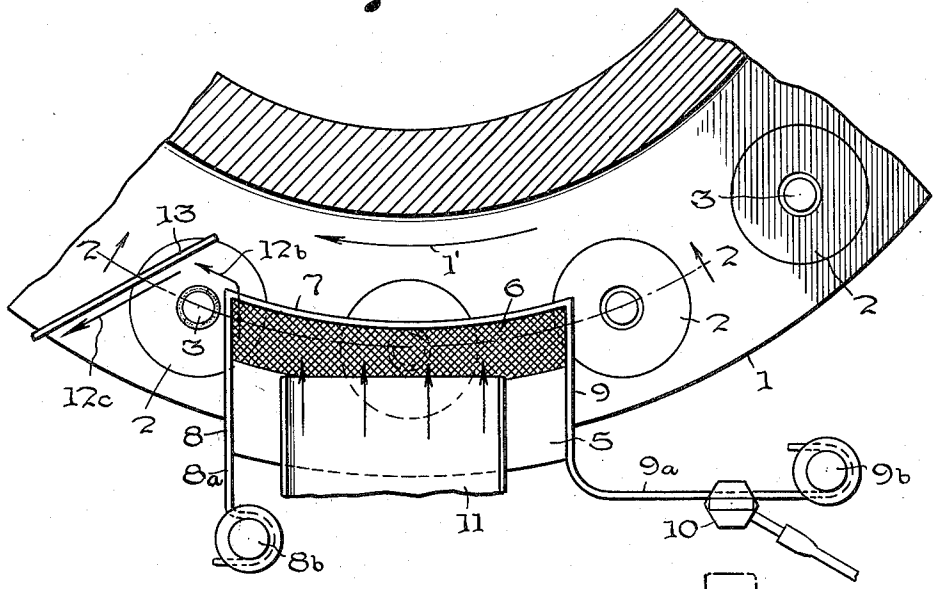
Nov. 21, 1950 L. H. BAILEY 2,531,245

SIFTING FEEDER FOR POWDER COMPRESSING MACHINES

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Fig. 1.



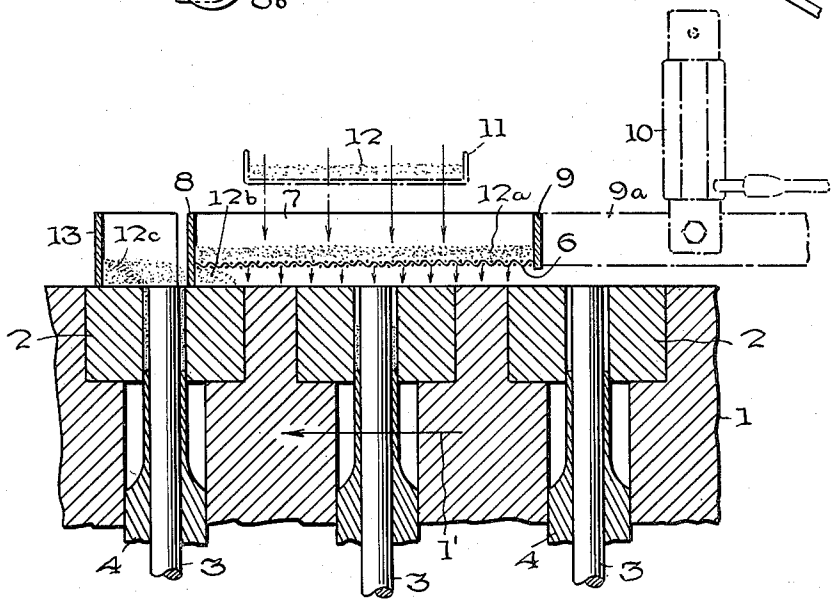




Fig. 2.

