May 6, 1930. F. KILIAN 1,757,370

APPARATUS FOR PRESSING PULVERULENT SUBSTANCES INTO BOXES

Filed July 12, 1927 4 Sheets-Sheet 1

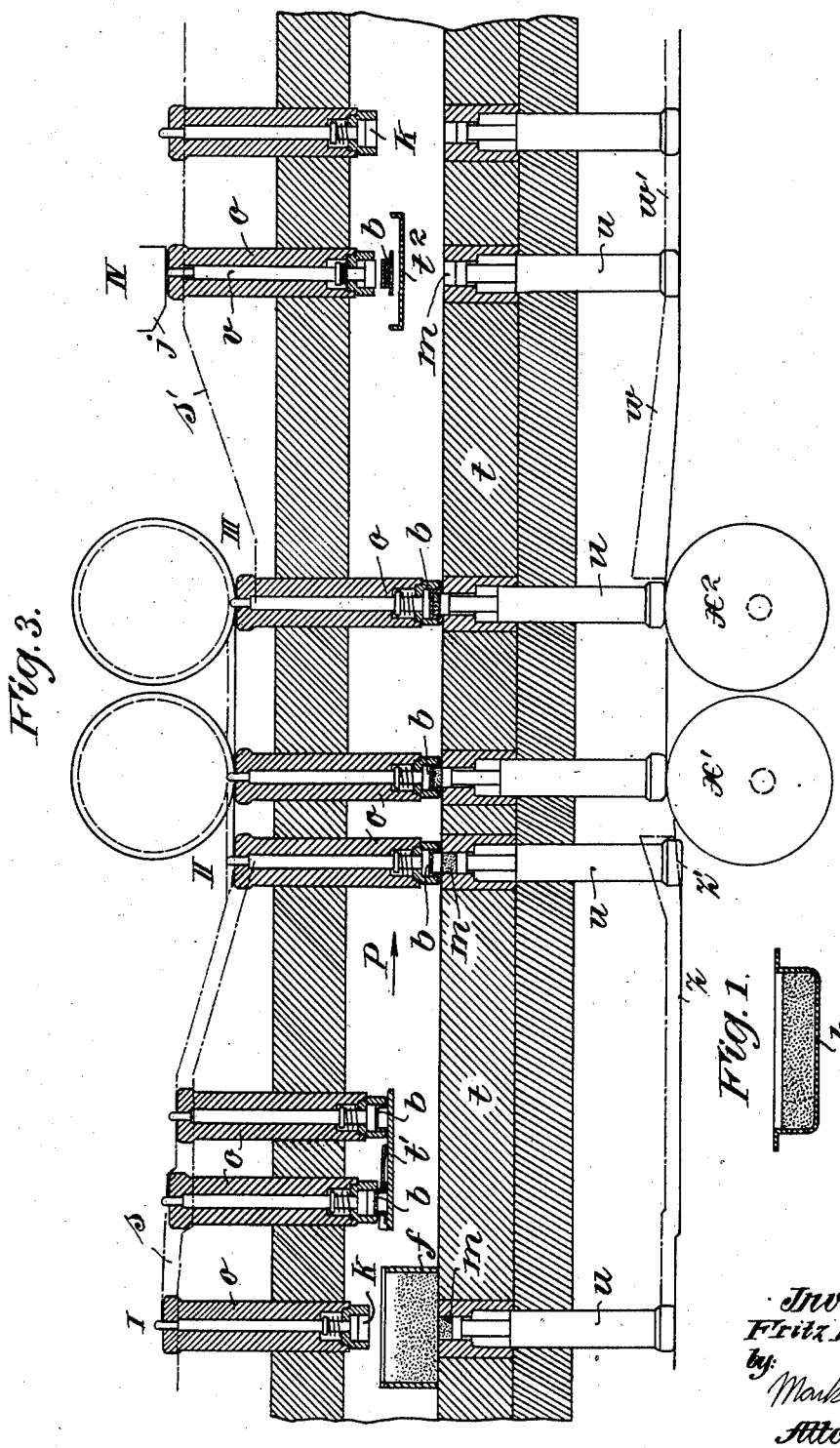


Fig. 3.

