

July 18, 1961

E. CURTIUS
TABLETTING PRESSES

2,992,729

Filed May 15, 1956

2 Sheets-Sheet 1

FIG. 1

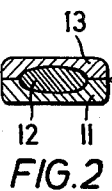
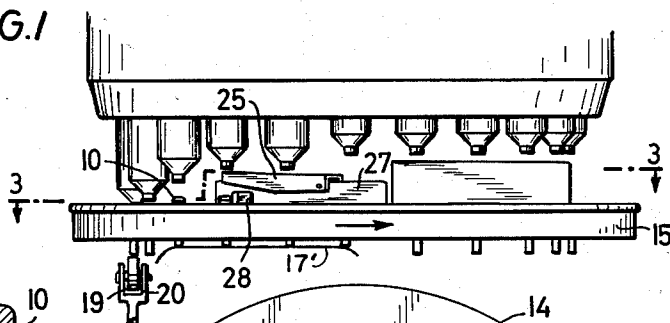


FIG. 3

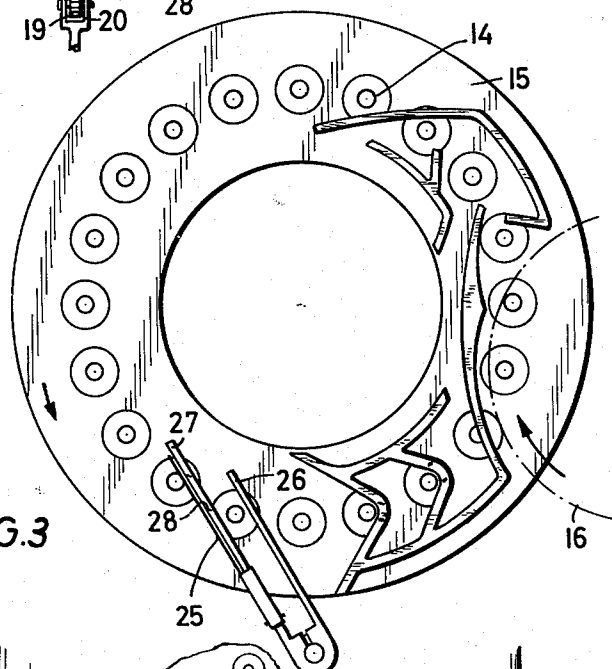
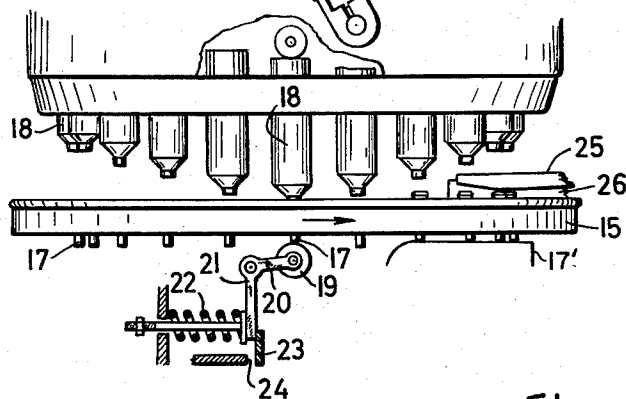


FIG. 4



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TABLETTEING PRESSES

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Filed May 15, 1956, Ser. No. 585,078

Claims priority, application Germany May 21, 1955

7 Claims. (Cl. 209—79)

This invention relates to apparatus for compressing a coating of powdered material around a preformed core.

It is known per se for cored tablets to be manufactured on rotatable tableting presses. In such cases, a bottom layer or "fill" of the coating material is first introduced into a die apparatus on top of a lower punch and initially compressed.

A core which has been made independently on a separate machine is then laid in position on top of the bottom fill. Finally, after suitable continued descending movement of the lower punch, a top coating layer or "fill" is introduced into the die aperture and the whole is then pressed between the lower punch and an upper punch so that a sufficient consolidation of the coating material is obtained and the margins of the two outer layers covering the core are firmly united with one another.

It may occasionally happen that, for some reason or other, no core tablet is placed in a die aperture so that an imperfect tablet consisting entirely of coating material is produced and must be discarded. However, this presents some difficulty, since the absence of a core cannot be detected by visual inspection.

