEETS—SHEET 1.

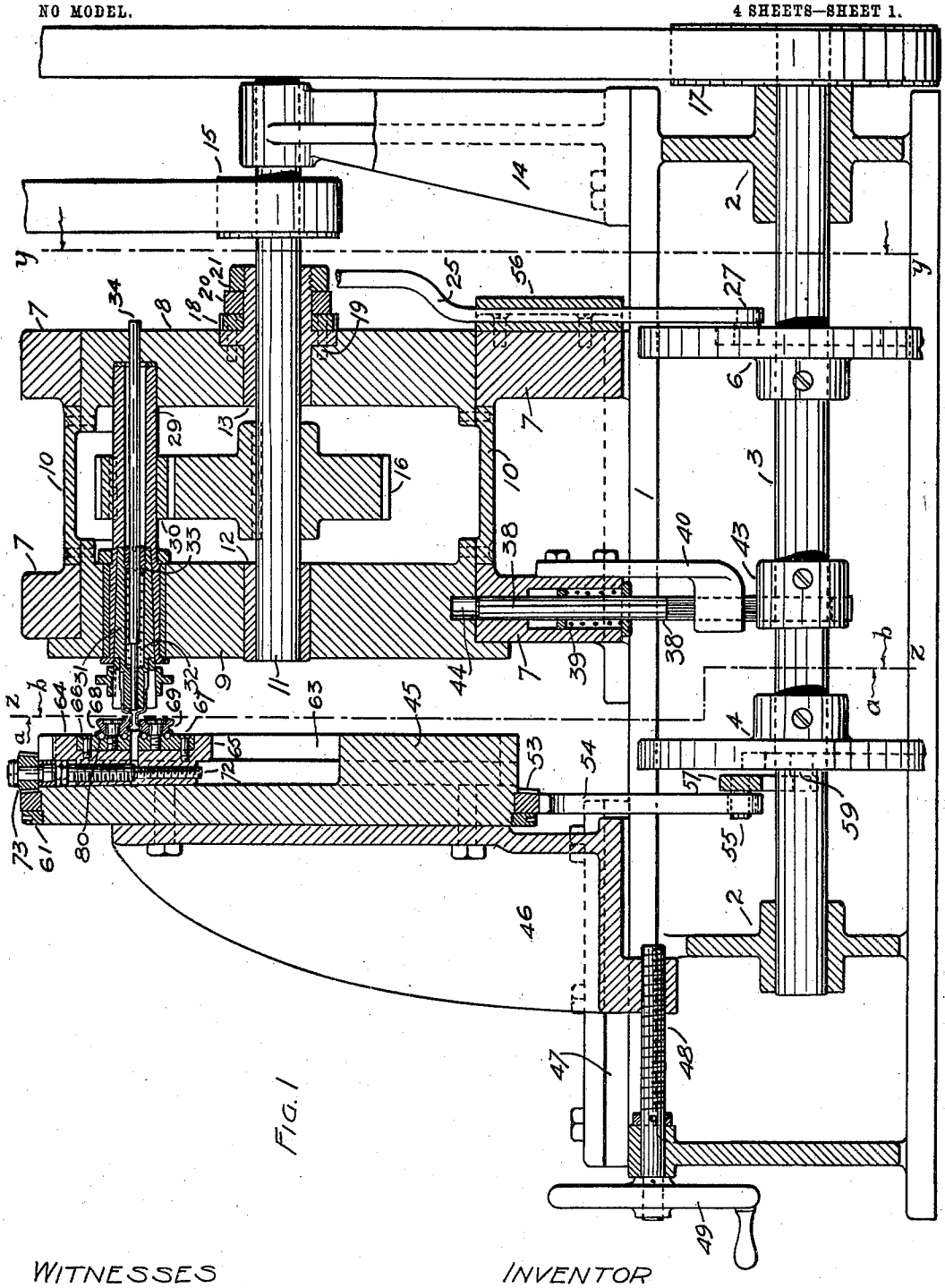


FIG. 1

WITNESSES

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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NO MODEL. 4 SHEETS—SHEET 2.

