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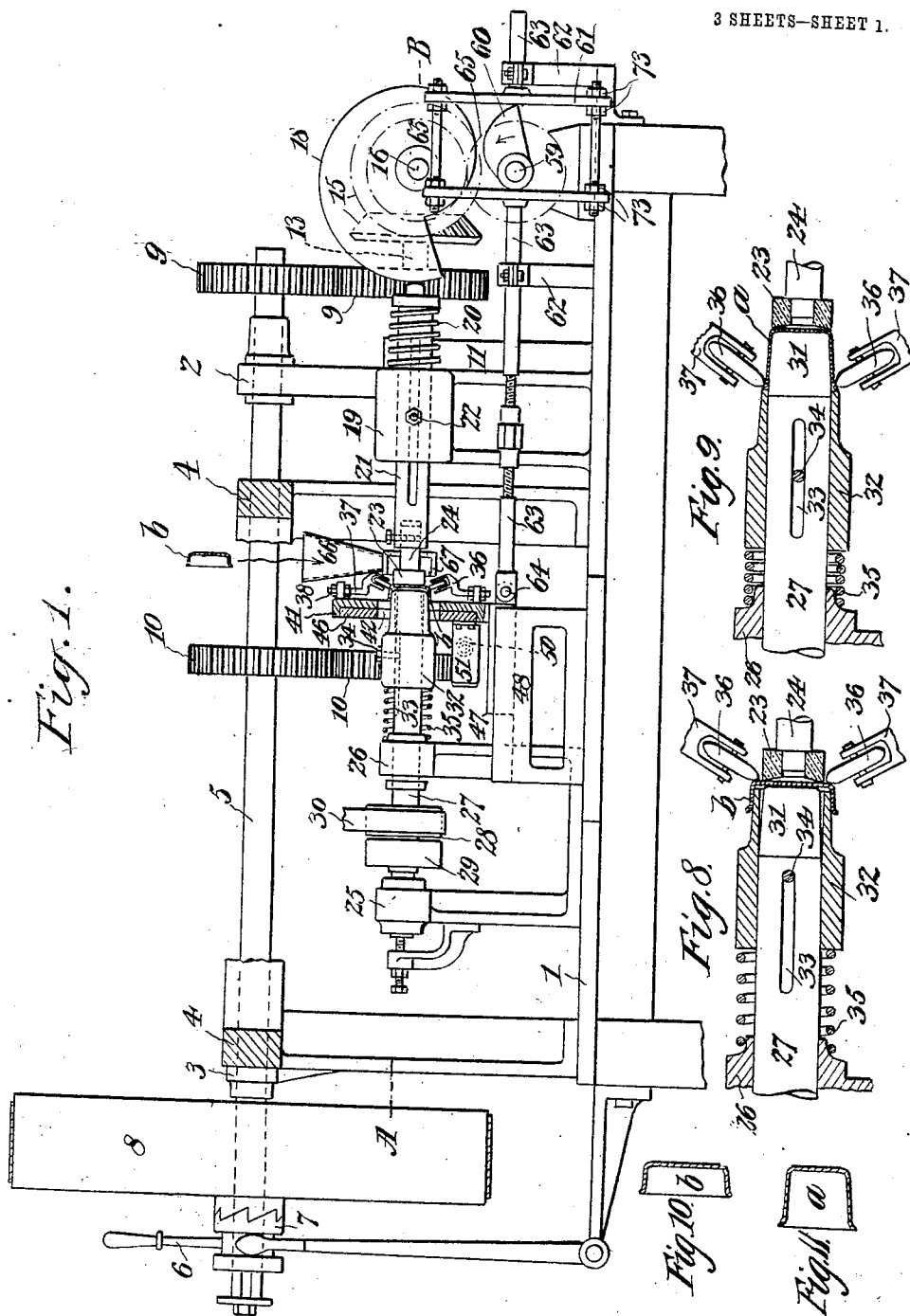
PATENTED FEB. 27, 1906.

E. WATZKE.

MACHINE FOR THE MANUFACTURE OF CAPSULES FOR BOTTLES.

APPLICATION FILED DEC. 24, 1902.

