

Shimada et al.

[11] **3,912,441**

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- |      |   |           |        |                      |           |
|------|---|-----------|--------|----------------------|-----------|
| [54] | <b>COMPRESSING ROLL IN ROTARY POWER</b>           | 2,881,475 | 4/1959 | Wilckens .....       | 425/809 X |
|      | <b>COMPRESSION MOLDING MACHINE</b>                | 2,973,555 | 3/1961 | Schwepke .....       | 425/324 X |
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| [76] | Inventors: <b>Yasuo Shimada; Giichiro Kowada,</b> | 3,431,598 | 3/1969 | Lueddeke et al. .... | 425/348 X |
|      | both of 104, Minamikamiaia                        | 3,633,245 | 1/1972 | Partos .....         | 425/261 X |
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### Related U.S. Application Data

- [63] Continuation of Ser. No. 314,851, Dec. 13, 1972, abandoned.

- [52] **U.S. Cl.** ..... 425/348; 425/261; 425/804  
[51] **Int. Cl.** ..... B29c 3/00  
[58] **Field of Search** ..... 425/261, 804, 348, 361

[56] **References Cited**

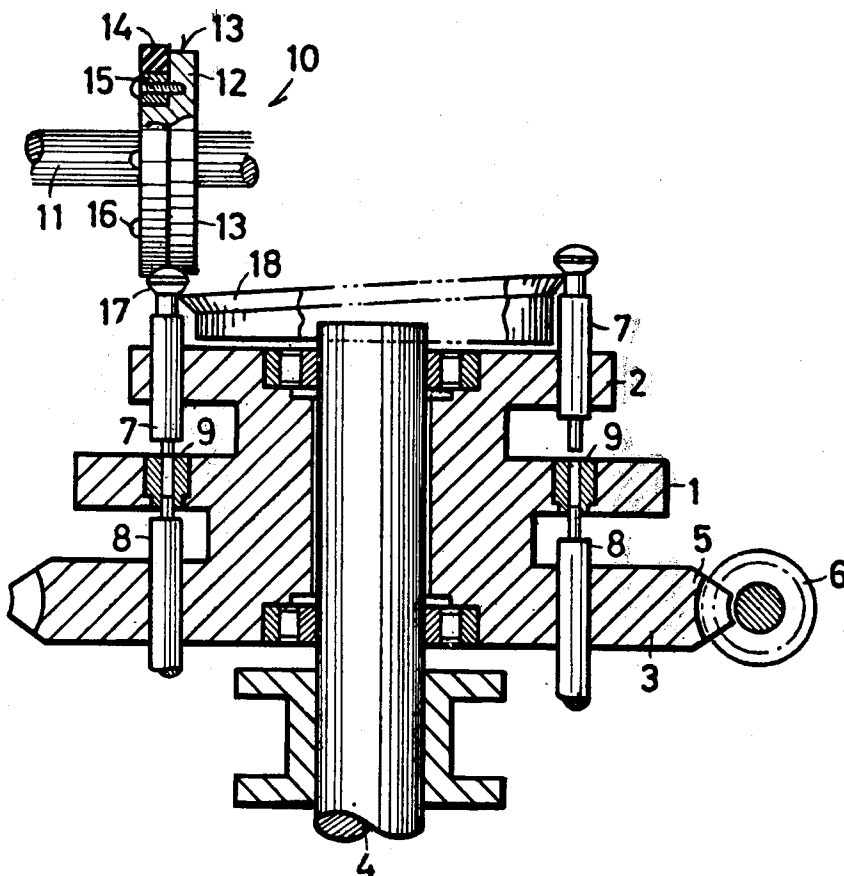
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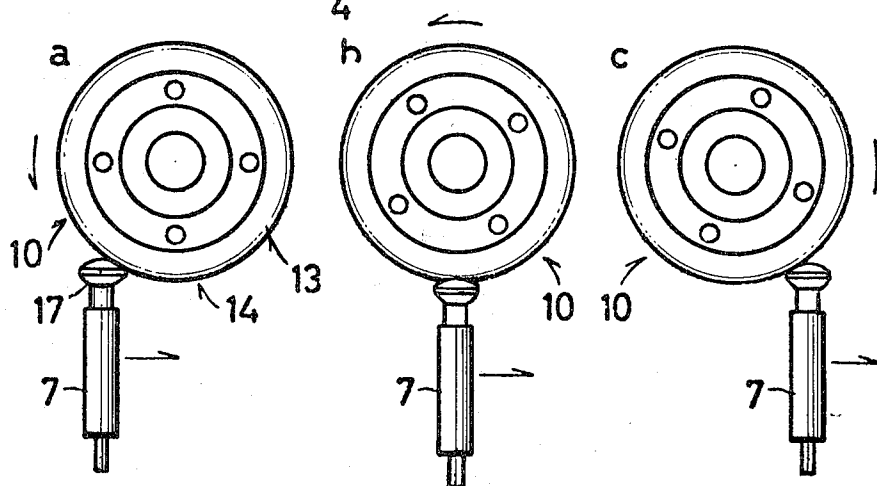
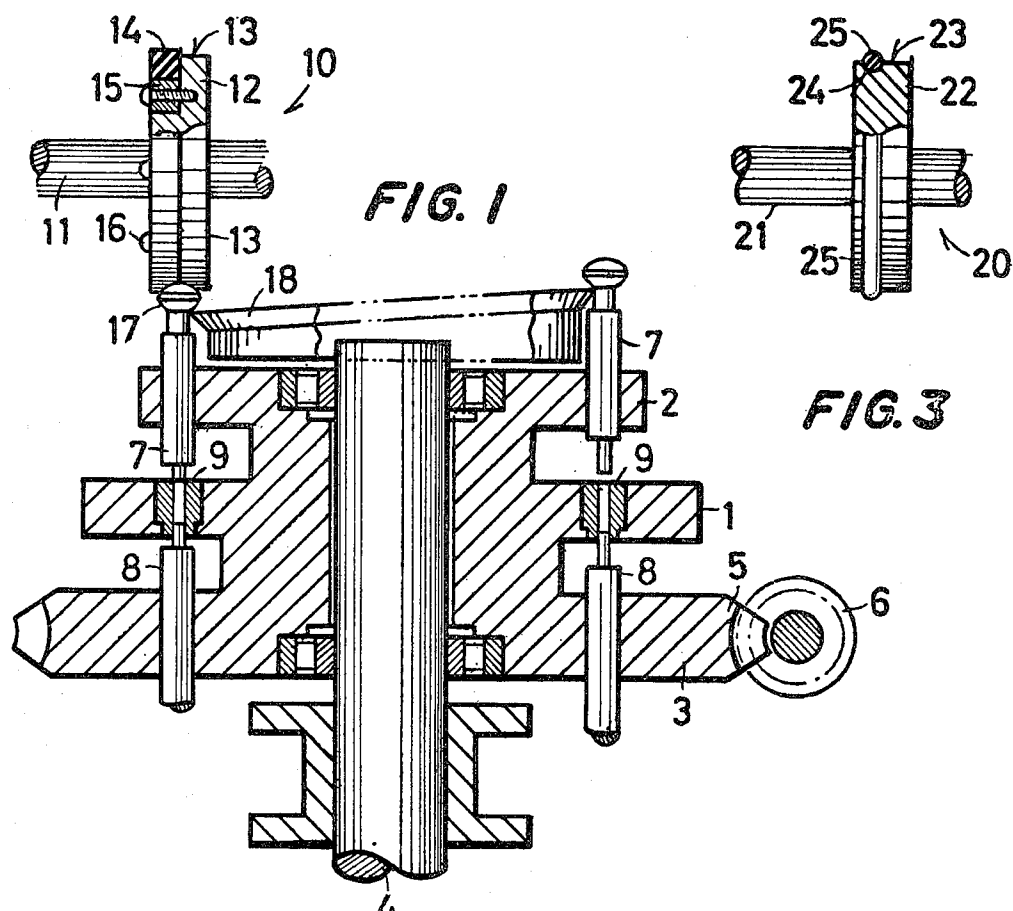
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[57] **ABSTRACT**

A compressing roll in rotary powder compression molding machine having an elastic substance, such as rubber or the like, attached to a part of a peripheral surface of a compressing roll body that contacts with each punch head, thereby pressing the punch little by little and also releasing it little by little.

### 3 Claims, 3 Drawing Figures





**FIG. 2**

## COMPRESSING ROLL IN ROTARY POWER COMPRESSION MOLDING MACHINE

### RELATED U.S. APPLICATION

Continuation application of Ser. No. 314,851, filed Dec. 13, 1972, now abandoned.