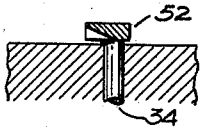


FIG. 5

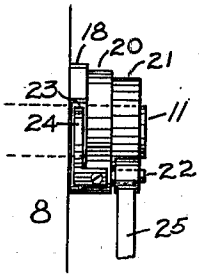


FIG. 9

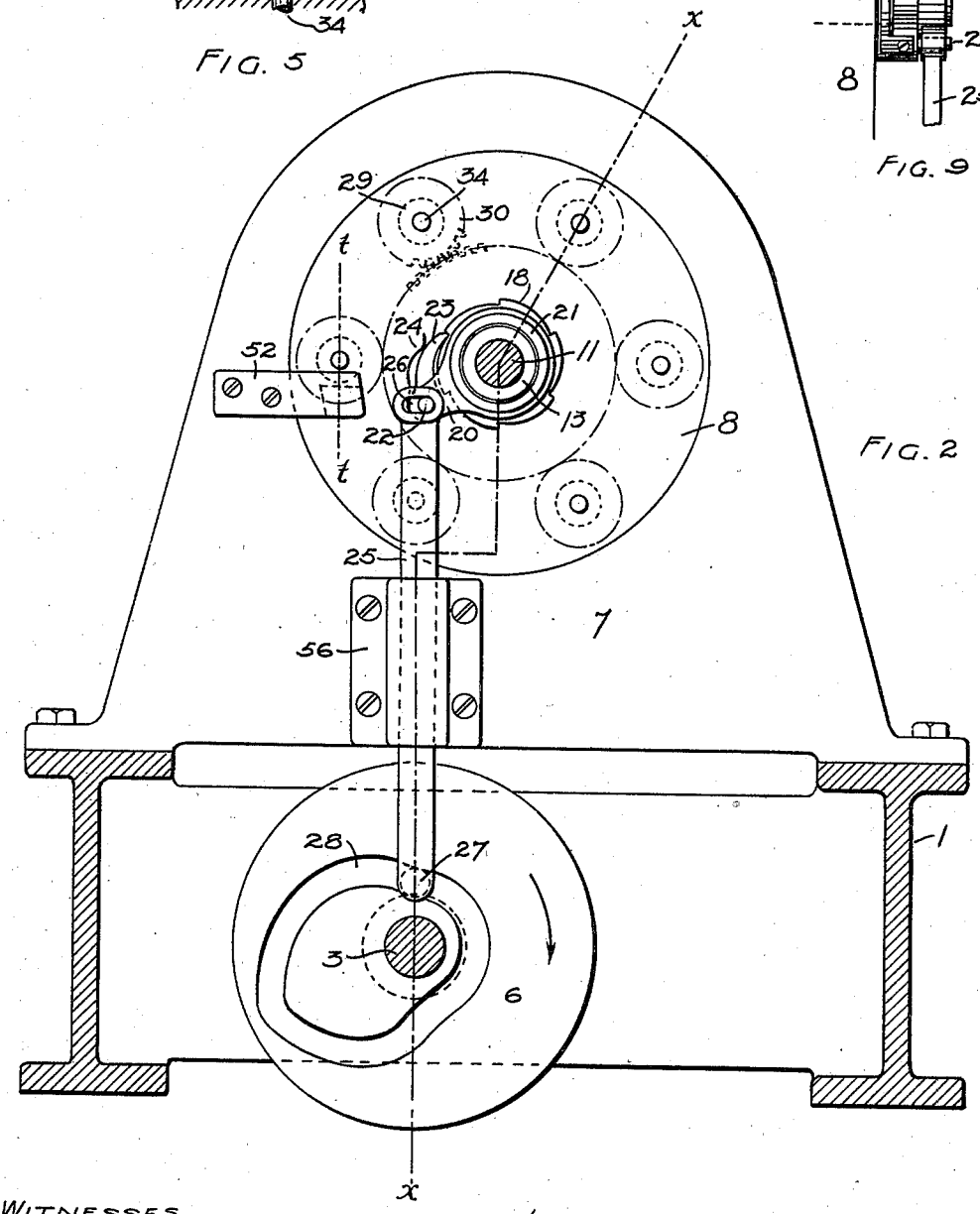


FIG. 2

WITNESSES

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NO MODEL. 4 SHEETS—SHEET 3.