3 SHEETS—SHEET 1.



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Inventor:
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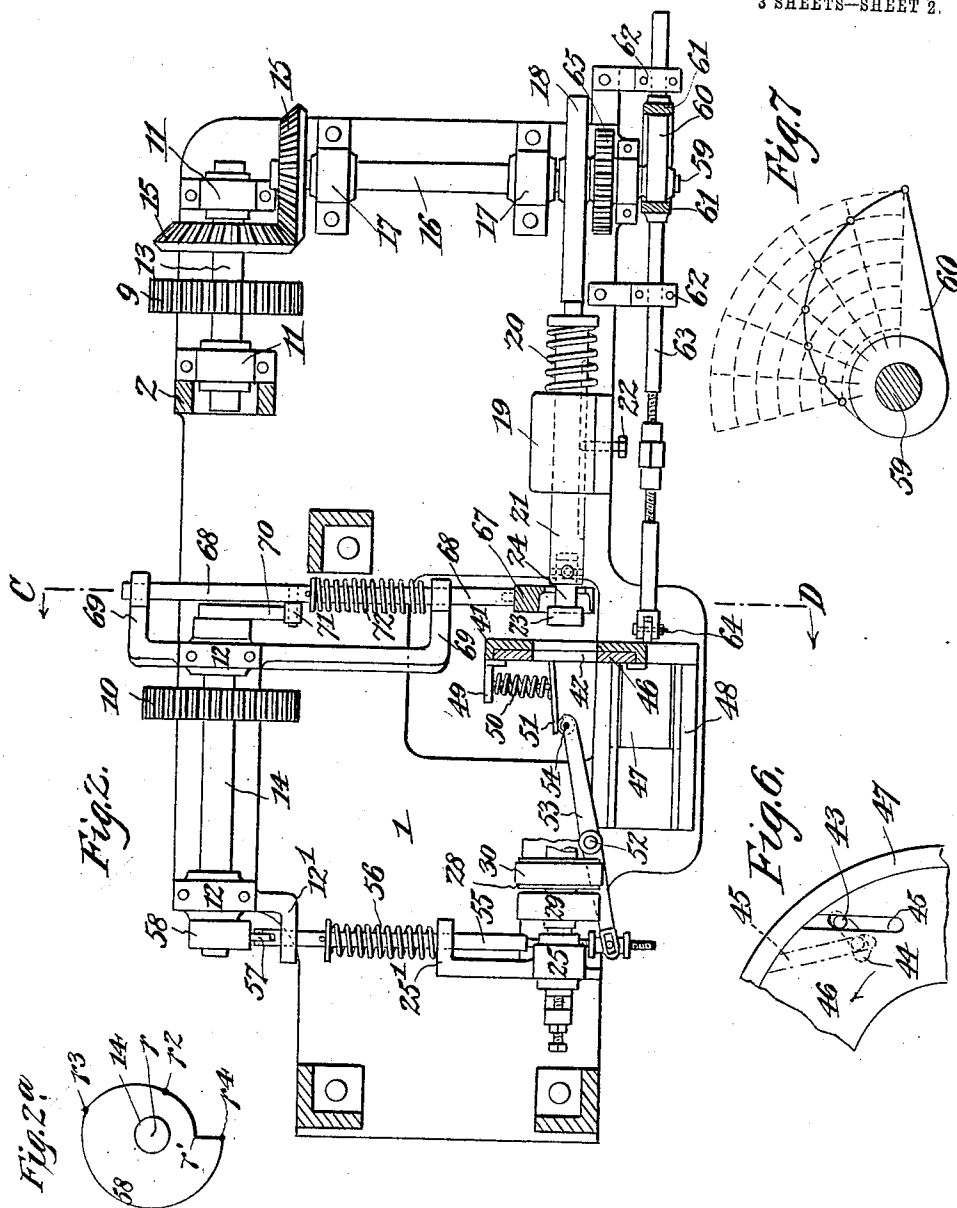
