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(54) TABLETTING MACHINE

(71) We, WILHELM FETTE GMBH, of Postfach 1180, 2053 Schwarzenbek, Germany, a Germany Body Corporate, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a tabletting machine for producing multiple-layer tablets comprising a rotary die disc associated with at least two filler devices having filling means for introducing tablet powder into circumferentially arranged dies in the disc.

In such machines it is necessary for control purposes to be able to detect the weight possessed by the first introduced layer of tablet powder in each die, since thereon depends the weight of the second layer introduced on top of the first layer and in many cases consisting of the effective substance of the tablet. Heretofore such control examinations have been found to be complicated and partly to be unsatisfactory as to the result, because of the following circumstances.

It would be possible in theory to eject by means of an ejector the first introduced layer of a tablet during the rotation of the die disc, constructed similarly, i.e. it is so constructed which follows the first filling station, and to measure the layer. In practice, however, this cannot be performed, because the first layer is pressed relatively softly in order that it adheres to the second layer, and thus the first layer is liable to break up during ejection.

If, in contrast, the first layers are allowed to travel through the second filling station and are then ejected for control purposes after travelling through a second pressing station, a weight measurement would not give sufficient information relating to the weight proportion of the first layer in relation to the weight proportion of the second layer and the proportion of the effective substance of the tablet. Attempts have been made to overcome this problem by increasing the pressing forces of the first pressing station while tablet layers for control purposes travelled through. However, in such cases the disadvantage arises that after the removal of samples which are pressed harder than usual, the pressing forces had to be readjusted, in order that a perfect joint can be produced between less strongly pressed first layers and a second subsequently deposited layer. In such cases, the values measured are not valid also for the tablets produced thereafter under different pressing conditions.

A machine is also known where a die is blocked off after it has received a first layer, as it passes the second filling station. The material in the half-filled die is then compressed in the pressing station, and discharged for measurement and control purposes.

According to the present invention, there is provided a tabletting machine for the production of multiple-layer tablets comprising a rotary die disc associated with at least two filling devices having filling means for introducing tablet powder into circumferentially arranged dies in the disc, wherein at least one filling device is provided with a filling wheel, a metering wheel and a driving means by means of which it is displaceable into and out of the travelling path of the dies in the disc during rotation of the disc.

If in such apparatus the second filling device is displaced away from the die disc for the purpose of weight control of one or more layers of the tablet, the pressing station following it can still be utilised prior to the ejection of the tablet to be examined, and there is no need for re-adjusting any pressing station after the displaced filling device has been rendered operative again. If, on the other hand, with the filling device displaced, samples are taken during the running of the machine and thereafter an adjustment of the

second pressing station is found necessary, this does not render necessary also a readjustment of this pressing station when the filling device has been brought into use again. It is also of advantage if it is taken into account that according to experience the tabletting machine produces an accurate weight only after a certain starting period. A further advantage results from the low loss of highly valuable tablet material during control procedure. Finally a considerable saving of time can be obtained in comparison with control methods in known tabletting machines.

According to a further development of the invention, it has been found advantageous if the filling device is arranged to be displaceable rectilinearly and if for this purpose the filling device is provided with guide rollers which run in a guide slot of a carrier plate, so that the rectilinear displacement to and fro can be effected rapidly and easily. For this purpose the filling device may advantageously be provided with a piston rod which is pneumatically or hydraulically or electrically actuable. It is possible in such an arrangement to remove samples during the full running of the machine from under the conventional protective cover without interruptions of the operation by short-term displacement of the filling device, to adjust the machine during its running and thereafter to continue to produce multiple-layer tablets. This is possible even in relatively large or heavy machines without the need for displacing together therewith also for example the driving motor disposed above the filling device, because according to one embodiment of the invention the filling device may be connected to its driving motor by means of a telescopic articulated shaft. Also a flexible pipe or tube may be used for connecting the filling device to a stationarily disposed relatively heavy hopper.