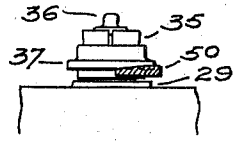


FIG. 6

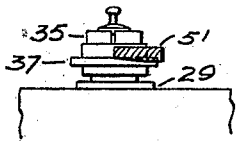


FIG. 7

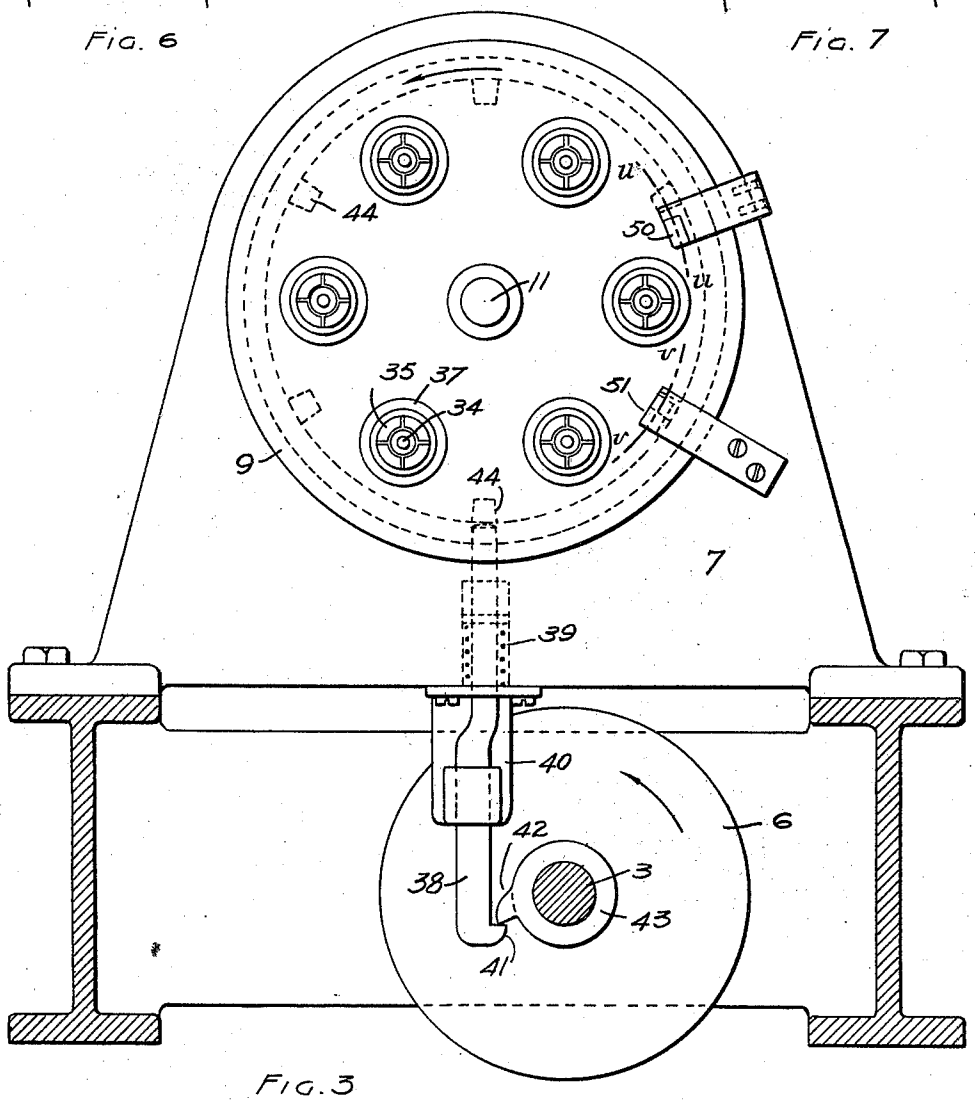


FIG. 3

WITNESSES

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THE NORRIS PETERS CO PHOTO-LITHO: WASHINGTON, D. C.