An object of the present invention is to provide a device which is controlled by the compression pressure so as to detect such imperfect tablets and eject them separately. The control of the device for the separate ejection of imperfect, coreless tablets may be effected by a pressure-equalizing roller for the bottom punches of the apparatus, which roller is arranged in a pressing zone and is resiliently supported. When a normal tablet is guided in its die aperture for final shaping over the pressure-equalizing roller, the bottom fill of coating has been initially compressed and the core has been finally compressed. Consequently, it is only a final pressing of the upper fill of coating material which takes place. Because the upper fill is comparatively small, the pressure-equalizing roller is forced back a comparatively large distance. However, the conditions are somewhat different if no core has been introduced into the die aperture as in such case, it is also necessary for that part of the coating material which takes the place of the absent core to be compressed. In this case, there is a less extensive retraction of the pressure-equalizing roller since the coating material is introduced in measured amounts and there is less material in the die aperture when no core is present.

The pressure-equalizing roller may be supported by links or by any other supporting device which in turn is resiliently retracted. The supporting device can, in a simple manner, be made to actuate a switch from which is operated a storage mechanism which in turn subsequently controls the adjustable ejection device. The ejection may be effected, for example, by two stripper devices arranged one behind the other in the direction of rotation of the die plate or table, it being possible to move the first of these stripper devices at will into and out of its operative position, the second being fixed.

The storage mechanism can consist of a disc rotating with the die plate or table and provided with electric condensers. Adjacent this disc, is a charging contact which receives electric current from a current source as long as a micro-switch controlled by the compression pressure in the preparation of the tablets is closed. The arrangement can be such that the micro-switch is closed

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when the compression pressure is too weak so that, under these conditions, the condenser just moving past the charging contact is charged. Moreover, a discharging contact for discharging the condenser is also arranged at a suitable point adjacent the rotatable disc and in turn controls a relay which controls the adjustable stripper device for removing the tablets from the die plate or table. This discharging contact is arranged at a distance from the charging contact which corresponds to the spacing between the pressing station and the ejecting station. In the time in which a condenser, charged because of the pressing of a coreless tablet, has been advanced from the charging station at the charging contact to the ejecting station at the discharging contact, the coreless tablet has also moved as far as the ejecting station. Owing to the operation of the movable stripper device, the coreless tablet is then ejected separately from the other tablets, i.e. the tablets containing cores.

It is necessary that the movable stripper should be held in its stripped position for a time, in practice, during one shifting movement of the die plate. In order to achieve this, the relay operated by the discharge contact closes an additional circuit in which the relay itself is arranged in addition to closing the circuit of a solenoid for the stripper. As the relay has been closed through the discharge contact, it remains in the closed position until the holding circuit is in turn broken by a circuit breaker which is held in the closed position by a lever applied by pressure (for example, the pressure of a travelling punch), for a period of time which is necessary for the coreless tablet to pass through the stripper.

If a tablet without a core is compressed, the corresponding control impulse is recorded by the storage mechanism and subsequently used for the control of the movable stripper device in such manner that, for example, all normal tablets containing a core are ejected by the movable stripper, but that the stripper is lifted out of the path of movement of the tablets on the arrival of a coreless tablet. This coreless tablet then travels in front of the fixed stripper device which ejects into a separate collecting means.

An embodiment of the invention is shown by way of example in the accompanying drawings in which:

FIGURE 1 is a side elevation of the pressing portion of a rotatable tableting press,

FIGURE 2 is an enlarged vertical cross-section of a cored tablet,

FIGURE 3 is a corresponding plan view, substantially on the line 3—3 of FIGURE 1,

FIGURE 4 is a side elevation corresponding to FIGURE 1, but seen from another direction, and

FIGURE 5 is a plan view of the pressing and discharge zones of the die plate or table with a storage mechanism.

As shown in the drawings, a cored tablet 10 consists of a bottom coating 11, a core 12 and a top coating 13.

