

Mar. 20, 1923.

1,448,969.

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BUTTON BLANK GRINDING MACHINE.
FILED FEB. 28, 1920.

5 SHEETS—SHEET 1.

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Fig. 11.

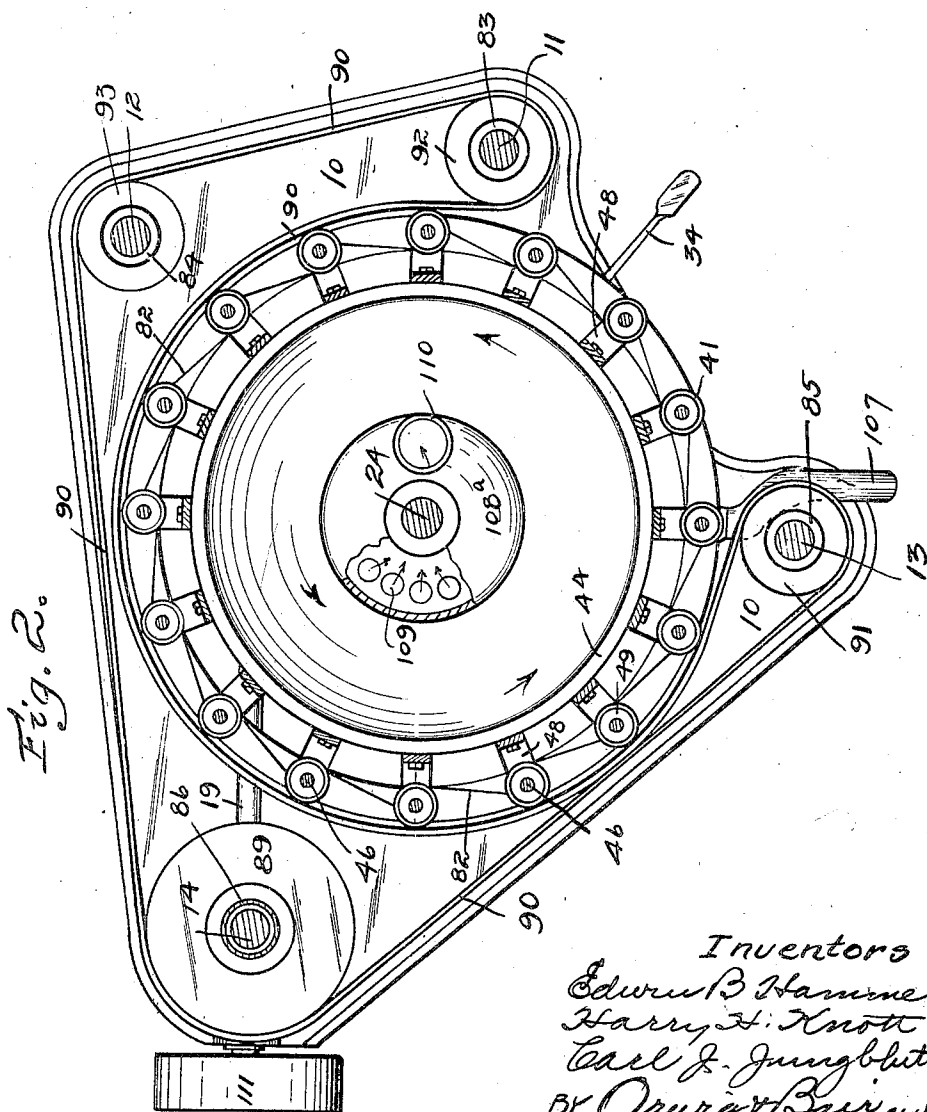
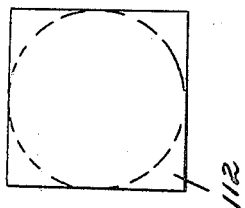


Fig. 2.

