

Feb. 22, 1938.

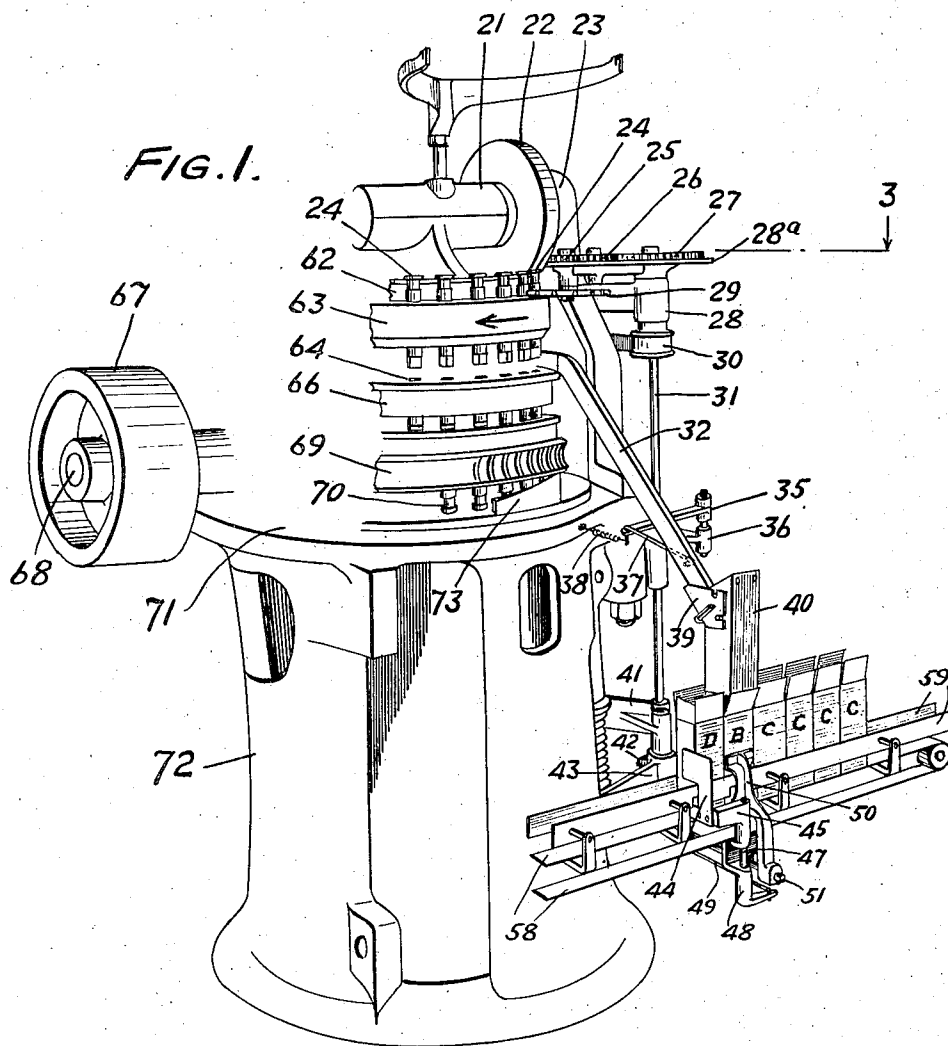
C. J. WESTIN

2,109,407

TABLET PACKAGING MACHINE

Filed Feb. 27, 1936

6 Sheets-Sheet 1



WITNESS:

*Robert R. Kitchel*

INVENTOR

*Charles J. Westin*

BY

*Augustus B. Straighton*

ATTORNEY.

Feb. 22, 1938.

C. J. WESTIN

2,109,407

TABLET PACKAGING MACHINE

Filed Feb. 27, 1936

6 Sheets-Sheet 2

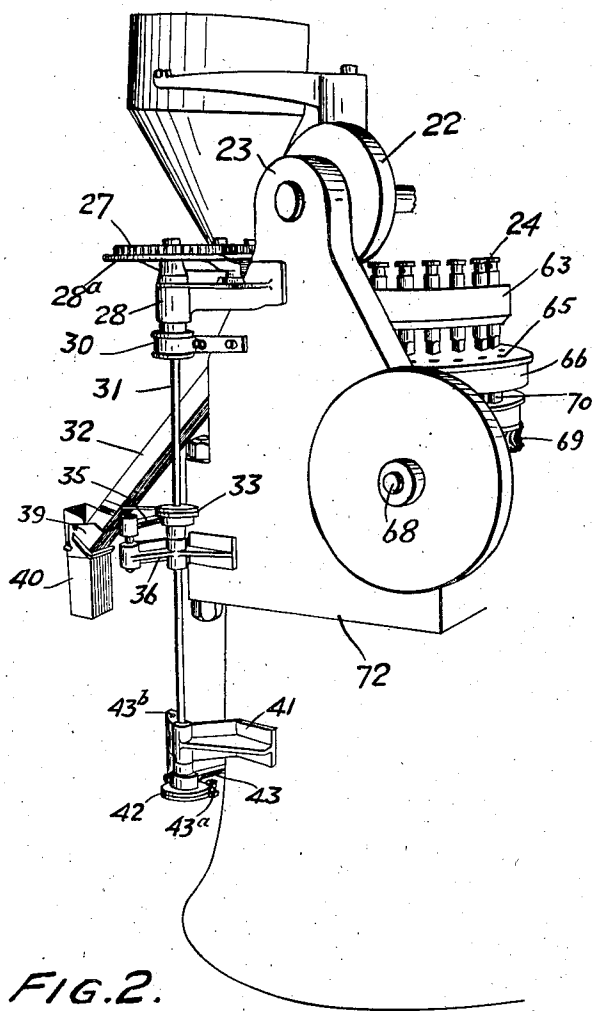


FIG. 2.