Although reference is made above merely to a first and a second filling station or filling device and pressing station, no limitation of the invention is to be seen therein to tabletting machines having only two filling devices. Such terminology was selected in conjunction with the description of the production of a two-layer tablet. However, the invention may be realised likewise on machines for producing tablets having three or four layers, which accordingly comprise three or four filling devices and three or four pressing stations, because there the same problems can be solved with the same means according to the invention; in this case it may even be of advantage when not only one, but several or all filling devices can be provided with their own driving means, by means of which they are displaceable, either individually or partly commonly, into and out of the travelling path of the dies in the disc during the rotation of the disc.

One constructional example of the invention is explained below with reference to the accompanying drawings, in which:

Figure 1 is a diagrammatic illustration of a die disc with two filling stations and two pressing stations;

Figure 2 is a plan view of a filling device;

Figure 3 is a partial cross-section of drive means of the filling device in side view, and

Figure 4 shows the drive means of the filling device in front view.

The tabletting machine illustrated in the drawings comprises a die disc 1 which carries circumferentially arranged dies and rotates counter-clockwise in the direction of the arrow 2 in Figure 1. The machine is designed for producing two-layer tablets. For this purpose two filling stations F1 and F2 are disposed at two mutually opposite locations, and two pressing stations P1 and P2 are located therebetween.

In the filling station F1 a first powder layer is introduced into the dies of the disc and is pre-pressed at the pressing station P1. In the filling station F2 introduction of a second powder layer is effected and this layer is pressed together with the first layer in the pressing station P2. The ejection of finished tablets occurs between the second pressing station P2 and the first filling station F1.

The respective filling devices disposed at the stations F1 and F2 are displaceable out of the travelling path of the dies 3 in the disc 1 by special driving means. The construction of an individual filling device at station F1 or F2 and the driving means associated therewith is shown in plan view in Figure 2.

The illustrated filling device comprises a bottom plate 4 on which a drive housing 5 is arranged. A filler wheel 6 with radially directed wings 7 rotates in the bottom plate 4 in the clockwise direction of the arrow 8. In the operative position of the filling device, the wings 7 pass over the individual dies 3 and thereby fill them with tablet powder. Behind the filling wheel 6, there is disposed a metering wheel 9 with cranked wings 10 which rotates in the anticlockwise direction of arrow 11. By means of this metering wheel, excess powder above the individual dies is swept away and returned into the operative region of the filler wheel 6. The supply of powder to the filler wheel is effected through a tube (not shown) which is connected to the upper side of the drive housing 5.

The filling device is mounted for rectilinear displacement radially of the disc 1 on a carrier plate 12. For this displacement of the filling device, a compressed air cylinder 13 is provided in which a piston is reciprocably mounted and connected to a piston rod 14 reciprocable in the direction of the double-arrow 15. A plate 16 which supports a bridge member 17 is attached to the end of

the piston rod 14. Two guide rollers 18 and 19 are rotatably mounted on the bridge member 17. The guide rollers 18 and 19 run in a guide slot 20 which is located in the stationary carrier plate 12. Shafts 22 and 23 of the two guide rollers 18 and 19 are mounted on the bottom plate 4 of the filling device.

During a reciprocatory displacement of the piston rod 14 corresponding to the arrow 15, the filling device which consists substantially of the bottom plate 4 and the housing 5 is displaced to and fro in a radial direction relative to the disc 1. The extent of displacement is approximately 4 cm, and sufficiently great that when the device is retracted the dies 3 of the disc 1 can freely travel through under the filling station, whereas when the device is in its operative position they can be completely swept over and filled.

During the advance of the filling device into the operative position, the device is locked or pulled downwardly together with its bottom plate by the effect of a wedge 24 which is rigidly connected to the stationary bottom plate 12 as shown in Figure 3.

In order that a driving motor A for driving the filling and metering wheels of the filling device need not be displaced during a displacement of the device, the drive of the device is effected by means of a telescopic articulated shaft 25 as shown in Figure 4, in which only the lower section of the articulated shaft 25 with its joints is illustrated. The upper section below the driving motor A is constructed similarly, i.e. at is so constructed that an angular movement and an axial extension can occur.