Fig. 1.

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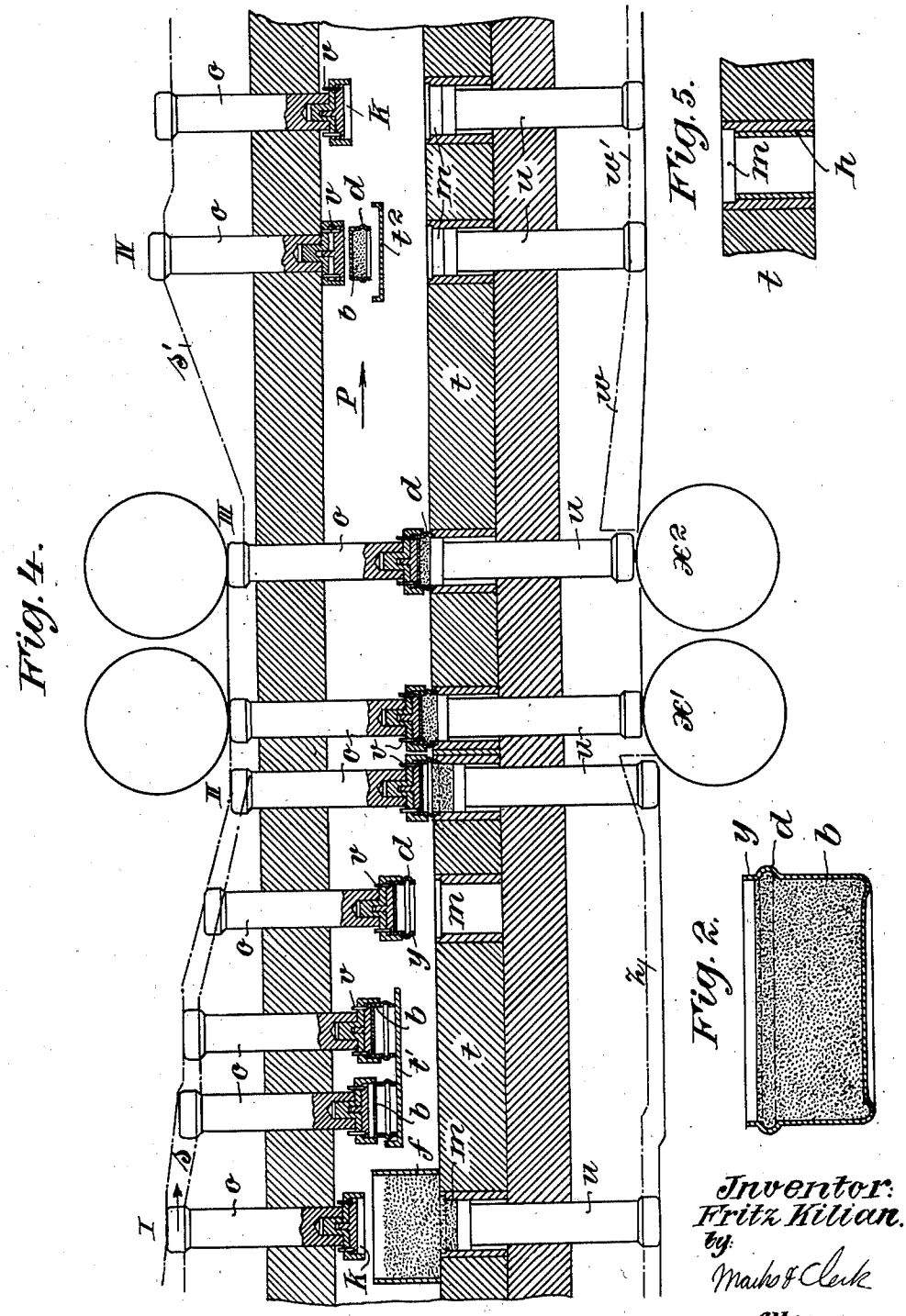


Fig. 4.