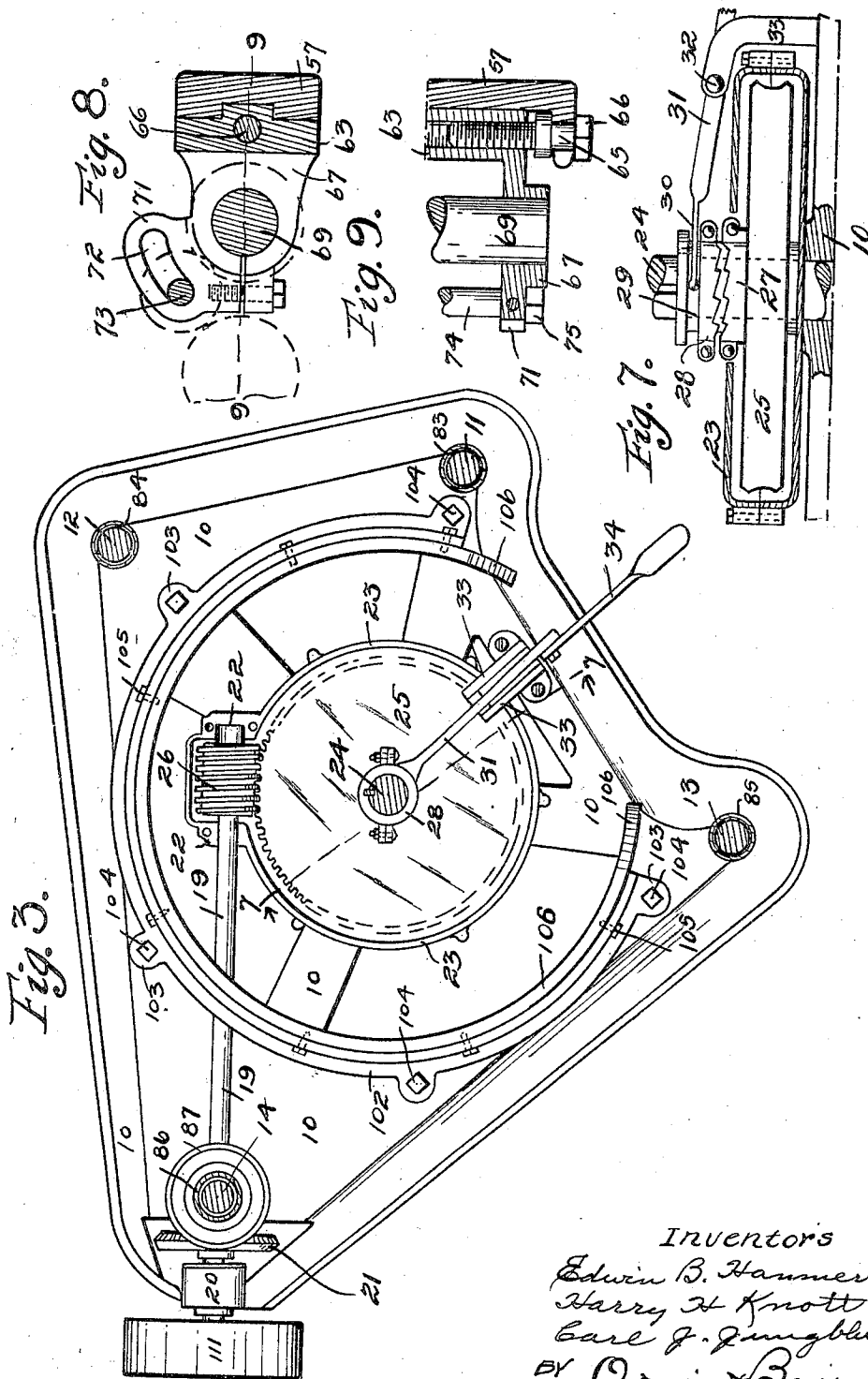
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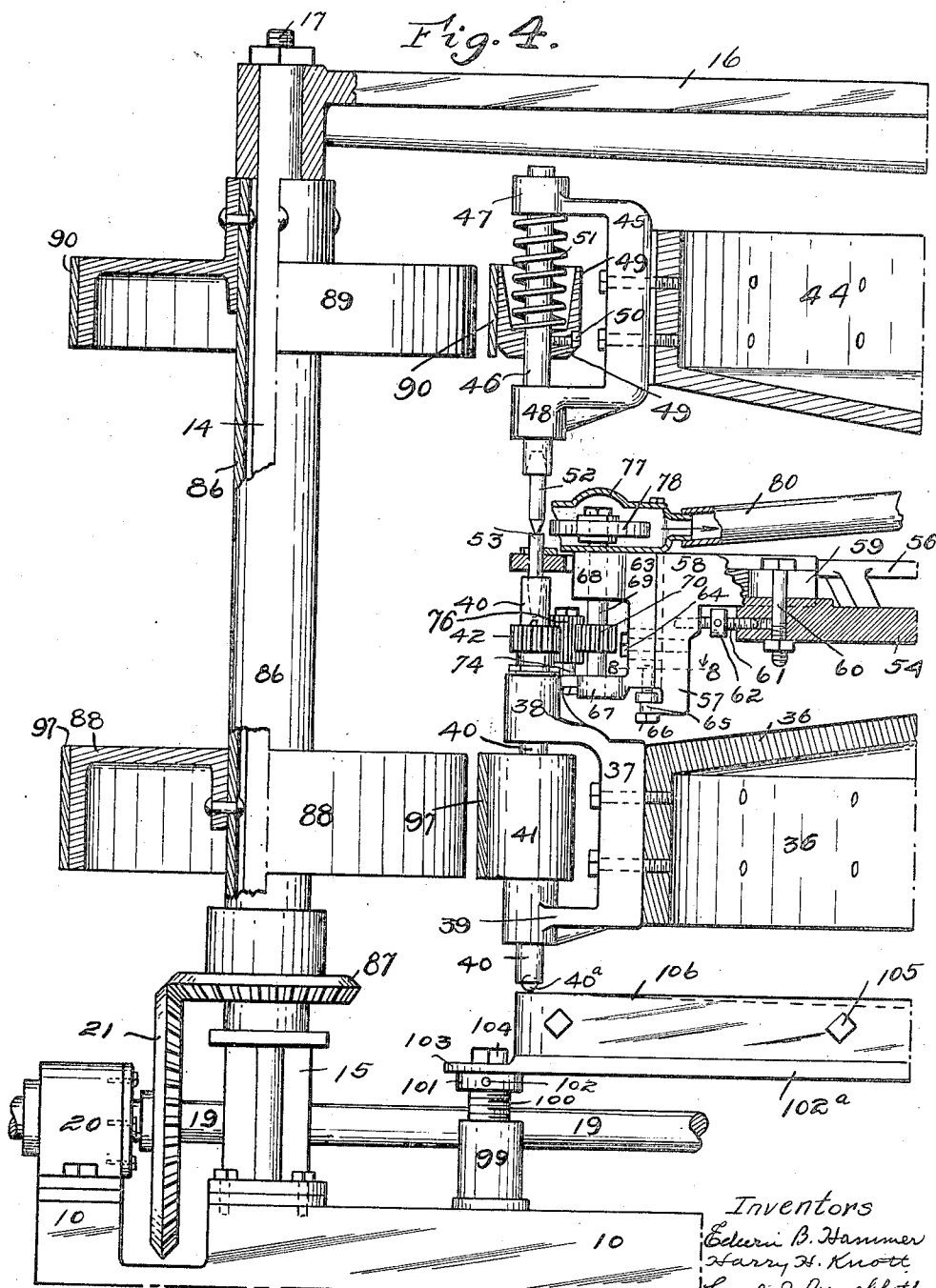
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