To produce such a tablet a measured quantity of comminuted coating material for the bottom layer 11 is introduced into one of a number of die apertures 14 (FIGURE 3) of the die plate or table 15 of a rotatable tableting press. The core 12 is laid in position in the die aperture when the bottom layer or "fill" is in position. This may be effected by a depositing plate or table 16 (which is diagrammatically indicated in FIGURE 3) or by any other suitable means. The coating material for the top layer or "fill" 13 is then introduced into the die aperture. The tablet 10 is then compressed as a unit at high pressure. The pressing is effected in the vertical die apertures 14 of the die plate or table 15 between bottom punches 17 and top punches 18 there being a guide track 17' below and in contact with the lower ends of bottom punches 17. The maximum compression pressure is produced in a pressing zone, shown at the center

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of FIGURE 4, in which the bottom punch 17 travels over a pressure-equalizing roller 19 while the top punch 18 is moved downwardly to its lowest end position. The equalizing roller 19 is mounted on bell-crank 20, an arm 21 of which is loaded by a supporting spring 22. The arm 21 also carries an electrical contact lever 23 which can touch an opposite contact 24 when the equalizing roller 19 has been forced back a sufficient distance.

If a core 12 has been correctly deposited in the die aperture 14 by the distributing plate 16, the equalizing roller 19 in the pressing zone is retracted in the downward direction for a large distance. The consequence of this movement is that the contacts 23 and 24 come into engagement. On the other hand, if the tablet in the die aperture is an imperfect one which does not contain any core the same downward pressing movement of the top punch 18, acting through the bottom punch 17, retracts the pressure-equalizing roller to a smaller extent, because the die aperture contains less material.

On each occasion that a tablet passes the pressing zone, an electrical storage device records whether or not contact has been made or not made by the two switch contacts 23 and 24. When a tablet subsequently approaches the discharge position, this tablet is selectively ejected over the edge of the die plate 15 by one of two different discharge devices, according to whether or not the said tablet contains a core.

The discharge devices are two separate strippers 25 and 26 (FIGURE 3) disposed in spaced relation respectively ejecting cored and coreless tablets. The first stripper 25 is disposed in front of, and is fitted to, a bridge-shaped support 27 having an opening 28 through which tablets 10 can pass. The stripper 25 is caused to be moved downwards to eject a cored tablet by electromagnetic means energized by a current discharged by the electrical storage device so as to close the opening 28. The opening 28 remains open when a coreless tablet is advancing of the rotating die plate 15 so that the imperfect tablet is then discharged laterally by the stripper 26.

The arrangement described in the previous paragraph can be modified so that the stripper 25 is usually lowered and the opening 28 is closed. It is then only occasionally, when a coreless tablet has been manufactured, that the stripper 25 is raised by the storage device into the position shown in FIGURE 2. The coreless tablet 10 then passes through the opening 28 and finally strikes against the stripper 26 which is fixed and fed by this stripper 26 to a separate receptacle.

It is essential that the electrical impulse which is produced by the closing of the contacts 23, 24 by a tablet in zone A (FIGURE 5) and transmitted to the electrical storage device is retained until the same tablet has reached the discharge zone B.

If in the FIGURE 3 arrangement the tablet pressed in the zone A has a core, an electric impulse is produced by a micro-switch 30 in the manner explained with reference to FIGURE 4, the switch 30 corresponding to the two contacts 23 and 24 of FIGURE 4. If there is no core, the switch 30 does not produce an impulse.

The electrical storage device comprises a series of condensers 31 arranged on a disc 32 rotating in synchronism with the die plate or table 15.

Contacts 33 are provided at the circumference of disc 32 and each of them is connected to one of the condensers 31. If a contact 33 slides past a charging contact 34 with the micro-switch 30 closed, the condenser which is now connected becomes charged. Such a charging occurs each time that a cored tablet has been compressed in the pressing operation illustrated in FIGURE 4.

While the tablet producing the electrical impulse is travelling forward from the pressing station A to the discharge station B, the disc 32 also travels forward and the charged condenser, through its contact 33, becomes connected with the discharge contact 35. In this position,

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the condenser discharges and in so doing energizes a magnet relay 36, which closes the contacts 37 and 38 of two circuits. The circuit closed by the contact 37 energizes a solenoid 42 to operate the stripper 25.

The contacts 38, which are also closed by the magnet relay 36, are in a circuit in which the coil of the magnet relay itself is disposed. Thus, the coil remains energized even when the condenser is discharged, provided that a circuit breaker 39 arranged in the circuit is closed. The closing of this circuit breaker 39 is effected by a lever 40, having a bearing surface 41. The circuit breaker 39 is held in the closed position as long as a top punch 18 is moving past the bearing surface 41. The surface 41 is of such a length that the tablet producing the electrical impulse has sufficient time to move through the opening 28 of the frame 27, or alternatively is rejected by stripper 25.