Fig. 5.

Fig. 2.

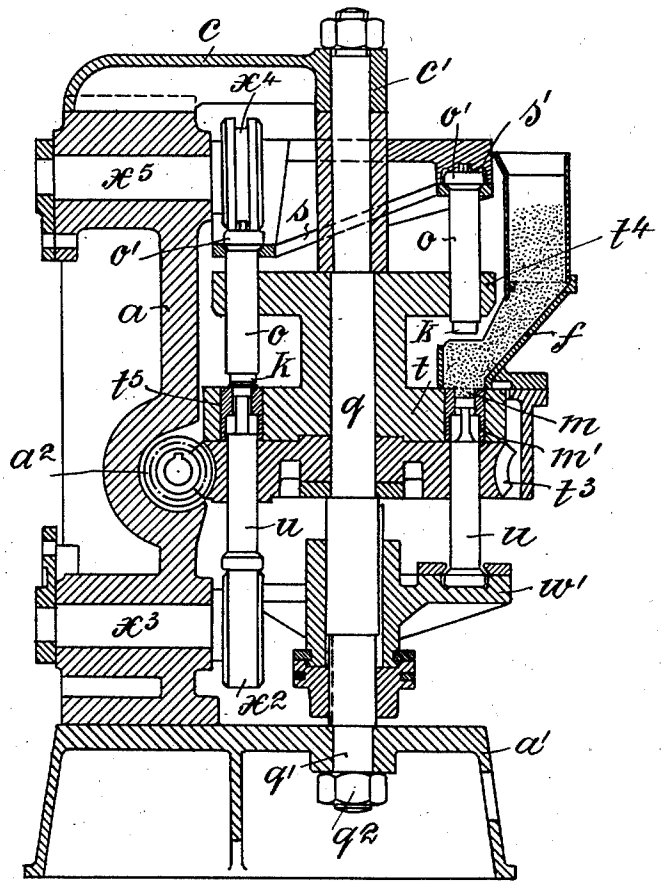
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APPARATUS FOR PRESSING PULVERULENT SUBSTANCES INTO BOXES

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Fig. 6.



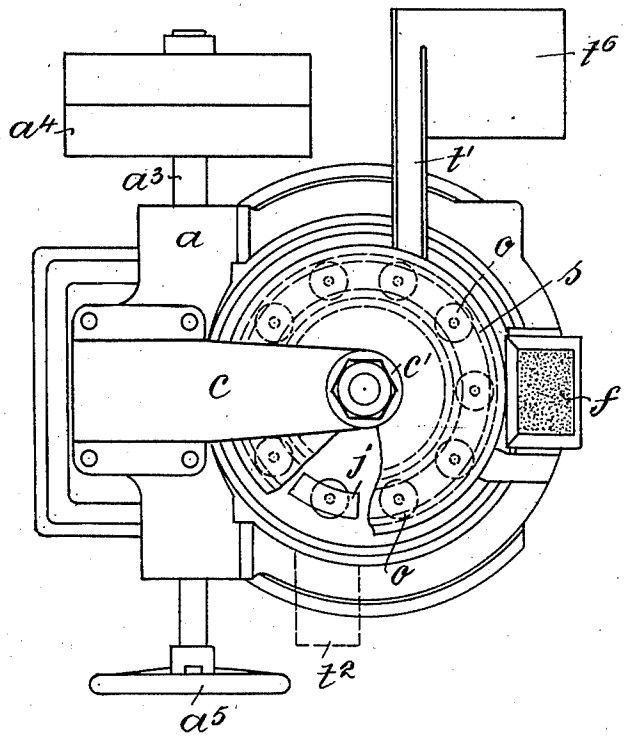
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APPARATUS FOR PRESSING PULVERULENT SUBSTANCES INTO BOXES

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Fig. 7.