No. 757,080. PATENTED APR. 12, 1904.

E. J. YALE.

MACHINE FOR FORMING COLLAR BUTTONS.

APPLICATION FILED MAY 6, 1903.

NO MODEL. 4 SHEETS—SHEET 4.

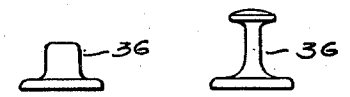


FIG. 10 FIG. 11

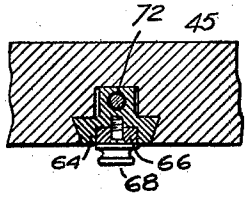


FIG. 8

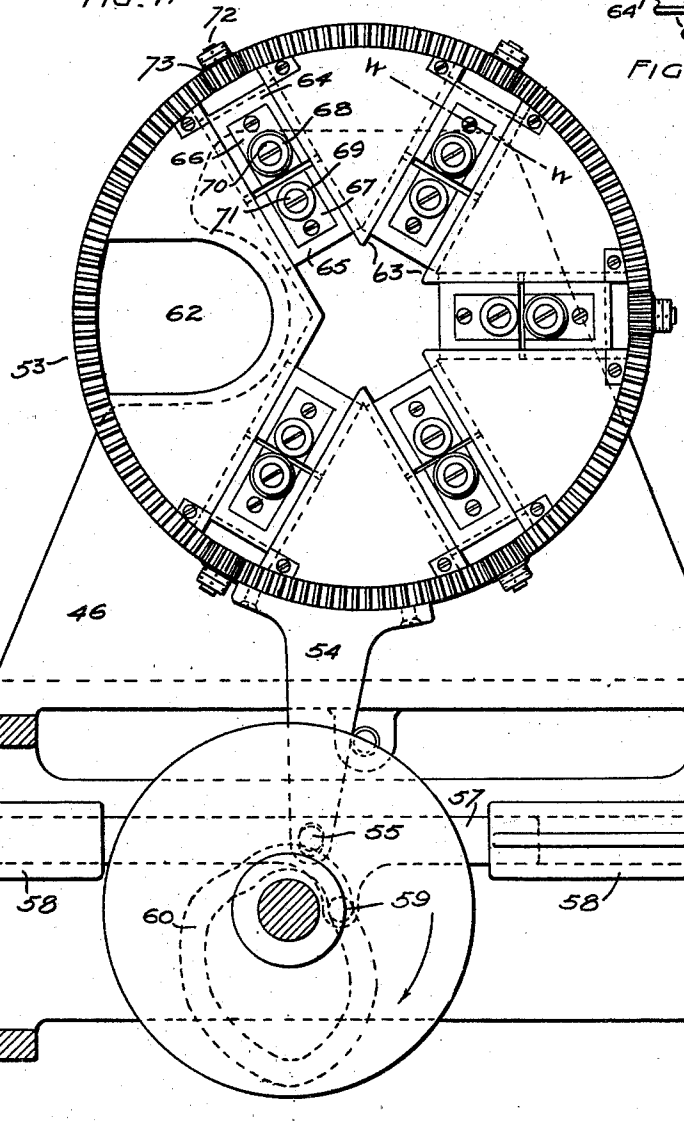


FIG. 4

WITNESSES

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No. 757,080. Patented April 12, 1904.

UNITED STATES PATENT OFFICE.

EDWARD J. YALE, OF NORTH ATTLEBORO, MASSACHUSETTS.