INVENTOR

Charles J. Westin

BY

Augustus B. Stoughton

ATTORNEY.

WITNESS:

*Robert Mitchell*

Feb. 22, 1938.

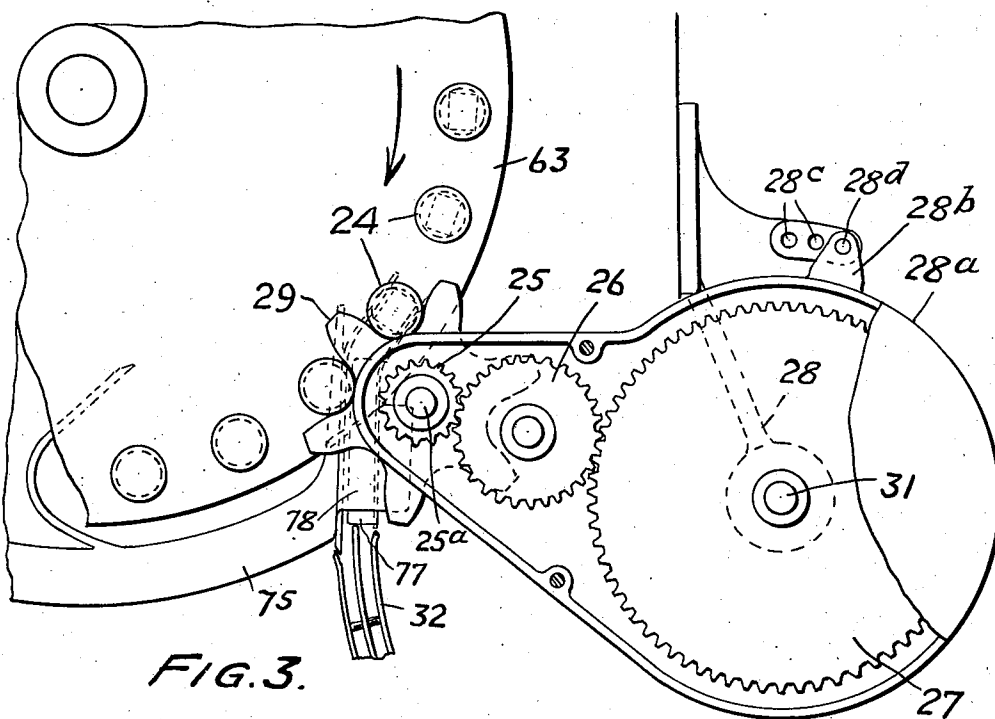
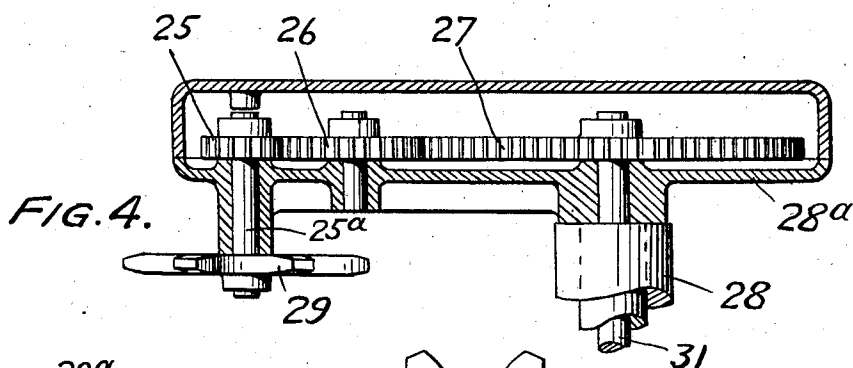
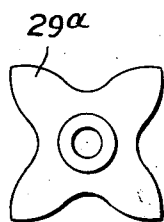
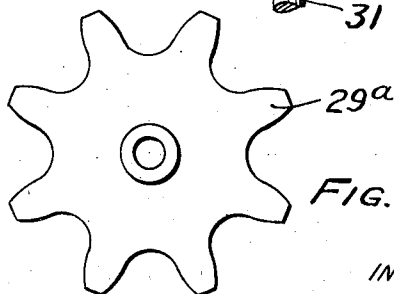
C. J. WESTIN

2,109,407

TABLET PACKAGING MACHINE

Filed Feb. 27, 1936

6 Sheets-Sheet 3



WITNESS:

*Robert R. Mitchell.*

INVENTOR

*Charles J. Westin*

BY

*Augustus J. Staughton*  
ATTORNEY.