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UNITED STATES PATENT OFFICE

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APPARATUS FOR PRESSING PULVERULENT SUBSTANCES INTO BOXES

Application filed July 12, 1927, Serial No. 205,224, and in Germany July 28, 1926.

For a long time substances of different kinds have been placed on the market as moulded blocks set solidly in boxes or tins. These are mostly powders for toilet purposes or treatment media such as cleaners for boots and shoes and the like. The measures hitherto employed for arranging the fundamentally pulverulent contents in the box as a solid moulded block present considerable difficulties, which do not allow the work to proceed very economically. Not only does the exact measuring cause difficulties, but frequently a great deal of the filling material is wasted during the filling operation. The ground for this resides in the fact that since the box is a vessel open at the top the pulverulent body as such is first filled into this box and the pressing effected then. More particularly is the working material wasted when the box, as is frequently desirable, is constructed in a flange-like manner on its free annular edge or when there is a kink in the cylindrical surface of the box, which serves not only for stiffening but also as an abutment for the lid which is to be placed thereon.

The process forming the subject-matter of the present invention thoroughly obviates all these disadvantages, owing to the fact that, as is moreover customary in series work for the manufacture of moulded blocks, it fills the pulverulent working material into the matrix belonging to the machine, in which case very accurate measuring is possible. The box which is to receive the working substance as a solid moulded block, is fitted over the matrix as a lid-like cover, and then the working material, by means of a lower ram, is pushed out of the matrix into the box, a suitable abutment being of course provided for the latter. In this case an upper ram constitutes the abutment. The devices required for this purpose may be substantially of a known construction, it being merely necessary for the upper rams to be equipped for the full reception of the box with its mouth downwards.

In the accompanying drawings the filling operation is diagrammatically illustrated on a pressing machine with a revolving moulding table for the filling of two different kinds of boxes.

Fig. 1 shows in section a powder box,

Fig. 2 a box with a pressed-in polishing brick or lap-stone, for the treatment of white foot-wear for example,

Fig. 3 shows diagrammatically in development part of a moulding table of a pressing machine for the filling of a box according to Figure 1, the necessary guiding means and the pressing appliance being illustrated above and below.

Fig. 4 illustrates a corresponding device for the filling of boxes according to Fig. 2.

Fig. 5 shows a section of a matrix with a liner.

Fig. 6 shows a longitudinal section of a complete machine embodying the invention, and

Fig. 7 a plan of the machine.

In a standard a mounted upon a base plate a^1 are supported journals x^3 for a roller x^2, and in the same plane, but not shown in the drawing, a further journal for a roller x^1, shown in Figures 3 and 4, if two such sets of rollers are provided. In the same vertical plane as the shaft x^3 is provided a journal x^5 for an upper roller x^4. Furthermore a worm a^2, which meshes with a worm wheel t^3, is supported horizontally in the standard a. This worm wheel t^3 is in fixed connection with the table t, which contains the matrix m. The worm wheel t^3 and the table t, are mounted upon a fixed vertical shaft q, which at the lower end is secured in the base plate a^1, by means of a journal q' and a nut q^2, and at the upper end is held by a neck member c' on a curved member c, which is secured to the standard a. The table t is double T-shaped in cross section, and therefore comprises a plate or table top t^4, which forms a guide for the upper rams o. To each upper ram there corresponds in the same vertical plane a lower ram u. These lower rams are guided in the worm wheel t^3, and each penetrates, in the manner shown in Figure 6, into a cylindrical bore in a member m'. This piece m' contains at the top the matrix m and is itself set in a cylindrical bore t^5 in the table t. Figure 7 shows how a plurality of upper rams o