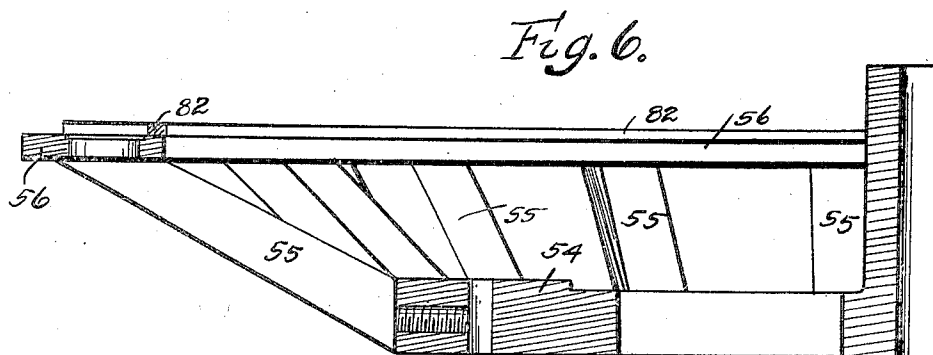
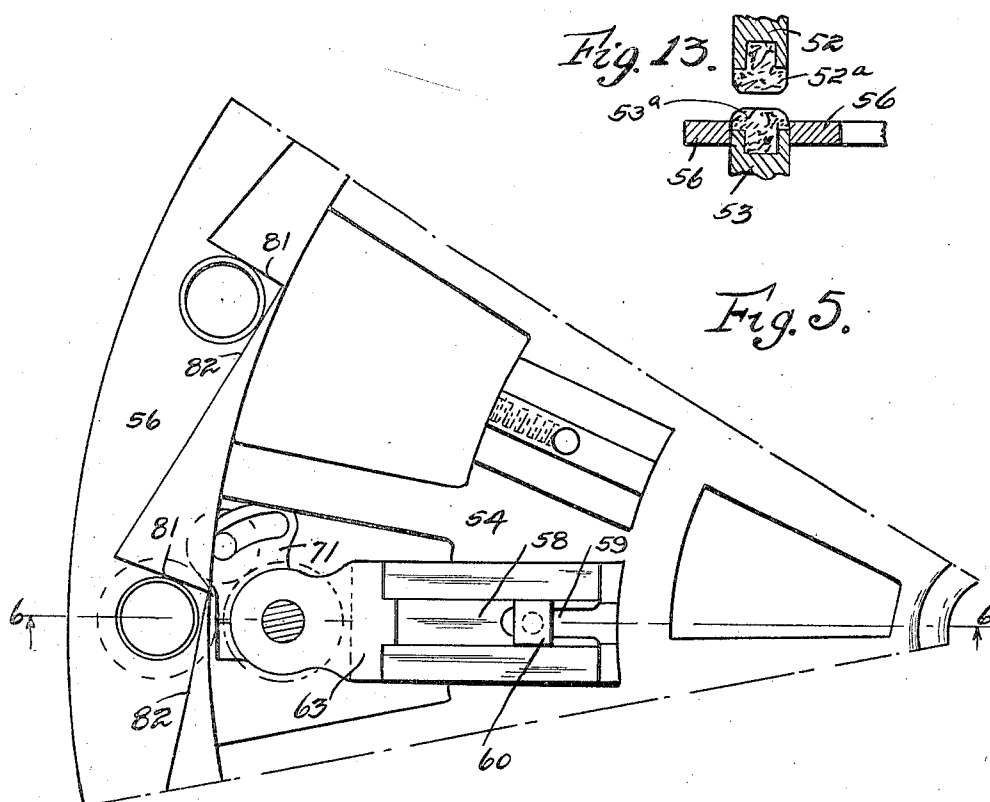
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5 SHEETS--SHEET 5.