### BACKGROUND OF THE INVENTION

The present invention relates to a compressing roll in a rotary powder compression molding machine, and more particularly to a compressing roll in a rotary powder compression molding machine having an elastic substance, such as rubber or the like, attached to a part of a peripheral surface of a compressing roll body that contacts with each punch head.

As is well known, the rotary powder compression molding machine is a machine for producing mold goods shaped like tablets of medicines, foodstuffs, agricultural chemicals, electrical parts, industrial chemicals, etc., being so designed that each punch is lifted and lowered from above and under a number of dies provided in the turntable, and with the rotation of the turntable the die is filled with powder, which is compressed with the compressing roll disposed in the compression position by pressing said punch, then discharging the mold goods produced. This operation is repeated cyclically and thus mold goods is produced one after another.

In such a molding machine, when the punch begins to be pressed by the compressing roll, that is, when the punch, which has been moved to the compression position by the rotation of the turntable, contacts with the compressing roll, the punch and the compressing roll receive violent impact, and then the punch is suddenly pressed by the compressing roll until it comes to the maximum compression position, and after it has passed the maximum compression position, it is suddenly released, thus it has such great disadvantages that the time the powder is kept compressed, namely compression time, is very short, and that the condition of compression is very bad.

For the above reasons the punches and the compressing roll get worn, make loud impact noises, and the mold goods produced is apt to be of inferior quality and liable to cause capping, etc.

### OBJECTS OF INVENTION

The object of this invention is to overcome these drawbacks of the conventional molding machines.

That is, it is an object of the present invention to provide an improved compressing roll in a rotary powder compression molding machine wherein it is possible to eliminate impact at the moment the punch begins to contact with the compressing roll and to eliminate noises and wear of the punches and compressing roll.

Another object of the present invention is to provide an improved compressing roll in a rotary powder compression molding machine wherein the time powder is kept compressed is prolonged, and consequently it is possible to obtain mold goods of superior quality with little capping, etc.

A further object of the present invention is to provide an improved compressing roll in a rotary powder compression molding machine wherein an elastic substance, such as rubber or the like, attached to a part of

a peripheral surface of the compressing roll body can be easily replaced when worn.

### SUMMARY OF THE INVENTION

Briefly, the present invention is an improvement on conventional compressing roll in a rotary powder compression molding machine, having an elastic substance, such as rubber or the like, attached to a part of a peripheral surface of a compressing roll body that contacts with each punch head, and so designed that, before said punch contacts with a compressing roll body of said compressing roll, it contacts with said elastic substance, and then after said punch has left the compressing roll body it keeps contacting with said elastic substance for a while.

### BRIEF DESCRIPTION OF THE INVENTION

The nature and object of the invention will be more fully apparent from the following detailed description of preferred embodiment thereof, taken in connection with the accompanying drawings in which:

FIG. 1 is an elevation showing in relation with an upper punch a form of a compressing roll in a rotary powder compression molding machine embodying the present invention,

FIG. 2 is a side elevation showing the condition of contact of said compressing roll with the upper punch, and

FIG. 3 is an elevation showing a modified form of the compressing roll in a rotary powder compression molding machine embodying the present invention.

### DETAILED DESCRIPTION

A preferred embodiment of the compressing roll in a rotary powder compression molding machine of the present invention is illustrated in FIGS. 1 and 2 of the drawings.

Referring to FIG. 1, a turntable 1, an upper punch holding block 2 and a lower punch holding block 3 are formed in one unit, which can rotate round a shaft 4 which runs through a hole in the center of said one unit. Said unit of turntable 1, etc. is rotated at a uniform speed by a worm wheel 5 provided on a periphery of said lower punch holding block 3 meshing with a worm 6 which is driven by a prime mover.

Upper punches 7 run through the holes made in the upper punch holding block 2 along a circumference at proper intervals. Likewise, lower punches 8 run through the holes made in the lower punch holding block 3 along a circumference. Said turntable 1 has a dies 9 in it, and into this dies a projection of said upper punch 7 and a projection of said lower punch 8 are inserted from above and under respectively.

A compressing roll 10 is disposed in compression position, and by this compressing roll 10 said upper punch 7 is pressed downward, thereby compressing and molding powder.