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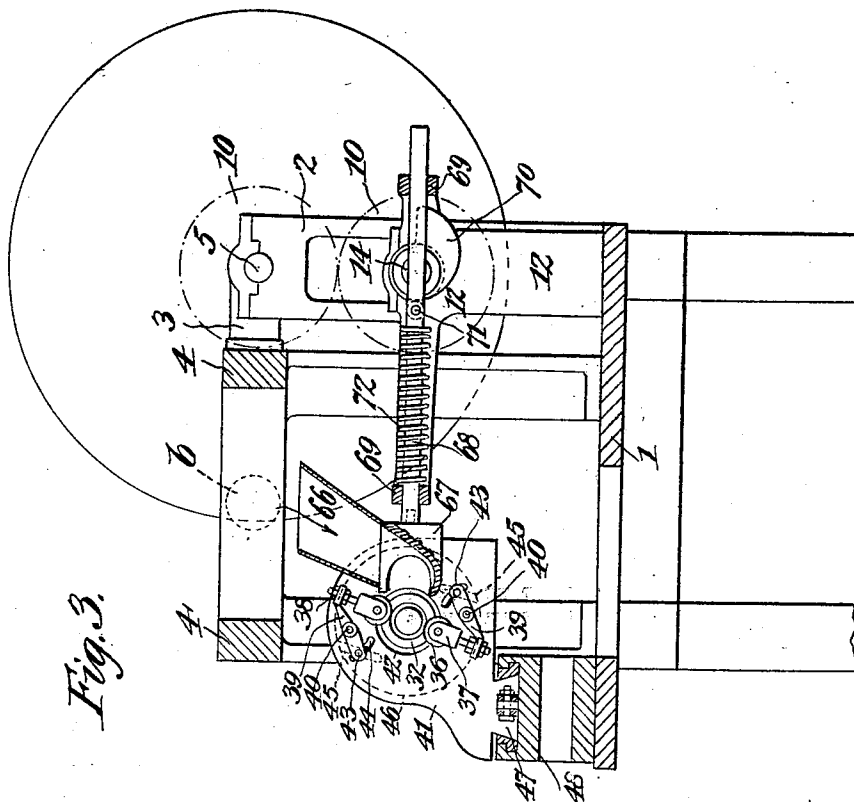
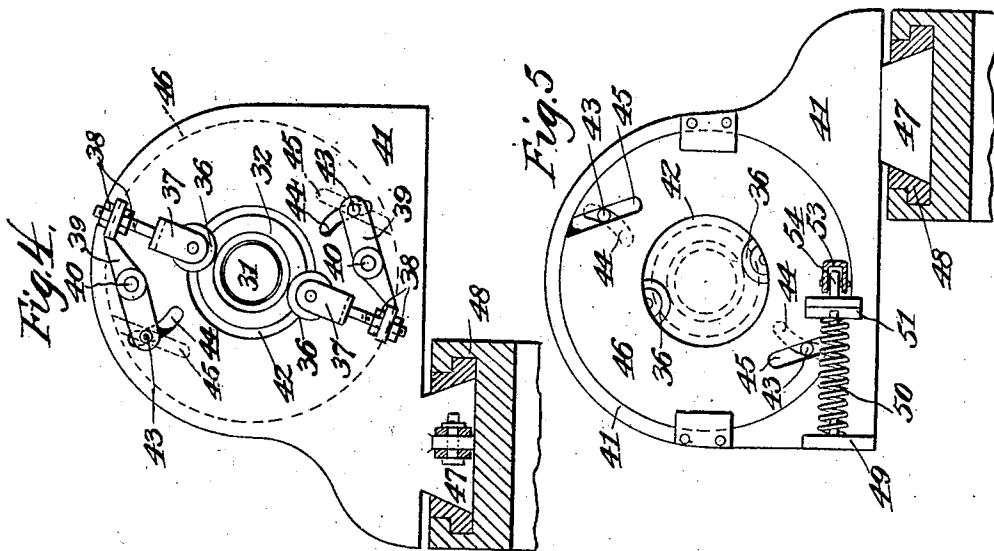
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR THE MANUFACTURE OF CAPSULES FOR BOTTLES.