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UNITED STATES PATENT OFFICE.

HARRY E. KNOTT, CARL J. JUNGBLUTH, AND EDWIN B. HAMMER, OF WASHINGTON, IOWA, ASSIGNORS TO WASHINGTON MANUFACTURING COMPANY, A CORPORATION OF IOWA.

BUTTON-BLANK-GRINDING MACHINE.

Application filed February 23, 1920. Serial No. 361,983.

To all whom it may concern:

Be it known that we, HARRY H. KNOTT, CARL J. JUNGBLUTH, and EDWIN B. HAMMER, citizens of the United States, and residents of Washington, in the county of Washington and State of Iowa, have invented a certain new and useful Button-Blank-Grinding Machine, of which the following is a specification.

10 The object of our invention is to provide a machine so constructed and arranged as to efficiently and rapidly grind button blanks which originally are angular in outline so as to reduce them to the proper diameter and to circular form.

15 It is our object to provide such a machine peculiarly adapted for the practicing of our process disclosed in our prior application Serial Number 351,180, filed January 13, 20 1920, wherein we take button blanks angular in outline and mount them for rotation and then subject their side surfaces to abrasion or grinding for reducing them to the proper diameter, by grinding off the corners and obtaining from the blanks a button of the greatest possible diameter, without waste or breakage.

A further object is to provide such a machine to which the angular button blanks 30 may be successively fed and which will grip and hold such blanks for rotation in proper relation to a grinding element which machine is provided with means for automatically removing the completed blanks from the holding devices after the grinding process has been finished.

With these and other objects in view our invention consists in the construction, arrangement and combination of the various 40 parts of the device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in our claims and illustrated in the accompanying drawings, in which:

45 Figure 1 shows a side elevation of a machine embodying our invention, only one of the button blank holding and grinding mechanism being shown, and the other of such mechanism being omitted for the sake of clearness, parts being shown in vertical 50 cross section for better illustration.

Figure 2 shows a horizontal, sectional view taken on the line 2—2 of Figure 1, illustrating particularly the arrangement of the but-

ton handling mechanism in series around a 55 common center.

Figure 3 shows a horizontal, sectional view taken on the line 3—3 of Figure 1, illustrating particularly the driving mechanism, the clutch and clutch control and the 60 cam track.

Figure 4 is an enlarged, detail side elevation of one of the clutch holding and grinding units, parts being shown in cross section for better illustration. 65

Figure 5 is an enlarged, detail view of a segment or portion of the spider or frame which holds the blank grinding and handling device.

Figure 6 is a vertical, sectional view taken 70 on the line 6—6 of Figure 5, illustrating the details of the construction of the spider or frame illustrated in Figure 5.

Figure 7 is a detail, sectional view of the clutch control mechanism, the worm wheel 75 and case for the latter.

Figure 8 is a detail, sectional view of a portion of one of the brackets for supporting the grinding mechanism adjustably, taken on the line 8—8 of Figure 4. 80

Figure 9 is a detail, sectional view of the adjustable bracket taken on the line 9—9 of Figure 8.

Figure 10 is a detail, sectional view taken 85 on the line 10—10 of Figure 1, illustrating the mechanism for adjusting the position of the cam track.

Figure 11 is a plan view of a button blank angular in outline, the dotted lines showing the shape of the blank which is produced 90 from the angular blank.

Figure 12 shows a top or plan view of a portion of the spider or frame equipped with a button feeding device, embodying a slightly modified form of our invention; and 95

Figure 13 shows a detail, sectional view of a modified form of the button blank gripping fingers.