MACHINE FOR FORMING COLLAR-BUTTONS.

SPECIFICATION forming part of Letters Patent No. 757,080, dated April 12, 1904.

Application filed May 6, 1903. Serial No. 155,954. (No model.)

To all whom it may concern:

Be it known that I, EDWARD J. YALE, a citizen of the United States, residing at North Attleboro, in the county of Bristol and State of Massachusetts, have invented certain new and useful Improvements in Machines for Forming Collar-Buttons, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to machines for converting or reducing hollow blanks into collar-buttons or analogous articles, and has for its purpose the ends commonly sought in machines of this character, particularly increased production in a given time and the substitution of automatic for manual means in manipulating the blanks.

My invention consists, broadly, in reducing the blank by means of spinning, and, specifically, in the combination, with a series of rotating retaining-spindles for the blank, of a succession of roller-couplets coacting with the spindles for reducing the blank. The means employed attain an end long vainly sought in the reduction of gold-plated blanks in that all abrasion of the plating film or skin is avoided during the forming operation.

Further objects and advantages will be disclosed in the following description and in the claims.

In the accompanying drawings, wherein like reference-numerals indicate like parts, Figure 1 is a longitudinal sectional side elevation of a machine embodying my invention, taken on line *x x* of Fig. 2; Fig. 2, a sectional elevation of the same on line *y y* of Fig. 1; Fig. 3, a similar elevation on line *z z* of Fig. 1 looking in the direction shown by arrows *a a;* Fig. 4, a like elevation on line *z z* looking in the direction shown by arrows *b b;* Fig. 5, a section on line *t t* of Fig. 2, showing the knock-off pin contacting with the beveled plate; Fig. 6, a section on line *u u*, Fig. 3, showing a sliding collar contacting with the engaging plate; Fig. 7, a section on line *v v* of Fig. 3, showing a sliding collar contacting with the disengaging plate; Fig. 8, a cross-section on line *w w* of Fig. 4, showing a roll and its carrier; Fig. 9, a detail of the ratchet-and-pawl mechanism; Fig. 10, a detail of a blank intended for conversion into a button before operation, and Fig. 11 a similar view of the same after operation by the machine.

The structure of the machine is as follows: In the bed or frame 1 is mounted in suitable bearings 2 a shaft 3, driven by pulley 17 and carrying cams 4 6 and collar 43. Fastened to the bed is a head 7, in which are rotatably mounted disks 8 and 9, connected by a cylindrical shell 10. The disks and shell, which form a barrel, revolve intermittently in the head. Loosely traversing the barrel in bushings 12 13 is a shaft 11, supported by a bracket 14 and driven by a pulley 15. This shaft drives a gear 16 intermediate the disks 8 9. The rotation of the barrel is obtained by the mechanism shown in Figs. 2 and 9. A ratchet 18 upon the bushing 13 is secured by screws 19 to the barrel. Upon the bushing and adjacent the ratchet is a swinging arm 20, held against lateral displacement by a nut 21. A pin 22 projects from each side of the arm 20, one end of which carries a pawl 23, and the other end registers with slot 24 in the upper end of a vertical sliding bar 25. The spring 26 upon the arm 20 retains the pawl in engagement with the ratchet. A plate 56, secured to the head 7, is a guide for the bar 25. The latter is provided at its lower extremity with a pin 27, projecting into an irregular oblong groove 28 in the cam 6. By means of the latter the barrel is intermittently advanced.

Mounted in the barrel at intervals and circularly disposed are spindles 29, in this instance six. These revolve in the disks 8 9, and each carries a pinion 30, meshing with the gear 16, whereby each spindle is rapidly revolved about its own axis. Each spindle carries a longitudinally-bored chuck 31, whose interior is enlarged a portion of its length to accommodate a spiral spring 32, which bears against a collar 33 upon the slidable knock-off pin 34. The latter traverses the chuck, spindle, and disk 8 and normally projects slightly beyond the face of the disk. Upon the end of the chuck is secured an exteriorly-tapered split spring-collar 35, intermediate which and the chuck is inserted the blank 36. A collar

37 with a central annular ridge slides upon the tapered spring-collar.