No. 813,604

Specification of Letters Patent.

Patented Feb. 27, 1906.

Application filed December 24, 1902. Serial No. 128,490.

To all whom it may concern:

Be it known that I, EDUARD WATZKE, a subject of the Emperor of Austria-Hungary, residing at Friedberg, in the Province of Styria, in the Empire of Austria-Hungary, have invented certain new and useful Improvements in Machines for the Manufacture of Capsules for Bottles and the Like; and I 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.

This invention relates to improvements in machines for manufacturing capsules for bottles from a disk that has been previously stamped from a tin-foil strip into the form of a dish-shaped blank before it is fed to the machine, where it is finally stretched into the form of the finished capsule.

The invention consists in the special arrangement of the stretching devices intended to work the dished blank, the arrangement of two or more stretching-rollers acting simultaneously on the blank to give the rollers a uniform parallel motion along the stretching-spindle, thereby exercising a steady and uniform action on the dished blank during the entire stroke of the spindle.

The invention may be fully understood by the following description and reference to the accompanying drawings, in which—

Figure 1 of the accompanying drawings represents in elevation and partly in vertical section a machine according to the present invention and intended for stretching the dished blank and for transforming it into the finished capsule. Fig. 2 is a horizontal section on the line A B, Fig. 1, a portion of the stretching-spindle being omitted. Fig. 2^a is an enlarged detail side view of the cam 58. Fig. 3 is a cross-section on the line C D, Fig. 2, seen in the direction of the arrow. Figs. 4 and 5 show in front and in rear elevation, respectively, and on a larger scale the device which carries the pressure-rollers. Fig. 6 shows, on a larger scale, a portion of the device carrying the roller. Fig. 7 represents, also on a larger scale, the cam serving to shift lengthwise the device carrying the rollers. Figs. 8

and 9 represent the stretching device in two positions corresponding to the beginning and to the end of the stretching. Fig. 10 shows the dished blank, and Fig. 11 the finished capsule in section.

The main shaft 5 is arranged in a standard 2, fixed on the base-plate of the machine, and in a bearing 3 of the frame 4, mounted on the base-plate. This main shaft 5 is arranged to be thrown into and out of gear with the driving-pulley 8, loosely mounted on the main shaft, by means of a clutching device 7, operated by the hand-lever 6. The shaft 5 drives, by means of the gear-wheels 9 9 and 10 10, respectively, two counter-shafts 13 and 14, mounted beneath the main shaft in bearings 11 11 and 12 12, respectively.

The shaft 13 drives, by means of the bevel-wheels 15, a transverse shaft 16, running in bearings 17 and on which there is secured a stepped cam 18, which during its rotation displaces axially a rod 21, guided in fixed bearings 19 and constantly pressed toward the periphery of the cam by means of a spring 20. This rod is prevented from rotating by means of a screw 22 in the bearing 19 engaging a longitudinal slot of the rod. The latter has at its free end a rotary spindle 24, provided with an india-rubber ring 23.

In line with the rod 21 is arranged the stretching mechanism, which consists of a horizontal spindle 27, mounted in fixed bearings 25 and 26 and having a fast pulley 28 and a loose pulley 29 and capable of being driven at a high speed by means of a belt 30. At the right-hand end 31 of the spindle 27, which is corresponding to the hollow space of the finished capsule *a*, Fig. 11, of conical shape, there is arranged a sleeve 32, prevented from rotating by means of screw 34 engaging in the longitudinal slot in the spindle. This sleeve is reduced at its end situated near to rod 21 in such a manner that it fits into the recess in the dished blank *b*, Fig. 10. A spring 35 tends to push the sleeve 32 toward the end 31 of the stretching-spindle 27.

The stretching of the blank is effected by a number of pressure-rollers 36, arranged in a circle. In the case represented in the drawings there are arranged two pressure-rollers 36 of this kind, the bearing-forks 37 of which are adjustably arranged each at one end of a lever 39. These levers 39 are pivotally fixed,

by means of studs 40, to a bearing-plate 41, through the central aperture 42 of which the stretching-spindle 27, with its sleeve 32, can pass.

5 The opposite free end of each lever 39 is provided with a pin 43, projecting through a curved slot 44 of the plate 41, having its center in the stud 40, and through an inclined or eccentric slot 45 of a circular disk 46, rota-
10 tably fixed to the plate. When this disk 46 is being rotated, the edges of the inclined slots 45 cause the displacement of the pins 43 in the corresponding curved slots 44, Figs. 4 to 6, and consequently an oscillation of the le-
15 vers 39, so that the pressure-rollers 36 are moved toward the stretching-spindle or from it, according to the direction in which the disk is rotating.

20 The two pressure-rollers may be disposed, as represented, diametrically or at other angles against each other, or there may be arranged more than two pressure-rollers.