are provided, each of which corresponds to a lower ram u and a matrix m. The lower rams u are guided by a guide which surrounds the shaft q like a table. The displacing of the lower rams is effected by means of rails z, and at the end of the stroke a final compression pressure can be exerted in the usual way by the lower ram running up on to rollers x^1, x^2. With the lower rams there co-operate, in a known manner, upper rams o. While, however, in the manufacture of ordinary moulded blocks, the upper rams likewise penetrate into the matrix, so that the pulverulent working material previously introduced into the matrix on the end of the lower ram is pressed within the matrix between the end faces of the two axially working rams, the pressing operation in the case of the new process takes place outside the table matrix and inside the box, which roofs over the matrix perforation and registers therewith.

In the constructional example according to Fig. 3, I denotes the filling arrangement. Through a filling shoe f the working material passes into the matrix m and reaches the end face of the associated lower ram u. The corresponding upper ram at this position is above the filling shoe. It is guided slowly downwards during this time by the rail s and receives below, in its cavity k provided for the purpose, the box b to be filled, which the ram takes from an automatic feed table t^1. The descent proceeds further, until at position II the upper ram has reached its lowest position. At this position its end face bears with the box rim upon the table t. The internal cylindrical surface of the box b is flush with that of the matrix m. At this juncture, by the part z^1 of the lower rail z, the lower ram u may already be somewhat raised. During further travel of the table t in the direction of the arrow P the upper ram o revolving with it maintains the position it took up at II, whereas the lower ram u travels upwards and guides the working material filled into the matrix m into the interior of the box b, which has its mouth downwards. Finally, at position III, the compression pressure previously begun by the rising portion z^1 of the rail z and the preliminary pressing roller x^1 reaches its maximum amount. The moulded block is now finished. It adheres in the box b and it is now necessary for the lower ram u to be drawn back. For this purpose there serves the descending track w. At IV the lowest position of the lower ram is reached. At this position, held by the further horizontal portion w^1 of the lower rail, the matrix, with the lower ram, can again pass in front of the filling shoe f for the purpose of receiving therefrom a fresh filling. The quantity of the filling depends on the level of the end face of the lower ram u in the matrix m.

Beyond the position III, the upper ram o again travels upwards, owing to the portion s' of the track rail s. In order to remove the box b located therein and now provided with the pressed block, it is advisable to allow a spring pusher v provided in the matrix to run against a stationary cam or abutment such as a rail j. The pusher is thereby thrust further into the ram o, and, with its lower end face, presses the box b out of the upper ram o and on to a delivery plate t^2.

This procedure as a whole is repeated in a continuous manner for each individual one of the many matrices and associated upper and lower rams, as is known with such rotating machines.

The longitudinal section shown in Figure 6 shows on the right hand side the placing of a lower ram u under the filling shoe f, the lower ram being located at the part w' (Figure 3) of the track w. On the left, a lower ram u runs straight on to the press roller x^2, and thus reaches the maximum ascent. The counter-pressure is applied at this position by the roller x^4 at the top, the associated upper ram o running against this roller x^4. The guiding of the upper rams is effected by a guiding rail s engaging over the heads o' of the upper rams, which is shown in Figure 6 partly in section and partly in outside elevation. The cross-sectional part in Figure 6 bears the reference s' and thereby shows the relationship of this figure to Figure 3.

If it is a question of a box with an annular ledge below the outer rim, the apparatus shown in Fig. 4 is employed. It is not fundamentally different from the apparatus according to Fig. 3, only the cylindrical part y of the box b extending beyond the annular ledge enters the matrix m, which is correspondingly somewhat stepped in construction, so that the ledge d bears upon the moulding table t. If boxes of different thicknesses have to be dealt with and it is not desired to employ a special moulding table t for each, it will be advisable, as shown in Fig. 5, to obtain the stepping in the matrix m by means of an auxiliary bush h.