**Feb. 22, 1938.**

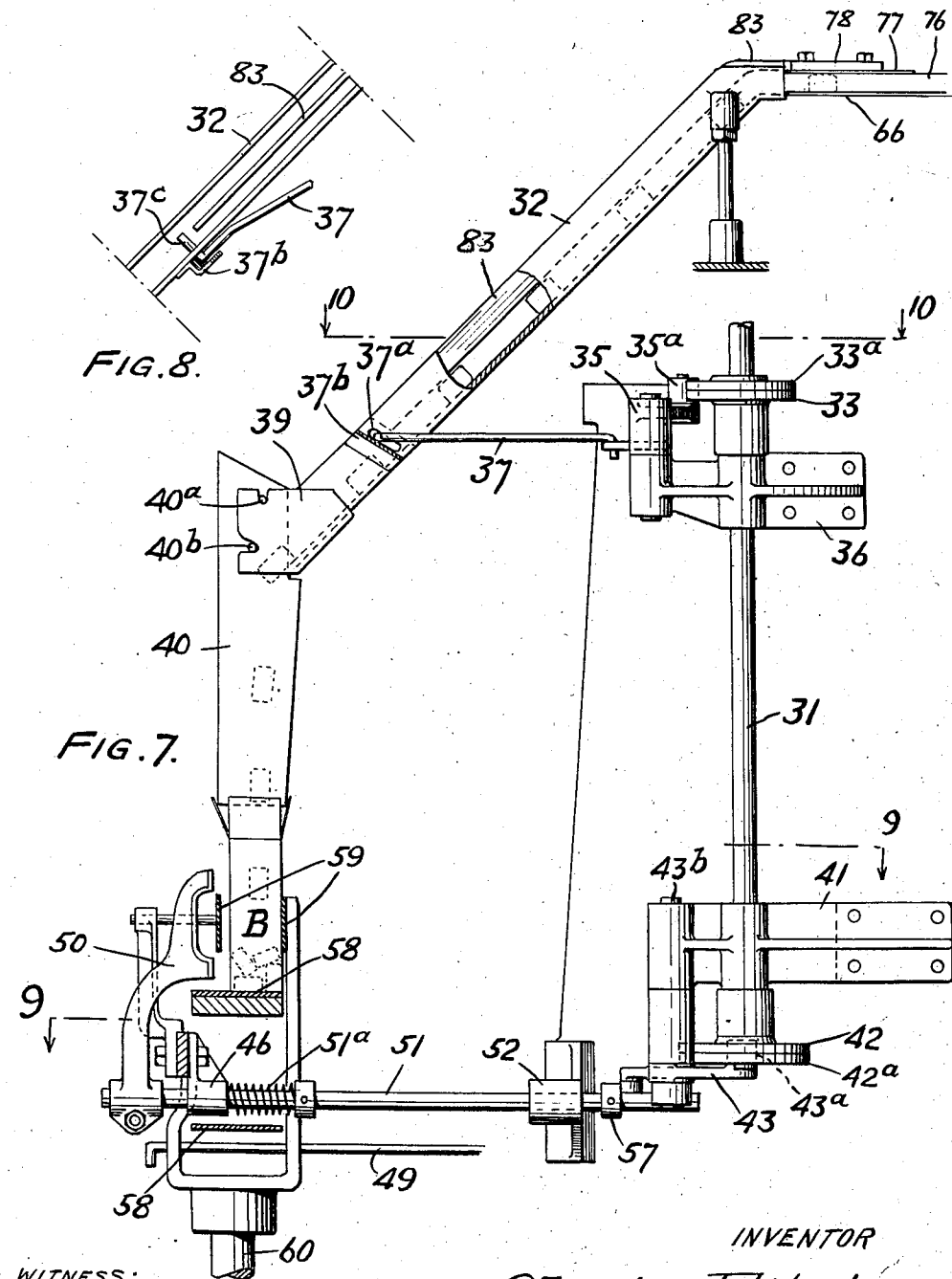
C. J. WESTIN

**2,109,407**

TABLET PACKAGING MACHINE

Filed Feb. 27, 1936

6 Sheets-Sheet 4



Feb. 22, 1938.