Our machine embodies the base or support which is indicated in the accompanying 100 drawings by the reference numeral 10, the general shape of such base being best illustrated in Figures 1, 2 and 3.

Extending from the base 10 are upright posts 11, 12, 13 and 14. The posts 11, 12 105 and 13 are mounted directly in the base 10. The post 14 is mounted at its lower end in a bearing casting or the like 15, which rests

upon and is connected with the base 10. The upper ends of the posts 11, 12, 13 and 14 are connected by a frame 16 which gives rigidity to the whole frame and machine.

5 The upper ends of said upright posts are extended through suitable openings in the frame 16 and are formed with reduced screw-threaded portions 17 upon which portions are mounted securing nuts 18.

10 Mounted in the bearings 20 and 22 below the post 14 is a substantially horizontal drive shaft 19. The shaft 19 simply extends through the so-called bearing 15. The outer end of the shaft 19 is mounted in a bearing 20, and has supported thereon a bevelled gear 21. The inner end of the shaft is supported in bearings 22 formed on a gear casing 23 supported by the central portion of the base 10.

20 Our machine is provided with a substantially central, upright shaft 24, on the lower portion of which is a worm wheel 25, which meshes with a worm 26 on the shaft 19. Formed on the worm wheel 25 is a clutch member 27. The worm wheel 25 is loosely mounted on the shaft 24.

Slidably but non-rotatably mounted on the shaft 24 just above the clutch member 27 is a coacting clutch member 28 having an annular groove 29. Received in the groove 29 are the arms 30 of a clutch control lever 31, which is pivoted at 32 on a supporting bracket 33. Connected with the lever 31 is a foot pedal 34 whereby the clutch may be controlled by the foot of the operator. The weight of the parts is such that the clutch member will normally stand in engaging position.

40 Suitably supported on the shaft 24 and spaced somewhat above the worm wheel 25 is a hub 35 of a hollow downwardly opening drum 36, which is adapted to rotate with the shaft 24.

45 We have shown our machine built with sixteen button grinding and handling units. Each unit includes a lower blank holding shaft or spindle, an upper blank holding shaft or spindle, and an adjustable grinding element.

50 The lower blank holding shafts or spindles 40 are mounted in brackets 37 mounted in a series in spaced relation with each other around the drum 36. One of the brackets is illustrated, for instance, in Figure 1, and in greater detail in Figure 4.

55 These brackets 37 are screwed or bolted to the drum 36, so as to be readily removable and interchangeable. Each bracket 37 has an upper arm 38, and a lower arm 39 provided with bearings for the shaft or spindle 40. On each shaft or spindle 40, between the respective arms 38 and 39, is a pulley 41. On each shaft 40, above the arm 38 is a gear 42.

65 Mounted on the shaft 24 substantially

above the drum 36 is a hub 43 of a drum 44, which opens upwardly and is similar in general construction to the drum 36.

70 Mounted on the outer wall of the drum 44 are brackets 45 for supporting the upper blank gripping shaft or spindle 46. Each bracket 45 has an upper arm 47 and a lower arm 48 forming bearings for the spindle or shaft 46.

75 Fixed on each shaft 46, between the respective arms 47 and 48 is a pulley 49 which may be held in position by means of a set-screw 50.

80 The upper part of each pulley 49 is hollowed out to form a sort of cup or receptacle for one end of a coil spring 51. The other end of which bears against the arm 47, so that the shaft 46 is normally, yieldingly held in its lower-most position in which the pulley 49 rests against the lower arm 48 of the bracket 45.

The shafts 46 are preferably provided at their lower ends with detachable, and interchangeable points 52.

90 Mounted in the upper end of each shaft or spindle 40, is a detachable and interchangeable gripping member 53. The points 52 are sharp at their blank engaging ends, while the gripping members 53 are designed to engage the shell blank over a considerable area. Other forms of shell gripping shafts or spindles may be employed.

100 In the modified form of the shell gripping fingers shown in Figure 13, the reference numerals 52^a and 53^a indicate detachable flexible points, preferably made of rubber.

105 Supported on the shaft 24 is a spider or frame 54 which at its outer portion supports the adjustable shell grinding devices. Supported above the main body of the spider or frame 54, by upwardly and outwardly inclined arms 55 is an annular ring 56 of greater diameter than the main body of said frame 54.

110 For each button blank grinding mechanism there is provided a radially adjustable bracket 57 having a horizontal extension 58 mounted in a radially arranged guide in the spider 54, as illustrated in Figures 4 and 5.

115 Each extension 58 is provided with a radially elongated slot 59. A bolt 60 extended through the slot 59 and mounted in the spider 54 is employed for locking the bracket 57 in its various adjusted positions.