The intermittently-rotating barrel is locked at each sixth revolution during the successive spinning operations upon the blank. This is effected by the following mechanism: In the forward portion of the head 7 is mounted a slidable vertical bolt 38, held in elevated position by an inclosing spiral spring 39 and traversing a bracket-arm 40, screwed to the head. Its lower end is hooked, 41, to engage the finger 42 of collar 43, fixed to shaft 3. The bolt is adapted to register in six holes 44, sunk at equal intervals in the side of the disk 9.

Screwed to the front face of the head 7 and overlapping the edge of disk 9 sufficiently to contact with the under edge of the spindle-collar 37 is a plate 50, with its outer surface beveled. A second plate 51, similarly disposed at a short distance from the first, has its inner surface beveled and is adapted to contact with the upper edge of the spindle-collar. The above plates may be respectively termed the "engaging" and "disengaging" plates. Another beveled plate 52, employed to force the knock-off pins against the tension of springs 32, is shown sectionally in Fig. 5. It is screwed to the head 7 and overlaps the disk 8 sufficiently to bring the under or beveled portion thereof within the path of the projecting pins.

A face-plate 45 is fastened to a bracket 46, which slides in ways 47 upon the frame 1. The bracket is longitudinally adjustable by a screw 48, also mounted in the frame and operated by a hand-wheel 49.

A ring-gear 53 slides upon the circumference of the face-plate 45 and carries a downwardly-projecting arm 54, through which projects a pin 55 from a sliding bar 57, traveling in transverse guides 58 in the frame 1. Projecting from a depending portion of the bar 57 is a pin 59, which engages with an oblong irregular slot 60 in cam 4. The revolution of this cam imparts reciprocating rectilinear motion to the bar 57 and thence through arm 54 a reciprocating rotary motion to the ring-gear. A threaded collar 61 upon the face-plate in the rear of the ring-gear holds the latter in place. An opening 62 in the face-plate furnishes access to the ends of the chucks. Slidably mounted in each of the five radially-disposed ways 63 in the face-plate are two carriers 64 65, to which are secured, respectively, blocks 66 67. Small smooth rolls 68 and 69 on ball-bearings 80 are loosely mounted upon pins 70 and 71, fixed, respectively, in the blocks 64 and 65. Traversing each of the five carrier-couplets is a right and left handed screw 72, having a beveled pinion 73 fixed to its top and meshing with the ring-gear, by which means the rolls are made to approach or retreat from each other, according to the reciprocation of the ring-gear. The distance between the carriers 64 and 65 of each successive roll-couplet constantly decreases.

The operation of the machine is as follows: The flange of a blank, such as shown in Fig. 10, is inserted between the end of a chuck 31 and the split spring-collar 35 opposite the opening 62 in the face-place and rotated at high speed by the shaft 11 through the gear 16 and pinion 30. The advance of the barrel by the ratchet mechanism carries the collar 37 into contact with the beveled engaging plate, whereby the blank is clamped upon the chuck, and thence passes to a position between one of the roll-couplets 68 69, where it pauses during the compressing action of the latter produced by an oscillation of the ring-gear 53 in one direction. During this interval the barrel is locked by the bolt 38. The return oscillation of the ring-gear separates the rolls after the spinning interval. The locking-bolt is withdrawn, and the ratchet motion operated by their respective cams 43 and 6, swinging the blank to position between a second pair of rolls somewhat closer together than the former pair, where the blank is still further reduced. These operations are repeated until the chuck has passed all the rolls and is brought again into alinement with the opening 62 with the completed button. At this point the sliding collar 37 contacts with the disengaging plate 51, which releases the button, and the knock-off pin 34, passing under the beveled plate 52, pushes the button off the chuck, leaving the latter free to receive another blank. In this case five blanks are simultaneously acted on; but it is optional how many spindles and rolls be mounted in the machine. From the above it will be seen that each of the five successive spinning operations somewhat elongates and reduces the blank to a button, the form of whose head may be determined by the cross-sectional contour of the rolls. The length of the button-shanks may be modified by longitudinal adjustment of the face-plate 45 through the hand-wheel 49.