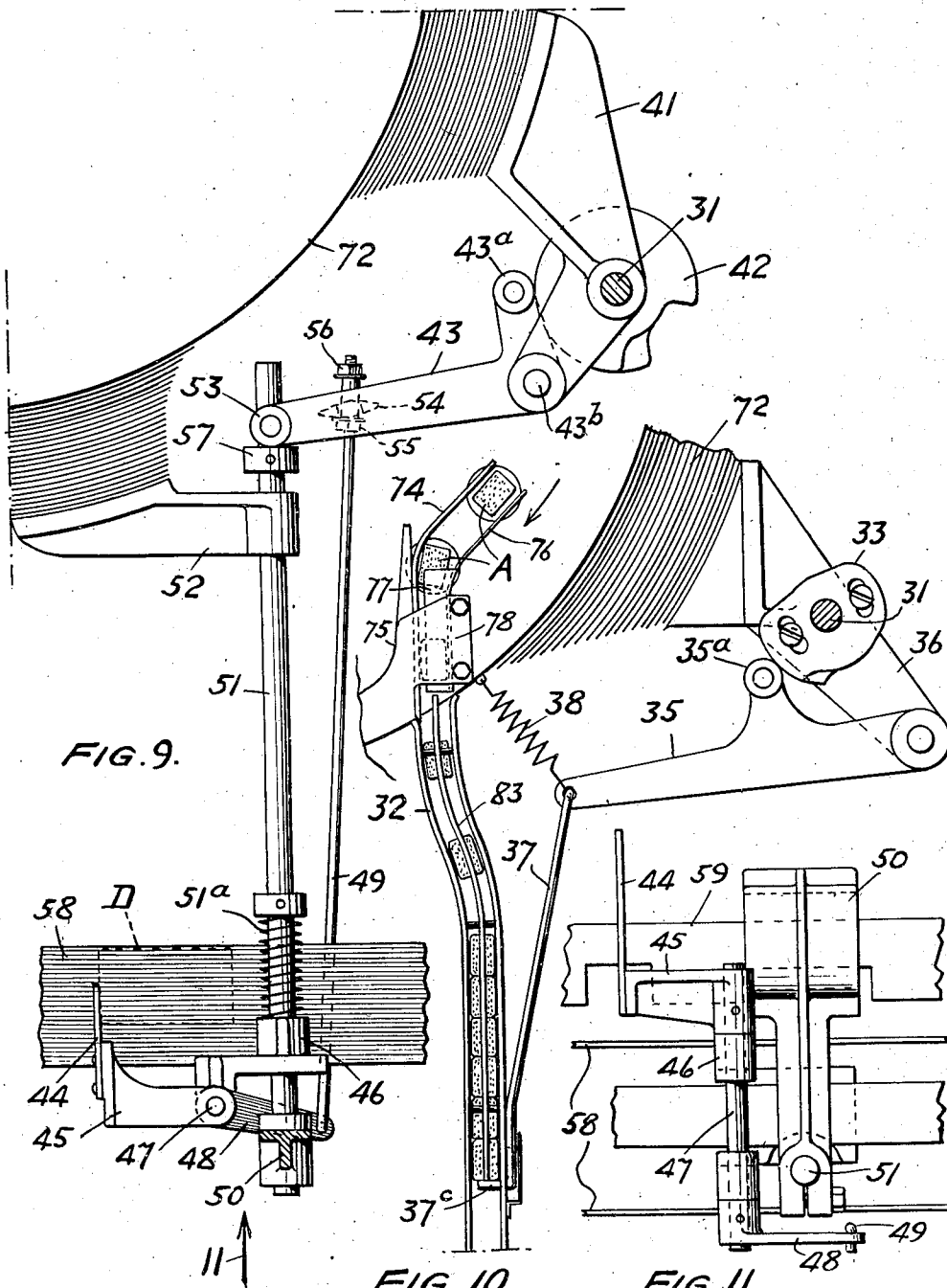
C. J. WESTIN

2,109,407

TABLET PACKAGING MACHINE

Filed Feb. 27, 1936

6 Sheets-Sheet 5



WITNESS:

*Robert R. Mitchell*

FIG. 10.

FIG. 11.

INVENTOR

*Charles J. Westin*

BY  
*Augustus B. Foughton*  
ATTORNEY.

Feb. 22, 1938.

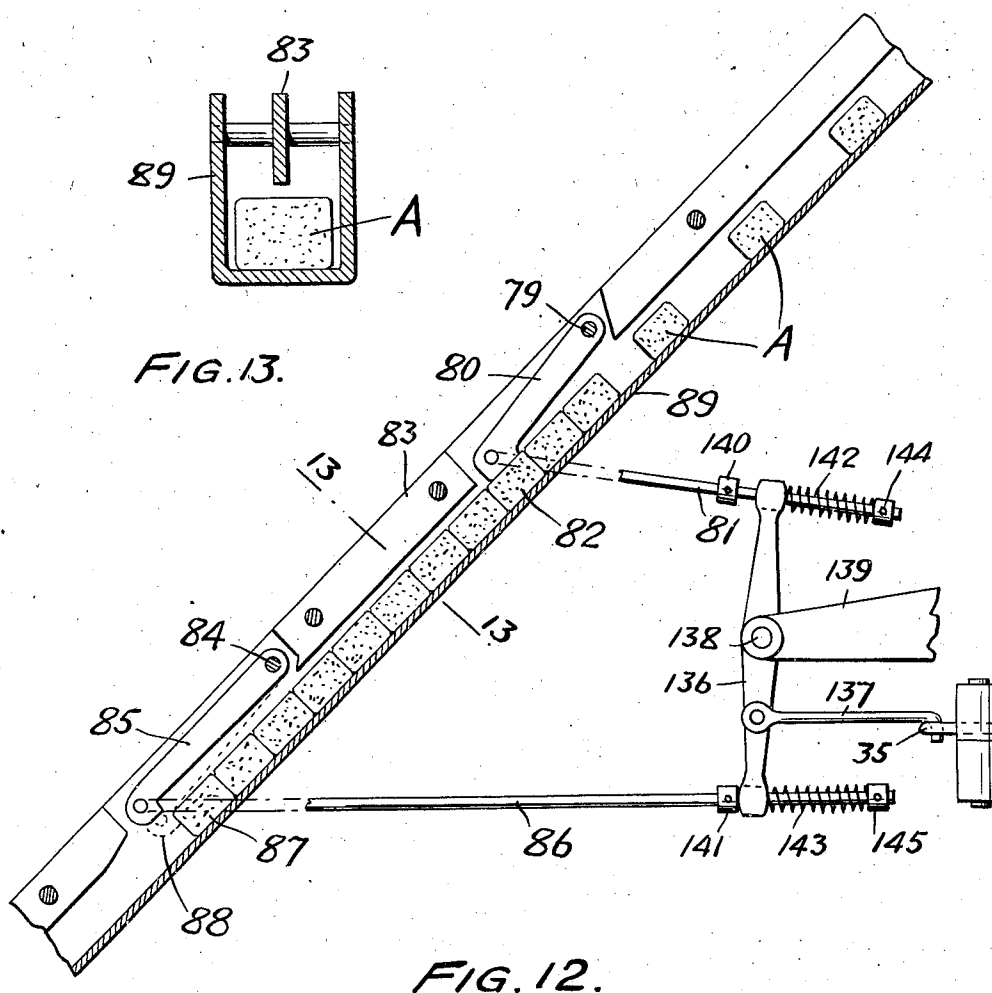
C. J. WESTIN

2,109,407

TABLET PACKAGING MACHINE

Filed Feb. 27, 1936

6 Sheets-Sheet 6



WITNESS:

*Robt. R. Kitchel.*

INVENTOR

*Charles J. Westin*

BY

*Augustus B. Stoughton*

ATTORNEY.