120 A shaft 61 having oppositely arranged screw-threads on its opposite ends is mounted with one end in each bracket 57, and with the other end in the spider 54, as illustrated for instance in Figure 4.

125 At the middle of each shaft 61 is a collar 62, fixed to said shaft and used with the shaft for giving to the bracket 57 adjustment radially of the spider.

Slidably mounted on each bracket 57 for vertical adjustment, is a second bracket 63,

which has a vertically elongated slot, shown by dotted lines in Figure 4, to receive the bolt 64, screwed into the bracket 57. At the lower end of each bracket 57 is an outwardly extending arm 65 in which is mounted an adjusting screw 66. The screw 66 is mounted in the outwardly extending arm 65 for rotation, and is screwed into the lower part of the bracket 63, so that by rotating the screw 66, the bracket 63 may be adjusted upwardly or downwardly. The bracket 63 is located just inside the ring 56. The bracket 63 has vertically spaced, outwardly projecting bearings 67 and 68. In each pair of said bearings is mounted an upright shaft 69, on which is a gear 70.

On each arm 67 is a laterally projecting segmental plate 71 having therein a curved slot 72. The slot 72 is curved on the arc of a circle having its center in the longitudinal axis of the shaft 69.

Received in the slot 72 is the reduced lower end 73 of an upright shaft 74. On the lower end 73 below the plate 71 is a lock nut 75. Rotatably mounted on the shaft 74 above the plate 71 is a wide gear 76. The gear 76 is wide enough so that the gear 42 will remain in mesh therewith during the various vertical adjustments of the bracket 63.

On the upper end of each shaft 69 above the arm 68 and within a casing 77 is a grinding wheel 78. The casing 77 is open on its side adjacent to the blank gripping shaft, so as to let the grinding wheel 78 project therefrom.

Each casing 77 is connected with a pneumatic take-off pipe 80 for drawing off the shell dust by air suction.

The ring 56 is so located that the shell gripping members 53 project through said ring, as illustrated in Figure 4.

On the upper surface of the ring 56 are stop shoulders 81 and 82, so arranged and located that an angular button blank may be pushed against said shoulders and will then be in proper position to be gripped by the shell gripping members.

Mounted on each of the upright posts 11, 12, 13 and 14 is a tubular shaft. The shafts are indicated by the respective numerals 83, 84, 85, and 86. On the tubular shaft 86, above the bearing 15 therefor is a bevelled gear 87, in mesh with the bevelled gear 21, hereinbefore referred to. Fixed on the shaft 86 on a horizontal level with the various pulleys 49, is a relatively large belt pulley 89. A belt 90 extends around the pulley 89 and thence around the pulley 91 on the shaft 85, thence around certain of the pulleys 49, as illustrated particularly in Figure 2, thence around the pulley 92 on the shaft 83, thence around the pulley 93 on the shaft 84, and back to the pulley 89.

It will be noted that the threading of this

belt is such that the pulleys 49 between the pulleys 91 and 92 will not be rotated during the operation of the machine, but the remaining pulleys 49 will be rotated when the machine is in operation.

On the shafts 83, 84, 85 and 86, on a horizontal level with the pulleys 41 are pulleys 88, 94, 95, and 96. A belt 97 is threaded around the pulleys 88, 96, 41, 94 and 95, in a manner generally similar to the threading of the belt 90.

It may be mentioned that the parts are geared so that rotation is imparted to the shaft 24 and the parts carried thereby in anti-clockwise direction, and at a relatively low speed. The speed of the belts 90 and 97 and the pulleys rotated thereby, is much higher.

Screwed into the upper surface of the base 10 is a series of plugs 98 having at their upper ends internally screw-threaded sockets 99.

Screwed into the upper end of each member 99 is a plug 100, having a head 101, provided with openings 102 to receive a wrench. As many of the devices just described are provided as are necessary for supporting the cam track which is now being described.

There is provided a cam track support 102^a extending perhaps a little more than three-quarters around a circle. The cam track support 102^a is provided with laterally extending flanges 103 resting on the heads 101 of the plugs 100, and secured thereto by means of screw-bolts 104.

Resting upon the cam track support 102^a, and fastened thereto by means of screw-bolts 105 is the cam track 106. It will be noted that the cam track 106 is removable, so that it may be changed for another cam track of different size.

It will be noted also that the cam track support 102^a is adjustable vertically by means of the plug 100. The cam track is so constructed, located and arranged that when the shaft 24 and the parts supported thereon are rotated, the spindles 40, will for a short part of their movement, during the time when button blanks are being placed in position for engagement between the rotating spindles, be at the lower limit of their movement unaffected in any way by the cam track 106.