The bearing-plate 41 is secured to a slide 47, sliding in a guiding 48, parallel to the axis
25 of the stretching-spindle. At the rear side of the bearing-plate 41 is provided a shoulder 49, against which one end of a spiral spring 50 is abutting, the other end of which presses against a shoulder 51 of the disk 46. The opera-
30 tion of this disk 46, intended to put the pressure-rollers into their operative position, is effected by a lever 53, Fig. 2, pivoted at 52. The free end of said lever contiguous to the stretching device acts on the shoulder 51
35 either direct or, as shown, by means of a sliding roll 54, thereby rotating the disk 46 against the pressure of the spring 50 in such a manner that the pressure-rollers are moved into their operative position toward the
40 stretching-spindle. During the stretching operation the pressure-rollers have to move along a rectilinear path, which, however, corresponding to the conical shape of the capsule, is inclined toward the axis of the spindle.
45 Consequently the pressure-rollers must be displaced outwardly during their longitudinal movement. To this end the shoulder 51 of the disk 46 is suitably inclined, Fig. 2, so that during the motion of the slide 47 or of
50 the bearing-plate 41 (to the left) the remoter parts of the inclined shoulder successively reach the sliding roll 54 of the lever 53, which does not alter its position during the stretching operation. Therefore in proportion as
55 the slide 47 is moving to the left the spiral spring 50 is gradually pressing back the shoulder 51, and with the latter the disk 46, thereby oscillating the levers 39 and moving the pressure-rollers outwardly in a corresponding manner. The lever 53 is articulated to a
60 rod 55, guided in bearing-arms 12' and 25', which are respectively affixed to or made of one casting with the bearings 12 and 25. The rod 55 is under the pressure of a spring 56,
65 tending to press a roll 57, mounted at one end

of the rod 55, against a cam 58, fixed on the short counter-shaft 14. The said cam 58 is stepped, as shown in Fig. 2^a, the face between the points r' and r^2 being an arc of a circle from the axis r of the shaft 14, and between
70 the points r^2 and r^3 the radius increases, while between the points r^3 and r^4 the face of the cam is concentric to the portion $r' r^2$. While the cam is turning from r' to r^2 the rod 55 re-
75 mains stationary, and during the same period the blank b is driven on the sleeve 32 of the spindle 27 by the operation of the cam 18. During the movement of the cam from r^2 to r^3 the rod 55 is pushed forward and takes the
80 position shown in Fig. 2 a short time before the beginning of the stretching operation and remains stationary during the travel of the cam from the point $r^3 r^4$, which is owing to the
85 fact that the cam between these points is concentric to the axis of the shaft 14, as above described. During this last period the slide 47
90 is traveling to the left, and the inclined shoulder 51 travels upon the roller 54 of the lever 53, causing the rollers 36 to separate according to the conicity of the end 31 of the spindle 27. When the roller 57 on the rod 55 passes the
95 point r^4 on the cam, said rod 55 is quickly returned to its former position under the action of the spring 56 after the stretching operation is accomplished. By this movement of
100 the rod 55 the inclined shoulder 51 is released by the lever 53, and the spring 50 rotates the disk 46 in such a manner as to move the pressure-rollers 36 outwardly, as hereinbefore de-
105 scribed, and to move the sleeve 32 under the action of the spiral spring 35 toward the end of the stretching-spindle 27.

The to-and-fro motion of the slide 47 is preferably effected by means of a cam 60, keyed upon the short transverse shaft 59,
105 Figs. 1 and 2, and inclosed in a yoke-shaped frame 61, the adjustable bearing-rod 63 of which is connected with the slide 47 at 64. The shaft 59 of the cam is driven by the transverse shaft 16 by means of the gear-wheels 65
110 of equal diameters or in any other known manner.

According to the present invention the cam 60 is shaped so as to impart a uniform movement to the slide 47, and therefore also
115 to the pressure-rollers 36. For this purpose the cam is so constructed that similar inclinations of its working surface correspond to similar angles. Fig. 7 shows in what manner a curve of this kind may be generated. 120

The dished blank b which is to be transformed into a capsule is fed to the stretching device by means of a feeding-hopper 66, attached to the forked head 67 of a transverse rod 68, guided in the arms 69, fixed to the
125 bearing 12 and operated by a cam 70, fixed to the shaft 14. The cam 70 acts on the rod 68, either direct or as shown in the drawings, by means of an abutting roll 71, fixed to the rod. The spring 72 moves the rod, together 130

with its fork 67, back into their rear position. (See Fig. 3.)