What I claim is:

1. A tableting press for the manufacture of cored tablets comprising a die plate provided with a die aperture, a pair of punches movable in said die aperture, compression rollers between which said die punches can pass so that compression pressure is exerted on them, two ejecting devices selectively operable one at a time for ejecting tablets produced in said die aperture, and means responsive to the loading applied to said punches during compression between said rollers to select one of said ejecting devices.

2. A tableting press for the manufacture of tablets by compressing a coating of comminuted material around a preformed core comprising a rotatable die plate provided with a plurality of die apertures, a plurality of pairs of punches each of which pairs is movable in one of said apertures, compression rollers between which each pair of punches is movable in turn to compress comminuted material around a core, a first ejection device for ejecting tablets having a core, a second ejection device for ejecting tablets consisting entirely of coating material, and means operable in response to the loading applied to a pair of punches as they pass between said rollers to select one of said ejection devices for ejecting the tablet compressed by that pair of punches.

3. A tableting press for the manufacture of tablets by compressing a coating of comminuted material around a preformed core comprising a rotatable die plate provided with a plurality of die apertures, a plurality of pairs of punches each of which pairs is movable in one of said apertures to produce a tablet and raise the tablet so produced out of said aperture, a resiliently supported compression roller acting on one of each pair of punches in turn to assist in compressing material around a preformed core, two separate ejection devices one of which is operable to eject tablets having cores and the other of which is operable to eject imperfect tablets consisting entirely of coating material, and means operable in response to the differences in movement of said resiliently supported roller when acting through one of said punches on cored or imperfect tablets to select which of said ejection devices is to eject the tablet compressed with the assistance of that punch.

4. A tableting press as claimed in claim 3 in which said means comprise an electric switch operable in accordance with movement of said resiliently-supported roller to transmit electrical impulses, and a storage device adapted to receive said impulses and to act on them subsequent to the operation of said switch.

5. A tableting press for the manufacture of tablets by compressing a coating of comminuted material around a preformed core comprising a rotatable die plate provided with a plurality of vertical die apertures, a plurality of pairs of punches each of which pairs is movable in one of said apertures to compress comminuted material in said aperture and to raise the tablet so produced to the surface of said plate, a fixed stripper arranged to be engaged by tablets produced in said apertures as said plate rotates thereby to eject said tablets, a movable

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stripper selectively movable into a position in front of said fixed stripper for ejecting tablets which engage it, a resiliently-supported compression roller displaceable by one of each pair of punches in turn in accordance with the pressure applied to material in said apertures, and means operable to place said movable stripper in position whenever said compression roller has been displaced a predetermined amount.

6. A tableting press for the manufacture of tablets by compressing a coating of comminuted material around a preformed core comprising a rotatable die plate provided with a plurality of vertical die apertures, a plurality of pairs of punches each of which pairs is movable in one of said apertures to compress comminuted material in said aperture and to raise the tablet so produced to the surface of said plate, a fixed stripper arranged to be engaged by tablets produced in said apertures as said plate rotates thereby to eject said tablets, a movable stripper selectively movable into a position in front of said fixed stripper for ejecting tablets which engage it, a resiliently-supported compression roller displaceable by one of each pair of punches in turn in accordance with the pressure applied to material in said apertures, a storage disc rotatable in synchronism with said die plate, a plurality of electric condensers carried by said disc, a first electric circuit, a charging contact adapted to connect each condenser in turn with said first electric circuit, an electric switch connected in said first electric circuit, means movable by said resiliently-supported compression roller for closing said switch when said roller is displaced by a predetermined amount whereby an electric impulse is transmitted to one of said condensers through said charging contact, a sec-

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ond electric circuit, a discharging contact adapted to connect each condenser in turn with said second electric circuit, and an electric relay connected in said second electric circuit and operable by the discharge of a condenser connected with it through said discharging contact in order to place said movable stripper in position to engage a tablet.

7. A tableting press as claimed in claim 6 comprising a solenoid adapted to be energized by said relay to displace said movable stripper, an electrical circuit breaker in said second electric circuit, and a lever engageable by one of each pair of punches in turn to hold said circuit breaker in its closed position until an imperfect tablet has passed said movable stripper.

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