The parts are so arranged that when the spindles 40 are in the position just mentioned, the button blank engaging member 53 will stand in position with its upper end flush with the upper surface of the ring 56, or just below such upper surface for permitting a button blank to be placed immediately above the blank engaging member 53. The position of such blank is gauged by the shoulders 81 and 82. The parts are further so arranged that immediately after the button blank has been put

in such position, which should occur when the spindle 40 is in its lower-most position, the lower end of the spindle 40 will be engaged by the cam track 106, which will

5 gradually raise the spindle 40 during its travel around the machine.

Each spindle 40 preferably has at its lower end a rotating ball for anti-frictional engagement with the cam track, which ball

10 is shown in Figure 4, and indicated by the reference character 40^a.

In Figure 2 we have shown a take-off pipe 107 whereby the completed button blank may be drawn away from the machine by suction after the grinding process

15 has been finished.

In Figure 12 we have shown a modified form of the stop or gauge devices for the button blanks. Instead of the members 81

20 and 82 shown in Figure 5, we have shown in Figure 12 stops 81^a and 82^a similarly located to the stops 81 and 82, and have shown secured to the stop 81^a a projecting spring clip 108. When the form of the

25 device shown in Figure 12 is used, the operator may shove the button blanks against the shoulders of the stops 81^a and 82^a and the blank will be yieldingly held in position by means of the spring clip 108.

30 Supported in position just above the web of the drum 44 is a hood 108^a, which does not rotate with the drum 44 but takes the air and dust from the various take-off pipes

35 drum 44.

The hood 109^a is connected with a suction pipe 110, which takes off the dust.

We will now describe somewhat in detail the practical operation of our improved

40 grinding machine, and the construction and arrangement of the parts will be made somewhat clearer in the course of such explanation.

It may be said at this time, that it is our

45 purpose to provide a machine which will grind the blanks beginning at one surface and grinding through the blanks to the other surface, rather than to grind from the periphery radially inwardly.

50 In the operation of our machine power is applied to the shaft 19 through the pulley 111. It will be seen that the gear 21 on the shaft 19 transmits rotation to the gear 87, and therethrough to the shaft 86, and to the

55 pulleys 88 and 89 thereon.

The belts 97 and 90 on the pulleys 88 and 89 transmit rotation to the various pulleys

41 and 49 which are engaged by said belt.

When the clutch members, hereinbefore

60 described, are thrown into gear, the shaft 24 and the parts connected therewith are slowly rotated.

It will be understood that the drums 36

65 and 44, and the spider 54 all rotate with the shaft 24 carrying with them the blank

engaging spindles 40 and 46, and the blank grinding mechanism hereinbefore referred to.

When the spindle 40 is clear of the cam track 106 and stands in its lower-most position where the blank engaging member 53 is flush with or just below the upper surface of the ring 56, the operator places a button blank angular in outline and such as is shown in full lines at 112 in Figure 11, on the ring 56 above said spindle 40. The button blank is centered on the spindle by means of the stops 81 and 82, or 81^a and 82^a.

In this connection it may be mentioned that the stops 81^a and 82^a are changeable to other stops which may be used for fitting the machine for use with button blanks of different sizes.

As the central shaft 24 rotates, the spindle 40 under consideration, engages the cam track 106 and is slowly raised for gripping the button blank between the blank engaging member 53 and the pointed member 52.

It will be understood that the button blank is installed in position by the operator during the time the pulleys 41 and 49 are not engaged by the belts and are not rotated.

There is provided, supported in proper position, a short cam 113 so arranged as to engage the lower edges of the pulleys 49 during the time required for placing the button blanks in position, for holding the button blank engaging pointed member 52 just high enough so that it does not interfere with the placing of the blank.

The spindle 40 is moved upwardly by the cam track 106, for raising the button blank into engagement with the pointed member 52 and the pulley 49 clears the cam 113 just before the pulleys 41 and 49 are engaged by the belts 97 and 90. As soon as said pulleys engage said belt they are rotated rapidly. The rotation of the pulley 41 imparts rotation to the spindle 40, and therethrough to the gear 42, the gear 76, the gear 70, the shaft 69, and the grinding wheel 78.

As the whirling button blank travels around the machine, the cam track 106 gradually pushes the spindle 40 upwardly carrying with it the button blank and bringing the upper face of the button blank into grinding engagement with the wheel 78.

The wheel 78 grinds through the button blank from side to side reducing it from its angular outline, shown by full lines in Figure 11, to its circular outline shown by dotted lines in said figure.

After the grinding has been completed, the button blank is advanced to position adjacent to the take-off pipe 107, which is so located that the button is taken off by suction just after the belts cease to rotate the pulleys 41 and 49, and just after the cam

130

113 has raised the pulley 49 for releasing the pointed member 52 from engagement with the button blank.