Said compressing roll 10 is so constructed that a part of a peripheral surface 13 of a compressing roll body 12 having in its center a shaft 11 running through it is notched annularly, and in this notched portion is attached with screws 16 a metallic ring 15 having an elastic substance 14 attached on its periphery so as to form one body. The peripheral surface of said elastic substance 14 is a little raised from said peripheral surface of said compressing roll body 12.

In the drawing, 17 is the head of said upper punch and 18 is a guide rail of said upper punch.

Referring to FIG. 2, FIG. a shows the upper punch 7 just beginning to contact with the compressing roll 10, that is, the head 17 of the upper punch 7 contacting with the elastic substance 14 of the compressing roll 10. FIG. b shows the upper punch 7 in the maximum compression position, the head 17 of the upper punch 7 contacting with the compressing roll body 12 of the compressing roll 10 and the elastic substance 14. FIG. c shows the upper punch 7 just before it leaves the compressing roll 10, with the head 17 of the upper punch 7 contacting with the elastic substance 14 of the compressing roll 10 just as in FIG. a.

In operation, when the turntable 1 rotates, the upper punch 7 contacts with the compressing roll 10 in the order of FIG. a, FIG. b and FIG. c, and is pressed by the compressing roll 10. In the position shown in FIG. a, the upper punch 7 contacts with the elastic substance 14 of the compressing roll 10, but it does not contact with the compressing roll body 12, so that the upper punch 7 and the compressing roll 10 do not receive impact, and consequently they neither get worn nor make any loud noises.

Next, in the process from the position shown in FIG. a to the position immediately before that shown in FIG. b, the upper punch 7 keeps being pressed little by little by the elastic substance 14 of the compressing roll 10; consequently compression time is prolonged and the condition of compression is improved.

In the position shown in FIG. b, the upper punch 7 contacts with the elastic substance 14 which has been deformed under maximum compression load and the compressing roll body 12, and is pressed by the peripheral surface of the compressing roll body 12. Lastly, in the process from the position immediately after that shown in FIG. b to the position shown by FIG. c, the upper punch 7 is released little by little while being pressed by the elastic substance 14 of the compressing roll 10, so that time of compression is prolonged and the condition of compression is improved accordingly.

Another embodiment of the compressing roll in a rotary powder compression molding machine of the invention is illustrated in FIG. 3.

Referring to FIG. 3, a compressing roll 20 is so constructed that an annular groove 24 is provided on a part of a peripheral surface 23 of a compressing roll body 22 having a shaft 21 in its center, and to this annular groove 24 is attached an elastic substance 25, just like a ring in the case of oil seal. The peripheral surface of said elastic substance 25 projects a little from the pe-

ripheral surface of said compressing roll body 22.

Although the invention has been particularly shown and described, it is contemplated that various changes and modifications may be made without departing from the scope of the invention as set forth in the following claims. Therefore, the compressing roll in the rotary powder compression molding machine according to this invention, like a preferred embodiment of the invention, can be used not only as a compressing roll for the upper punch, but also as a compressing roll for the lower punch. Further, the compressing roll of this invention may be, like the above-mentioned preferred embodiment, one whose shaft is either horizontal and rotated uninclined, or one whose shaft is not horizontal and rotates inclined.

We claim:

1. The improvement in a compressing roll for a powder compression machine wherein there is a shaft (4), a turntable (1) with a punch block (2) disposed for rotation on said shaft, drive means (5, 6) for rotating said turntable and, at least first and second punches disposed on said turntable outward from said shaft said punches including an elongated member journaled in said block (2) for up and down stroke movement parallel to said shaft (4) die means (9) engaged by said punch in said down stroke movement, a head (17) on said punch and a circular guide rail (18) disposed at an angle to said shaft to engage said head (17) raising and lowering said punch as said head travels along said guide rail, said improvement in said compressing roll comprising having said compressing roll (10) disposed to tangentially engage said head (17) as said punch reaches said rail lowering position said compressing roll (10) having a peripheral surface (13) with elastic means thereon, said elastic means prolonging the tangential period of contact between said compressing roll and said head (17).

2. The arrangement as claimed in claim 1, wherein said elastic means is formed in one body with a metal ring, and attached to a notch formed on a peripheral surface of the compressing roll, a peripheral surface of the elastic means being raised a little from the peripheral surface of said compressing roll.

3. The arrangement as claimed in claim 1, wherein said resilient means is attached to an annular groove formed on a peripheral surface of the compressing roll, a peripheral surface of said resilient means being raised a little from a peripheral surface of said compressing roll body.

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