## UNITED STATES PATENT OFFICE

2,109,407

## TABLET PACKAGING MACHINE

Charles J. Westin, Philadelphia, Pa., assignor to  
F. J. Stokes Machine Company, Philadelphia,  
Pa., a corporation of Pennsylvania

Application February 27, 1936, Serial No. 65,952

9 Claims. (Cl. 107-4)

This invention relates to tablet compressing and packaging machinery such as is used for compressing, counting and packaging tablets or lozenges made from pulverulent materials like sugar, starch, bakelite, etc. The present invention pertains particularly to rotary compressors and consists in the new and novel co-operation of the compressing punches with means for: conveying the tablets; counting them (interrupting the flow periodically); delivering a predetermined number into a container; conveying a progression of containers; and indexing the containers in relation to the counting or interrupting means.

The invention also embraces the novel arrangement of parts resulting in a packaging machine conveniently and quickly changeable from one count to another.

It also consists in features of construction and operation which will appear in the drawings and description to follow.

Rotary compressors are built in two styles—the single and the double. In the single compressors, only one set of compression rolls (of which one is shown in Figs. 1 and 2) are used and therefore only one tablet compressed by each set of punches 24 and 70 for each revolution of the head 63, while in the double compressor the use of two sets of compression rolls makes it possible to obtain two tablets from each set of punches for each revolution of the head. The drawings used to illustrate the invention only show the single type and therefore only a single take-off chute and counting device is shown. It is evident, however, that the chute and counting device may be built in multiple so as to take care of more than one tablet from each set of punches.

I am aware of the fact that a number of counting devices have been constructed and some are still in use which at the best only deliver an approximate number of tablets. These devices, of course, are intended to give an accurate count, but they cannot be depended on—being cam-operated from an independent source of power instead of operated from the source or the means producing the tablets. One reason for the shortcomings of such devices is that they will continue to operate even if a punch for one reason or other is left out and thus no tablet produced by that set of punches. Usually they are only single-purpose devices and cannot be used interchangeably for a series of differing counts. This means that a special machine must be used for each count. Devices depending for their action on

gravity are also in use but these are entirely unsatisfactory for high-speed operation.

My device utilizes for its source of power the very means producing the tablet and the influence of gravity is practically eliminated. As long as powder is fed to the machine, tablets are made by the punches and, when made, they are counted and so guided through the device that they cannot escape. Neither are they subject to the detrimental rough handling when stored or transferred in bulk.

In the drawings:

Fig. 1 is a front elevation of so much of a complete machine as is necessary to clearly show my device.

Fig. 2 is a side elevation with parts omitted.

Fig. 3 is a sectional view taken on line 3-3 of Fig. 1, showing the star and gears in plan.

Fig. 4 is a detail in cross-section showing the star and gear in elevation.

Figs. 5 and 6 show alternate star-wheels in outline.

Fig. 7 is a side elevation of the chute and indexing devices.

Fig. 8 is a plan view of a portion of the chute.

Fig. 9 is a horizontal cross-section on line 9-9 of Fig. 7.

Fig. 10 is a horizontal section taken on line 10-10 of Fig. 7.

Fig. 11 is a front elevation of the container-holding device, looking in direction of arrow 11 (Fig. 9).

Fig. 12 shows an alternate tablet-interrupting device.

Fig. 13 is a cross-section on line 13-13 of Fig. 12.

In the embodiment of my invention chosen from among others for illustration in the drawings and description in the specification, there is shown a machine of this general type consisting of a frame or base 72 with a stationary table 71 supporting the head 66 and having a central spindle (not shown) around which the head is made to rotate by means of a gear 69 meshing with a worm (not shown) on shaft 68, which is driven from a prime mover through some means such as pulley 67. The head 66 is of such construction that a number of rings or annular discs 63, 66, and 69 are superimposed with smaller rings or necks in between, forming a structure of several stories and of diameters to suit the co-acting mechanism. A plurality of apertures are spaced around the head and cut clear through the several discs, to form bearings and seats for the plurality of upper punches 24, lower punches

70 and mold-cavities 64. The punches are caused to co-operate with the mold 64 through cam tracks 62 and 73, or through a pair of compressing rollers—only the upper roller 22 being shown.

The powder, which is of the ordinary dry and granular form, is fed into the mold-cavity 64 at a suitable point and by the usual feed frame 75 (Fig. 3) and is compressed into the desired shape and weight as the punches pass between the rollers 22. After being compressed, the tablet is ejected from the mold-cavity 64 and lifted up over the surface of mold-cavity 64 by the lower punch 70 as this travels up on cam 73. At this point, the tablet is guided out towards the rim of disc 66 and into chute 32 by the take-off 74 (Figs. 3 and 10). It should be kept in mind that the head with its plurality of punches is rotating at a constant rate of speed while compressing the powder as well as ejecting the compressed tablet and the tablet therefore, when ejected, has a definite speed as it is guided out towards the rim by the take-off.