The operation of the machine is the following: As soon as the fork 67 is in its rear position, Fig. 3, the dished blank *b* is introduced through the hopper 66 into the fork, in which it remains. Now the fork-piece is moved forward so far that it lies in the axis of the stretching-spindle 27, Fig. 2. Then the rotary spindle 24 is moved toward the stretching-spindle by the cam 18, so that its ring 23 will push the blank lying in the fork onto the conical end of the sleeve 32, rotating at a high speed, Fig. 8. Immediately afterward the lever 53 is displaced by means of the cam 58, and thereby the pressure-rollers 36 are moved toward the stretching-spindle and brought into their operative position. In this moment the cam 60 causes the uniform displacement of the pressure-rollers 36 along the conical end 31 of the stretching-spindle, whereby the blank is stretched to form the finished capsule, while at the same time the sleeve 32 is being pushed back. A short time after the commencement of the stretching-operation the rod 21 reaches the step of the cam 18, so that the spindle 24 is moved back again by the spring 20 and its ring 23 is raised from the top of the capsule. As soon as the stretching operation is finished the lever 53 releases the inclined projection 51, so that the spring 50 turns back the disk 46 and throws the pressure-rollers 36 quickly into their inoperative position. The sleeve 32 is thus released and will be moved by the pressure of the spiral spring 35 toward the end 31 of the stretching-spindle, thereby stripping off the finished capsule from the conical end of the stretching-spindle. The capsule falls through an aperture of the base-plate 1 into a receptacle arranged beneath.

By the arrangement of several pressure-rollers acting simultaneously and moving uniformly an increased uniform action of the same during the whole operative stroke is obtained, because the degree of the stretching also remains the same at all places of the capsule.

If the machine should be adjusted for the manufacture of capsules of a different length, the cam 60 is taken off and is replaced by another cam of suitable dimensions, but of similar form, while the frame 61 is adjusted to correspond to this cam by means of set-screws 73.

The heretofore-described action of the stretching device remains the same in every case.

I claim—

1. In a machine for making capsules, the combination of a rotatable spindle having a capsule-forming end portion, a plurality of stretching-rolls, a non-revoluble bearing-plate therefor, a yoke, a rod connecting said

yoke and plate and a cam revoluble in said yoke, for the purpose specified.

2. In a machine for making capsules, the combination of a rotatable spindle having a capsule-forming end portion, a plurality of stretching-rolls, a non-revoluble bearing-plate therefor, a yoke, an adjustable rod connecting said yoke and plate, and a cam revoluble in said yoke, for the purpose specified.

3. In a machine for making capsules, the combination with a conical-ended rotatable spindle, of a non-revoluble bearing-plate, a plurality of stretching-rolls mounted on the latter, means for advancing the bearing-plate the length of said conical end, means for causing the rolls to move parallel to the end during said advance, and means to spread said rolls simultaneously with the return of the bearing-plate.

4. In a machine for making capsules, the combination with a receiving-spindle and mechanism for rotating the same, of a stretching mechanism comprising a bearing-plate having a plurality of slots and adapted to surround the spindle, means for moving the plate parallel to the axis of the spindle, a plurality of levers pivotally mounted on the plate axially of the slots, a pressure-roll mounted in each lever, a pin on the levers projecting through said slots, a disk mounted on the plate provided with slots engaging said pins, and means for rotating the disk, substantially as and for the purpose specified.

5. In a machine for making capsules, the combination with a rotatable spindle having a capsule-forming end portion, a non-revoluble bearing-plate surrounding said spindle, a plurality of stretching-rolls pivotally mounted on said bearing-plate, means for advancing the latter the length of the forming portion, and means for automatically returning the same, of a disk rotatable on the bearing-plate, mechanism connecting the rolls and disk, means for rotating the latter on the advance and on the return of the bearing-plate.

6. In a machine for making capsules, the combination with a rotatable spindle having a capsule-forming end portion, a non-revoluble bearing-plate having a central aperture surrounding the spindle, a plurality of stretching-rolls pivoted on said plate around the aperture, means for advancing said plate the length of the forming portion, and means for automatically returning the same, of a disk rotatably mounted on the plate, mechanism connecting the rolls and disk, an abutment on the disk and on the plate, a resilient connection between said abutments and means for rotating the disk on the advancement of the plate, for the purpose specified.

7. In a machine for making capsules, the combination with a rotatable spindle having a capsule-forming end portion, a bearing-plate surrounding said spindle, stretching-

4
rolls pivotally mounted on said plate, means for advancing the latter the length of the forming portion, and means for automatically returning the same, of a disk rotatably mounted on the plate, mechanism connecting the rolls and disk, an abutment on the disk and on the plate, means for engaging the disk-abutment upon the advance of the plate, and a spring connecting said abutments adapted to exert pressure thereon during said advancement.