It will be noted that the cam track 106 is adjustable by means of threaded stud and lock nut 99 and 101 for varying the action of the cam track in the process of raising and lowering the button blank.

It will also be noted that the grinding wheel may be vertically adjusted by loosening the screws 64 and adjusting the screws 66.

The grinding wheel may be horizontally adjusted, by loosening the bolt 60, and then adjusting the screw-threaded shaft 61.

The gear 76 may be held in proper mesh by adjusting the shaft 73 in the slot 72.

Our machine may be used in connection with automatic blank feeding mechanism suitable for the purpose, if desired.

The advantages of our machine may be largely seen from the foregoing description.

The blanks may be ground as fast as an operator can feed them to the machine.

It will be obvious also that many changes may be made in the details of the construction and arrangement of the various parts of the device, without departing from the real spirit of our invention, and it is our intention to cover by our claims any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

We claim as our invention:

1. In a machine of the class described, a spider, spindle supporting elements arranged above and below said spider, means for imparting simultaneously rotary movement to said spider and said elements, work spindles supported slidably and rotatably on said elements in aligned pairs, grinders on said spider adjacent to the respective pairs of spindles, a work receiving and aligning ring on said spider having holes in line with the respective pairs of spindles, means causing each pair of spindles to move axially to engage a work piece and carry it from the ring across the face of the grinder, and means for imparting rotation to one spindle of each pair and to the adjacent grinder adjacent to said pair, during a portion of the rotation of said spider and members.

2. In a machine of the class described, a frame, a plurality of pairs of aligned work spindles mounted for rotation around a common center, one spindle of each pair being mounted for yielding axial movement, the other spindle of each pair being mounted for axial movement, a rotary carrier, a grinder thereon arranged adjacent to each pair of spindles, means for imparting rotation to one of each pair of spindles, means for imparting rotation from such a one of each pair of spindles to the adjacent grinder

in any of the positions of axial movement of such spindles.

3. In a machine of the class described, a spider, spindle supporting elements arranged above and below said spider, means for imparting simultaneously rotary movement to said spider and said elements, work spindles supported slidably and rotatably on said elements in aligned pairs, grinders mounted on said spider adjacent to the respective pairs of spindles, each having its axis adjustable toward that of its adjacent pair of spindles to regulate the size of the work, a work receiving and aligning ring on said spider having holes in line with the respective pairs of spindles, means causing each pair of spindles to move axially to engage a work piece and carry it from the ring across the face of the grinder, and means for imparting rotation to one spindle of each pair and to the adjacent grinder adjacent to said pair, during a portion of the rotation of said spider and members.

4. In a machine of the class described, a spider, spindle supporting elements arranged above and below said spider, means for imparting simultaneously rotary movement to said spider and said elements, work spindles supported slidably and rotatably on said elements in aligned pairs, grinders on said spider adjacent to the respective pairs of spindles, a work receiving and aligning ring on said spider having holes in line with the respective pairs of spindles, and means for imparting rotation to one spindle of each pair and to the adjacent grinder adjacent to said pair, during a portion of the rotation of said spider and members, and means for moving said pairs of spindles longitudinally during the movement of said members and spider for bringing the flat faces of blanks held between the spindles against the flat faces of the grinders.

5. In a machine of the class described, a frame, a plurality of pairs of aligned work spindles mounted for rotation around a common center, one spindle of each pair being mounted for yielding axial movement, the other spindle of each pair being mounted for axial movement, a rotary carrier, a grinder thereon arranged adjacent to each pair of spindles, means for imparting rotation from such a one of each pair of spindles to the adjacent grinder in any of the positions of axial movement of such spindles, said spindles being mounted vertically, spring means for holding the yieldingly movable upper spindles at the limit of their downward movement projected to position just below the lower edge of the adjacent grinder.

6. In a machine of the class described, a frame, a series of blank holding devices mounted on said frame for rotation around

a common center, each of said blank holding devices comprising a pair of aligned members mounted for rotation, a grinding device mounted adjacent to each blank holding device, and arranged for bodily rotation around said common center, and means for imparting rotation to the button blank holding means, and the grinding device during part of the bodily rotation of said devices around their common center, and for imparting relative movement to the blank holding devices and the grinder for subjecting the blank to abrasion from one substantially flat face to the other during the time the button holding means and the grinder are rotating.

7. In a machine of the class described, a plurality of axially movable pairs of work spindles mounted for rotation around a common center, a rotary element, a grinder mounted thereon adjacent to each pair of spindles, and means for rotating the spindles and moving them axially for bringing work held by them into contact with the grinder during the rotation of the grinders and spindles around a common center, and means for rotating the grinders from the spindles.

Des Moines, Iowa, December 30, 1919.

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