In the apparatus according to Fig. 4 there are two pushers v for each ram head k. These run, at position IV, against the upper ram shaft guide, and thereby press the box out of the upper ram head.

The box-feeding is shown in Figure 7. It consists of a track t', to which an outer receptacle t^6 belongs. The discharging position is denoted by t^2.

The machine receives its drive through the shaft a^3 of the worm a^2. Upon this shaft is mounted a set of fast and loose pulleys a^4. Furthermore the shaft extends through to the other side of the standard a, and is there provided with a hand wheel a^5, in order that even when the belt is on the loose pulley the worm a^2 can still be operated.

What I claim is:—

1. Apparatus for pressing pulverulent sub-

stances into boxes, comprising a revolving moulding table, and filling matrices mounted upon said moulding table, each filling matrix comprising an upper and a lower ram, and each of said upper rams being formed with a box-shaped end cavity adapted to receive a box with its mouth downwards.

2. Apparatus for pressing pulverulent substances into boxes having an annular ledge below the rim of the mouth, comprising a filling matrix consisting of an upper ram and a lower ram, said upper ram being formed with an end cavity adapted to receive a box with its mouth downwards as far as the annular ledge, the matrix being formed in the moulding table with an annular hollow adapted to receive the margin beyond said annular ledge.

3. Apparatus for pressing pulverulent substances into boxes having an annular ledge below the rim of the mouth, comprising a revolving moulding table, and filling matrices mounted upon said moulding table, each filling matrix comprising an upper and a lower ram, and each of said upper rams being formed with an end cavity adapted to receive a box with its mouth downwards as far as the annular ledge, each matrix being formed in the moulding table with an annular hollow adapted to receive the margin beyond said annular ledge.

4. Apparatus for pressing pulverulent substances into boxes, comprising a filling matrix consisting of an upper ram and a lower ram, said upper ram being formed with an end cavity adapted to receive a box with its mouth downwards, a pusher adapted to eject the filled boxes from the upper ram and an abutment for operating said pusher.

5. Apparatus for pressing pulverulent substances into boxes, comprising a revolving moulding table, and filling matrices mounted upon said moulding table, each filling matrix comprising an upper and a lower ram, and each of said upper rams being formed with an end cavity adapted to receive a box with its mouth downwards, pushers adapted to eject the filled boxes from the upper rams, and an abutment for operating said pushers.

6. Apparatus for pressing pulverulent substances into boxes having an annular ledge below the rim of the mouth, comprising a filling matrix consisting of an upper ram and a lower ram, said upper ram being formed with an end cavity adapted to receive a box with its mouth downwards, as far as the annular ledge, the matrix being formed in the moulding table with an annular hollow adapted to receive the margin beyond said annular ledge, a pusher adapted to eject the filled boxes from the upper ram, and an abutment for operating said pusher.

7. Apparatus for pressing pulverulent substances into boxes having an annular ledge below the rim of the mouth, comprising a revolving moulding table, and filling matrices mounted upon said moulding table, each filling matrix comprising an upper and a lower ram, and each of said upper rams being formed with an end cavity adapted to receive a box with its mouth downwards as far as the annular ledge, each matrix being formed in the moulding table with an annular hollow adapted to receive the margin beyond said annular ledge, pushers adapted to eject the filled boxes from the upper rams, and an abutment for operating said pushers.

8. Apparatus for pressing pulverulent substances into boxes having an annular ledge below the rim of the mouth, comprising a revolving moulding table, and filling matrices mounted upon said moulding table, each filling matrix comprising an upper and a lower ram, and each of said upper rams being formed with an end cavity adapted to receive a box with its mouth downwards, as far as the annular ledge, each matrix being formed in the moulding table with an annular hollow adapted to receive the margin beyond said annular ledge, pushers adapted to eject the filled boxes from the upper rams, and an abutment adapted to operate said pushers when said pushers run against it.

In testimony whereof I have signed my name to this specification.

FRITZ KILIAN.