8. In a machine for making capsules, the combination with a rotatable spindle having a capsule-forming end portion, a bearing-plate surrounding said spindle, stretching-rolls pivotally mounted on said plate, means for advancing the latter the length of the forming portion, and means for automatically returning the same, of a disk rotatably mounted on the plate adapted to control the movement of said rolls, an abutment on the disk, means to hold said abutment in its normal position and mechanism for displacing the abutment simultaneously with the advancement of the plate, for the purpose specified.

9. In a machine for making capsules, the combination with a rotatable spindle, a bearing-plate surrounding said spindle, stretching-rolls pivotally mounted on said plate, means for advancing and means for automatically returning the latter, of a disk rotatably mounted on the plate operatively connected with said rolls, means to normally hold the rolls in an inoperative position, an abutment on the disk, a movable element, and mechanism to cause said element to displace the abutment simultaneously with the advance of the plate, for the purpose specified.

10. In a machine for making capsules, the combination with a rotatable spindle, a bearing-plate surrounding said spindle, stretching-rolls pivotally mounted on the plate and means for advancing the latter, of a disk rotatably mounted on the plate operatively connected with said rolls, an abutment on the disk, a lever, mechanism to move the latter into contact with said abutment on the advance of the plate, and mechanism for holding the lever stationary during said advancement.

11. In a machine for making capsules, the combination with a rotatable spindle, a bearing-plate movable parallel to the longitudinal axis of said spindle, stretching-rolls pivotally mounted on the plate and surrounding said spindle, means for advancing the plate and means for automatically returning the same, of a disk rotatably mounted on the plate and operatively connected with said rolls, an abutment on the disk, a lever, mechanism to cause the latter to displace said abutment simultaneously with the advancement of the plate, means for holding the lever stationary during said advancement,

means to hold the abutment in contact with the lever, and mechanism for returning the lever and plate simultaneously to their normal positions.

12. In a machine for making capsules, the combination with a conical-ended rotatable spindle, a bearing-plate movable parallel to the longitudinal axis of said spindle, stretching-rolls pivotally mounted on the plate and surrounding said spindle, means for advancing the plate along the conical part of the spindle and means for automatically returning the same, of a disk rotatably mounted on the plate and operatively connected with said rolls, an abutment on the disk inclined toward said axis of the spindle, a lever, mechanism to cause the latter to displace the abutment upon the advancement of the plate, means for holding said lever stationary during said advancement, and means for holding the abutment against said lever during advancement.

13. In a machine for making capsules, the combination with a conical-ended rotatable spindle, a non-revoluble bearing-plate movable parallel to the longitudinal axis of the spindle, a cam having a surface adapted to advance the plate the length of said conical end, a step in said cam to permit the sudden return of the plate, stretching-rolls pivotally mounted on the plate and surrounding the spindle, of a disk rotatably mounted on the plate and operatively connected with said rolls, an abutment on the plate, an abutment on the disk inclined toward said axis of the spindle, a spring connecting said abutments, a lever, a cam formed to move the latter into contact with the inclined abutment and to hold said lever stationary during the advancement of the plate and having a step to permit the lever to return simultaneously with the return of the plate.

14. In a machine for making capsules, a stretching mechanism comprising a slotted bearing-plate, a slotted disk rotatably mounted thereon, levers pivoted to the plate, a pin on one arm of each lever projecting through the slots in the plate and disk, and a roller secured to the free end of each lever, for the purpose specified.

15. In a machine for making capsules, a stretching mechanism comprising a bearing-plate provided with eccentric slots, a disk rotatably mounted on said plate provided with inclined slots crossing the aforesaid slots, levers pivotally mounted on the plate, a pin on one arm of each lever projecting through a slot in the plate and disk, and a roller secured to the free end of each lever.

16. In a machine for making capsules, a stretching mechanism comprising a bearing-plate having a central aperture and a plurality of eccentric slots, a disk rotatably mounted on said plate having a central aper-

ture registering with the aforesaid aperture,
and a plurality of inclined slots crossing the
aforesaid slots, levers pivotally mounted on
the plate, a pin on one arm of each lever pro-
5 jecting through a slot in the plate and in the
disk, a roller mounted on the free arm of each
lever, and a spring connecting the plate and
disk.

In testimony that I claim the foregoing as
my invention I have signed my name in pres- 10
ence of two subscribing witnesses.

EDUARD WATZKE.

Witnesses:

JOSEF RUBASCH,
ALVESTO S. HOGUE.