The mechanism shown is peculiarly adapted to the reduction of hollow or tubular blanks with a covering of precious metal, since the smooth surfaces of the revolving reducing-rollers are sufficiently antifrictional to obviate an abrasion of the blank exterior.

The facile removability of the rollers makes it possible to substitute rollers of the cross-sectional contour required for the head of any particular article—for example, the flange of a cartridge-shell.

Having described my invention, what I claim is—

1. In a machine of the class described, the combination with a rotating spindle of a chuck mounted in the spindle, an exteriorly-tapered split spring-collar mounted upon the end of the chuck, a longitudinally-sliding collar upon

the spring-collar, and means independent of the spindle for reciprocating the sliding collar.

2. In a machine for reducing hollow blanks, the combination with the head of a barrel mounted to revolve in the head, rotary members in the barrel for carrying the blanks, and means upon the head for clamping the blanks upon the rotary members.

3. In a machine for reducing hollow blanks, the combination with the head of a barrel mounted to revolve in the head, rotary members in the barrel upon which the blanks are clamped, means for clamping the same, and means upon the head for unclamping the blank.

4. In a machine for reducing hollow blanks, the combination with the head of a barrel mounted to revolve in the head, rotary members in the barrel for carrying the blanks, clamping-collars upon the rotary members, and a plate upon the head and in the path of the collars adapted to contact with and guide the latter into clamped position.

5. In a machine for reducing hollow blanks, the combination with the head of a barrel, mounted to revolve in the head, rotary members in the head for carrying the blanks, collars upon the rotary members for clamping the blanks upon the latter, and a beveled plate upon the head and in the path of the collars adapted to contact with and guide the collars into unclamped position.

6. In a machine of the class described, the combination with the frame of a head upon the frame, a spindle-barrel in the head, a shaft journaled in the frame loosely traversing the barrel, a ratchet fixed to the barrel, a swinging arm mounted on the barrel adjacent the ratchet, a driving-shaft journaled in the frame, a cam provided with a channel upon its face mounted on the driving-shaft, a rod slidably mounted to the head, means upon one end of the rod for registering with the cam-channel, means upon the other end of the rod for engaging the swinging arm, and a pawl upon the rod for engaging the ratchet.

7. In a machine of the class described, the combination with the frame of a head, a revolving barrel mounted in the head, spinning spindles rotatably mounted in the barrel, a face-plate mounted upon the frame, a series of roller-couplets mounted upon the face-plate, and means for advancing each spindle end to the roller-couplets in succession.

8. In a machine of the class described, the combination with the frame of a head, a revolving barrel mounted in the head, spinning spindles rotatably mounted in the barrel, a longitudinally-adjustable face-plate mounted upon the frame, a series of roller-couplets in the face-plate, means for adjusting the face-plate, and means upon the barrel for locking each spindle in alinement with the roller-couplets in succession.

9. In a machine of the class described, the combination with the frame of a face-plate mounted upon the frame, a series of carrier-couplets mounted in the face-plate, a roller upon each carrier, and means upon the face-plate for forcing the members of each carrier-couplet toward or away from each other.

10. In a machine of the class described, the combination with the frame of a face-plate mounted upon the frame, a series of carrier-couplets mounted in the face-plate, a roller upon each carrier, a right and left hand screw engaging each carrier-couplet, pinions upon the screws, a ring-gear engaging the pinions, and means for reciprocating the ring-gear.

In testimony whereof I have affixed my signature in presence of two witnesses.

EDWARD J. YALE.

Witnesses:

HORATIO E. BELLOWS,

EMILE C. YALE.