For the sake of illustration, the counting and packaging device consists of take-off 74 (best seen in Figs. 10 and 3), chute 32 with its tablet-interrupter 37, which periodically holds back the stream of tablets on their way to the funnel 40 (Figs. 1 and 7) and the container B under it. It should be noticed that the take-off 74 is of such construction as to completely confine and guide the tablets and keep them aligned as they travel past the interrupting-device to the container. I have found that a tunnel-shaped outline of the take-off and chute as shown in Fig. 13 is desirable for the accuracy of the count.

The take-off 74 may be fastened to feed-frame 75 so that the bottom edge is parallel with top of mold table 66 but elevated above the table a sufficient distance to permit powder-granules to pass under the edge into feed-frame 75 while at the same time it is made of suitable curvature and long enough to extend from a point beyond that at which the tablets A are ejected from the mold to the entrance of chute 32.

Parallel with the take-off 74, I have placed a rail 76 suitably spaced from the take-off so as to properly guide the tablets A and prevent any of them that may stick to the punches from snapping away or turning endwise as they are ejected. Rail 76 may also be provided with a side extension 77 forming the roof over the tunnel to prevent the tablets turning up on end when ejected. The rail 76 may be supported on an extension 78 of feed-frame 75.

The tablets are guided by the take-off 74 into the chute 32 which is made in the same general outline (Fig. 13) as the take-off so as to confine and guide the tablets on their travel. The chute 32 may, of course, be placed in a vertical position, in which case it would provide a sheer drop for the tablets. I have, however, found it of decided advantage to place the chute at a slight angle, as shown, this angle being such that as the tablets slide down the incline they will maintain the same speed of travel they had when ejected from the mold. It will be understood, however, that when compressing tablets having no tendency to stick, an open take-off and chute may work quite satisfactorily.

The tablet-interrupting and the container-indexing devices are operated in timed relation from a cam-shaft 31, supported in bearings 28, 36, and 41 and driven, for example, through a train of 75 gears 27, 28, and 25 by a star-wheel 29 engaging

the series of punches 24 as is best seen in Figs. 1 and 3. Provision is made to hold the cam-shaft 31 from change in position by a friction band 30. It is sometimes necessary to leave out one or more punches 24, in which case the star-wheel 29 should wait as left by the last punch until again engaged by the next punch. It is preferable to have the cam-shaft 31 make one revolution for each complete count so that the cams controlling the count and the container-index may remain unchanged, or practically so, regardless of the count desired. For example, let us say, for the sake of illustration, that the counting device is expected to be interchangeable for the delivery of twenty, twenty-five, thirty, etc., (multiples of five) tablets into the container B on the same machine and with a minimum of time and effort required in making the change-over. The gear ratios may, of course, be changed but that would require a multiplicity of parts as well as considerable labor. It is also desirable to have a device of this kind so simple and fool-proof that any unskilled operator can safely make the change in a few minutes. I, therefore, prefer to make the star-wheel 29 the interchangeable part and mount this so that it may be quickly and conveniently changed. As shown in Fig. 3, the star-wheel 29 is made with a pitch to correspond with the pitch of spacing of the punches 24 and a pitch-diameter in proportion to the number of teeth 29a on the star-wheel 29. The teeth 29a are made of such contour as to properly mesh with the round shanks of punches 24 and thus produce a smooth motion to the cam-shaft 31. The star-wheel 29 (Fig. 5) may be made with any desired number of teeth, for example four. With a gear ratio of one to five, this would give us a count of twenty tablets, because the star would have to make five revolutions to one of the camshaft, while, if we choose a star with five teeth, we would get with that same ratio a count of 25 tablets, and with a star of eight teeth (Fig. 6) 40 tablets, etc. On the other hand, if we use a gear ratio of four, we obtain with four teeth in the star a count of 16, with a five-tooth star 20, with a six-tooth star 24, etc. The above shows the flexibility of my device which thus enables me to build a number of machines at one time in the same lot, instead of single units, resulting in a considerable economy. A four-tooth star-wheel is shown in Fig. 5 and an eight-tooth in Fig. 6.

It is evident that, as the diameter of the star 29 varies with the number of teeth, so the center distance between shaft 25a and the punch 24, Fig. 3, will vary in proportion. To take care of this variation in center distance, the housing 28a may be swung in bracket 28 on shaft 31 to any suitable distance. To hold the housing 28a in the proper position for the star 29 used, arm 28b extends out over a corresponding pad on bracket 28. This arm 28b carries a pin 28d or screw which is made to engage with a suitable hole in the pad on 28, a series of holes 28c corresponding to the number and sizes of stars used being provided in the pad.

To change from one count to another, it is therefore only necessary to lift out pin 28d, swing housing 28a out so that the star 29 will clear the head 63, slip the star off shaft 25a, place the proper star in place, swing housing 28a back again so that the star will mesh with the punch, put pin 28d back in the proper hole 28c and the device is ready for operation.