WHAT WE CLAIM IS:—

1. A tabletting machine for the production of multiple-layer tablets comprising a rotary die disc associated with at least two filling devices having filling means for introducing tablet powder into circumferentially arranged dies in the disc, wherein at least one filling device is provided with a filling wheel, a metering wheel and a driving means by means of which it is displaceable into and out of the travelling path of the dies in the disc during rotation of the disc.

2. A machine according to claim 1, wherein said at least one filling device is arranged for rectilinear displacement.

3. A machine according to the claim 1 or 2 wherein said at least one filling device is provided with guide rollers which run in a guide slot of a carrier plate at the level of the disc.

4. A machine according to claim 1, 2 or 3 wherein said at least one filling device is connected to a piston rod which is pneumatically, hydraulically or electrically actuable.

5. A machine according to any preceding claim wherein said at least one filling device is provided with locking means for holding it in the operative position in the path of the disc dies.

6. A machine according to any preceding claim, wherein said at least one filling device is connected to a stationary driving motor for the filling means by means of a telescopic articulated shaft.

7. A tabletting machine substantially as herein described and shown in the accompanying drawings.

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1581890 COMPLETE SPECIFICATION

3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

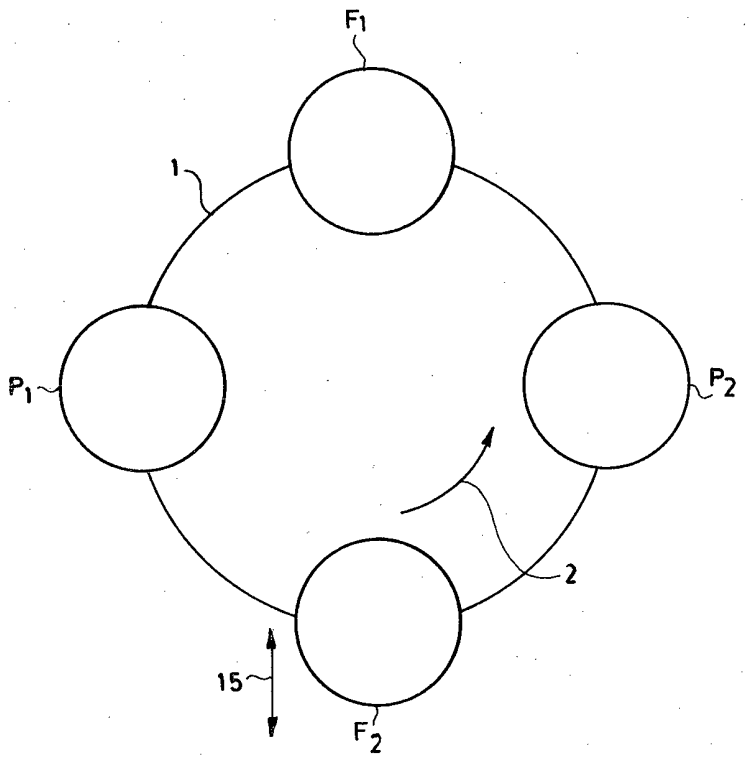

Fig.1

1581890 COMPLETE SPECIFICATION

3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 2

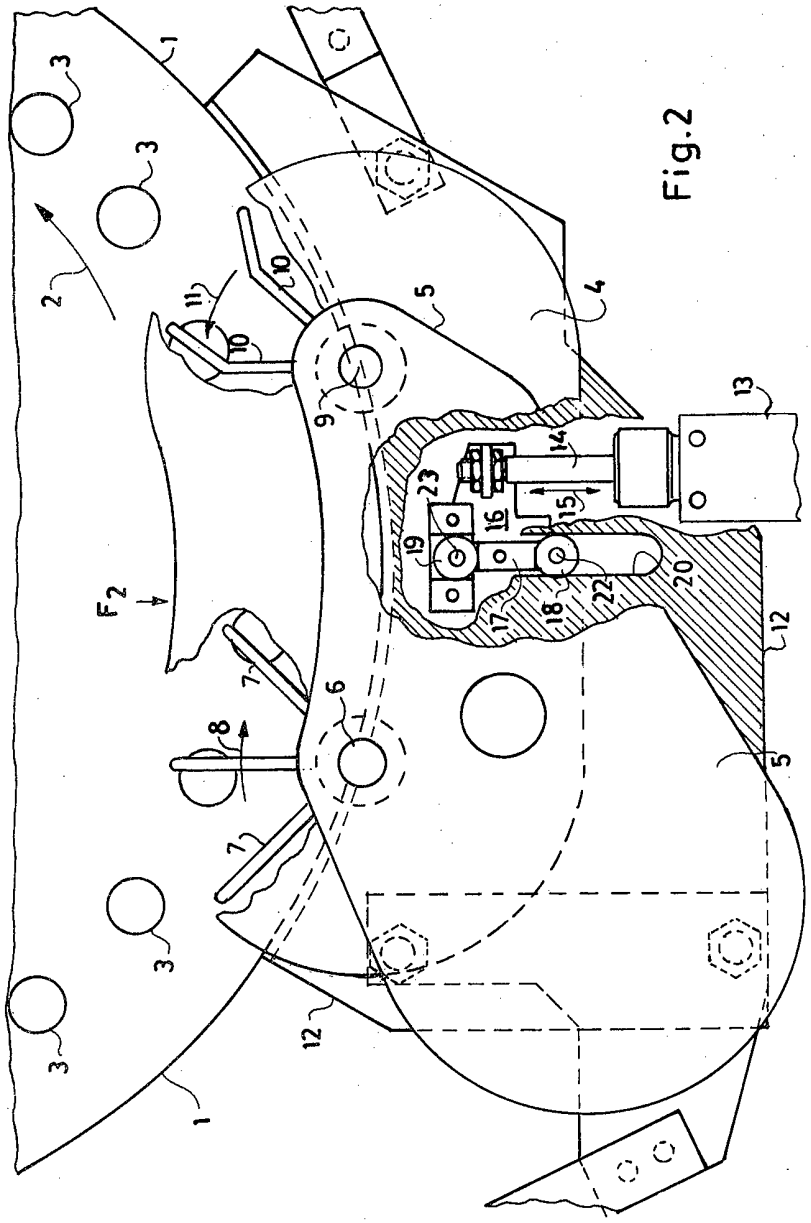

Fig.2

1581890 COMPLETE SPECIFICATION
3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 3

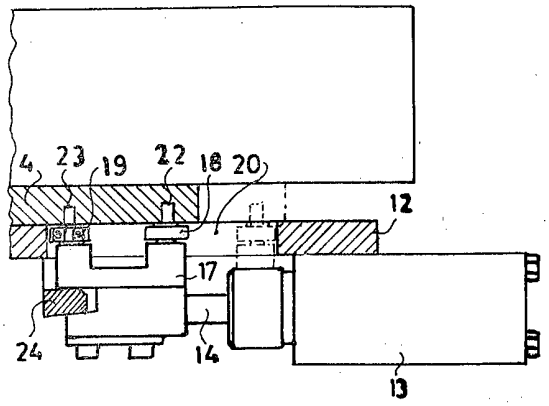

Fig.3

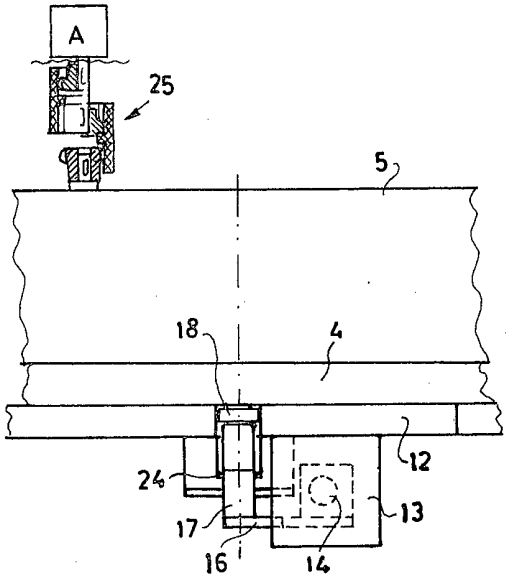

Fig.4