The simpler form of controlling (interrupting) 75

the flow of tablets down the chute 32 is shown in Figs. 1, 7 and 10. This device consists in a link 37, attached at one end to lever 35 and having at the other end an index-finger 37c extending into chute 32 in any convenient manner as, for example, through the slot 37a (Fig. 7). Lever 35 is provided with a cam-follower 35a pressed against the cams 33 and 33a by the spring 38. The contour of the cam 33 is such that for each revolution it causes the index-finger 37c to interrupt the flow of tablets and hold the tablets back a sufficient length of time to permit the filled container B to be replaced by the empty container C. The length of interruption may be varied by adjusting cam 33a in relation to its mate 33. The tablets come down the chute 32 spaced sufficiently far apart to permit the index-finger 37c to enter between them. The spacing, of course, would be the same as the distance between adjacent punches. To prevent breaking or chipping the tablets as they strike the index-finger, this may be provided with a soft covering; for example, rubber or a spring may be attached to the finger so as to yieldably press on the tablet. The interruption may be any length of time within the capacity of the chute and the distance of the index-finger from the take-off should be such that a sufficient number of tablets can be held back to allow plenty of time for indexing the containers.

An alternate to the tablet-interrupting device described above is shown in Fig. 12, which sometimes is preferable as it furnishes opportunity for visual inspection of the tablets as well as means for measuring, so to speak, the number of tablets entering the containers. In this case, two interrupting-fingers 80 and 85 are used and here shown in a preferred modified form, although the simple type 37 shown in Fig. 10 sometimes also is quite satisfactory. The fingers 80 and 85 are mounted on pins 79 and 84 in the chute 89, which is otherwise identical with 32, and are actuated by links 81 and 86, respectively. Links 81 and 86 are linked together by a lever 136 pivotally mounted at 138 on bracket 139. At its opposite ends, lever 136 bears against collars 140 and 141 which are respectively fast on links 81 and 86. Springs 142 and 143, bearing against collars 144 and 145 respectively fast on links 81 and 86, yieldingly stress the ends of lever 136 against collars 140 and 141. Link 137, corresponding to tablet-interrupter 37 of Fig. 10, is actuated by lever 35, as shown in Figs. 1, 7 and 10. The fingers are mounted in line with the central bar 83. The fingers may be placed any suitable distance apart to provide room for a desired number of tablets between them, for example, ten, twenty, etc.

The operation is as follows: Finger 85 is depressed and takes a position as shown in dotted lines at 88, holding back a row of tablets at least from 87 to 82. At the desired time, finger 80 comes in and clamps tablet 82 against the chute while simultaneously finger 85 releases the intervening row of tablets and allows them to pass down funnel 40 into the container B. Finger 85 is again depressed after the row of tablets extending from 87 to 82 have passed down funnel 40 and finger 80 is lifted.

The container-feed may be any convenient intermittent device or a simple belt conveyor 58, as shown, supported on a stand 60 (Fig. 7) and driven at a suitable speed from any convenient source of power. When a belt conveyor is used, it must be provided with proper guide rails 59

co-operating with the necessary indexing device, which in turn must be operated in timed relation with the interrupting device and at a suitable speed so that no tablet will miss the intended container. I prefer to make this device so that the filled container B moves into position D during the indexing, while at the same time an empty container C moves up in position under funnel 40. As soon as this change of position of the containers has taken place, the clamp 50 comes in and presses container B against the guide rail on the opposite side, holding this container stationary under funnel 40, while at the same time stop 44 swings out of the way to permit container D to pass on to the closing station. Briefly, the device might be described as consisting of a cam-actuated clamp 50 and a stop 44 coupled or suitably linked to the clamp so as to properly co-operate with the interrupter 37, to discharge a filled container after having received the stated number of tablets.

The container-feed device may consist of a clamp 50, supported on a lever or, as shown for convenience in this case, on one end of shaft 51 (Figs. 9 and 11) which is slidably journaled in suitable bearings 46 and 52, and provided at the other end with a collar 57 bearing against the end 53 of one arm of the lever 43, the other arm carrying a cam-follower 43a which is pressed against cams 42 and 42a by the action of spring 51a on shaft 51. Lever 43 may be fulcrumed on shaft 43b which is supported on bracket 41. The stop 44 may be fastened on a lever 45 which in turn is carried on a shaft 47 journaled in bracket 46. Another lever or arm 48 is fastened on shaft 47 and connected by a link 49 to a lug 54 on lever 43. The action of stop 44 is thus controlled from lever 43 through the adjustable collars 55 and 56. A separate cam-actuated lever could, of course, be used but the single lever has proved satisfactory and naturally more economical. The timing of the device is controlled by the contour of cams 42 and 42a and the positions of the two cams as in relation to each other.

From the above description it will be understood that a unit of this type provides the shortest and most efficient process in transforming pulverulent materials into tablets and/or briquettes and delivering a package containing a definite number of the finished product. It is also a well-known fact that compressors of the type here made part of the packaging unit produce tablets of uniform size and weight and the resulting package may, therefore, be said to contain, instead of a certain number of tablets, a definite net-weight of the material. Those versed in the art of tablet manufacture will appreciate the fact that greater accuracy of weight will result through the use of such a process because it eliminates the handling, storing and transferring of the tablets in bulk, which is detrimental, causing shrinkage on account of the wear on the tablets and the tendency of chipping.

The mechanical features of the device are not limited to the embodiment chosen for illustration but can, of course, be varied considerably to meet changing conditions and requirements.

I do not intend to be limited save as the scope of the prior art and of the attached claims may require.

I claim:

1. In a tablet-packaging machine, a rotary head having a plurality of mold-cavities therein and bearing a plurality of punches co-operating with said mold-cavities for the compression of

numbers of tablets, a take-off co-operating with said head to receive tablets on said head and convey them to a sloping chute which conducts the tablets to a funnel, a belt conveyor for conveying a plurality of containers beneath said funnel to receive tablets therefrom, a stop mounted adjacent said conveyor for stopping said containers so that one of them is aligned with said funnel, a clamp for clamping said aligned containers beneath said funnel, an index finger having a portion movable adjacent said chute so as to interrupt the passage of tablets along said chute, a cam-shaft having cams thereon for actuating said stop and said clamp and said index-finger, a pivotally mounted housing, and a star wheel mounted on said housing to mesh with said punches and to drive said cam-shaft.

2. In a tablet-packaging machine having a rotary head having a plurality of cavities therein and numbering a plurality of punches cooperating with said mould cavities for the compression of numbers of tablets, a belt conveyor for conveying a plurality of containers to receive tablets therein, a stop mounted adjacent said conveyor for stopping said containers, a clamp for clamping each of said stopped containers on said conveyor in succession, a cam shaft having cams thereon for actuating said stop and said clamp, and a star wheel mounted so as to mesh with said punches and to drive said cam shaft.

3. In a tablet-packaging machine, a rotary head having a plurality of mold-cavities therein and bearing a plurality of punches co-operating with said mold-cavities for the compression of numbers of tablets, first means for conveying a plurality of containers for receiving said tablets, second means for conveying said tablets from said head to the containers on said first means, third means for interrupting the flow of tablets on said second means, fourth means for locating each of said containers in succession in alignment with said second means, and fifth means driven by each of said punches in succession as a tablet is compressed, said fifth means driving said third means and said fourth means in synchronism.

4. In a tablet-packaging machine having a head bearing therein a plurality of punches for compressing tablets and having a chute for receiving tablets from said head and from said punches, the combination of, a conveyor for transporting a plurality of packages for receiving said tablets beneath said chute, and mechanism driven solely by each of said first-mentioned punches in succession and actuating each of said packages on said conveyor in succession so as to align said package beneath said chute.

5. In a tablet-packaging machine, a rotary head having a plurality of mold-cavities therein and bearing a plurality of punches co-operating with said mold-cavities for the compression of numbers of tablets, a take-off co-operating with said head to receive tablets on said head and convey them to a sloping chute which conducts the tablets to a funnel, an index-finger having a portion movable adjacent said chute so as to interrupt the passage of tablets along said chute, a cam-shaft having a cam thereon for actuating said index-finger, and a star-wheel mounted to mesh with said punches and to drive said shaft.

6. In a tablet-packaging machine, a rotary head having a plurality of mold-cavities therein

and bearing a plurality of punches co-operating with said mold-cavities for the compression of numbers of tablets, a take-off co-operating with said head to receive tablets on said head and convey them to a sloping chute which conducts the tablets to a funnel, a belt conveyor for conveying a plurality of containers beneath said funnel to receive tablets therefrom, a stop mounted adjacent said conveyor for stopping said containers so that one of them is aligned with said funnel, a cam-shaft having a cam thereon for actuating said stop, and a star-wheel mounted to mesh with said punches and to drive said cam-shaft.

7. In a tablet-packaging machine, a rotary head having a plurality of mold-cavities therein and bearing a plurality of punches co-operating with said mold-cavities for the compression of numbers of tablets, a take-off co-operating with said head to receive tablets on said head and convey them to a sloping chute which conducts the tablets to a funnel, a belt conveyor for conveying a plurality of containers beneath said funnel to receive tablets therefrom, a clamp for clamping each of said containers in succession in alignment beneath said funnel, a cam-shaft having a cam thereon for actuating said clamp, and a star-wheel mounted to mesh with said punches and to drive said cam-shaft.

8. In a tablet-packaging machine having a rotary head having a plurality of mold-cavities therein and bearing a plurality of punches co-operating with said mold-cavities for the compression of numbers of tablets, the combination of, a sloping chute co-operating with said head to receive tablets from said head and to conduct them away, a plurality of interrupting-fingers each having a portion movable adjacent said chute so as to interrupt the passage of tablets along said chute, a linkage interlocking said fingers so that one is in tablet-interrupting position and the other is out of tablet-interrupting position, a shaft having a connection thereon actuating said linkage, and a star-wheel mounted to mesh with said punches and to drive said shaft.

9. In a tablet-packaging machine having a rotary head having a plurality of mold-cavities therein and bearing a plurality of punches co-operating with said mold-cavities for the compression of numbers of tablets, the combination of, a sloping chute co-operating with said head to receive tablets from said head and to convey them away, a plurality of interrupting-fingers each having a portion movable adjacent said chute so as to interrupt the passage of tablets along said chute, a link pivotally connected to each of said fingers so as to actuate said finger into and out of tablet-interrupting position, a pivotally mounted lever having sliding engagement with the said links and interlocking said links so that one of said fingers is in and the other of said fingers is out of tablet-interrupting position, springs interposed between said lever and said links and yieldingly urging said fingers toward tablet-interrupting position, a shaft having connection with said lever to actuate it, and a star-wheel mounted to mesh with said punches and to drive said shaft.

CHARLES J. WESTIN.