Inventor
LAWRENCE H. BAILEY

By Ralph B. Stewart

Attorney

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## SIFTING FEEDER FOR POWDER COMPRESSING MACHINES

Lawrence H. Bailey, Cheltenham, Pa., assignor to F. J. Stokes Machine Company, a corporation of Pennsylvania

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4 Claims. (Cl. 18—30)

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This invention relates to improvements in apparatus for the manufacture of compressed parts from powdered metal, powdered ceramic, or other granular or powdered materials and especially parts having thin wall sections which are formed in dies having narrow sections, such as thin-walled bushings, or other parts with thin sections. The invention is especially concerned with arrangements for feeding the powdered material into the dies of compressing machines.

The preferred form of the invention described herein is applied to the so-called rotary type of tablet machine having a multiplicity of dies set in a rotating head.

The usual method of filling the dies in a rotary machine is to provide a feed frame positioned to rest upon the upper surface of the rotary head while the head rotates, and having several open-bottom compartments. Powdered material is placed within these compartments and rests upon the rotary table and falls by gravity into the die cavities as the die elements pass beneath the compartments of the feeding frame. Powder which does not flow freely tends to bridge over at the top of the narrow dies, and will not fall into the empty space below. This may be due to several causes, such as fineness of the powder, entrapment of air in the die, cohesive agglomerates or lumps in the powder, agglomeration of the powder by traces of oil, or the presence of small pieces of parts previously partly compressed and subsequently insufficiently broken. This condition is aggravated if the die has a large top section, and a narrow bottom section. In this case the lumps or agglomerates will rest in the larger part of the die, blocking the narrow part below, and cannot be displaced in the usual fashion by the scraping action of the partitions in the feed frame. The lower section then remains empty or partially empty so that very imperfect pieces or not solidly compressed pieces are produced.

The foregoing difficulties are especially troublesome in the handling of powders of a fineness which will pass through a screen of 100 to 300 mesh. Such fine powders do not allow air to pass readily through them when in a piled condition as exists in the ordinary feed frame described above. The feeding device of the present invention overcomes the above mentioned difficulties and permits the use of such fine powders in the formation of thin-walled molded parts.

The preferred form of the invention is illustrated in the accompanying drawing in which

Figure 1 is a fragmentary plan view, partly in section, of a rotary die table of a tabletting machine showing my feeding device associated therewith; and

Figure 2 is an elevational view of the arrangement shown in Figure 1, certain parts being shown in section.

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Referring to the drawing, only so much of a rotary press is shown as is necessary to explain the invention. 1 indicates the rotary table which carries a plurality of die elements 2 and a corresponding plurality of fixed core pins 3 centered in the die elements for forming thin-walled bushings. The lower punch elements are shown at 4, the upper ends of these elements being reduced in section to enter the annular space forming the die cavity. It will be understood that other shapes of die cavities may be employed, and the particular cavity illustrated in the drawing is only one example. The upper punches and the remaining conventional parts of the rotary press are not shown.

The sifting feeder of my invention is shown in plan view in Figure 1. The solid line portion of Figure 2 is a vertical sectional view of Figure 1 taken along the cutting plane 2—2 which follows a circular path passing through the centers of the die elements 2. The elements shown in dotted lines in Figure 2 are located in front of the cutting plane of Figure 1. The sifting feeder involves a tray-like structure mounted over the outer peripheral face of the rotary table 1 and having a bottom wall formed of a solid portion 5 and a section 6 covered with a screen of fine mesh, the screen section being arranged immediately above the path of travel of the die cavities during rotation of the table. The tray is provided with a side wall 7 which prevents the material from falling out of the tray onto the rotary table. The tray is also provided with end walls 8 and 9 and these walls are provided with extensions 8a and 9a which constitute brackets for mounting the tray from suitable pins or rods 8b and 9b mounted on a fixed part of the press.

The feeding tray is vibrated vertically or horizontally by any suitable vibrator. In the arrangement shown in the drawing, the tray is vibrated vertically by means of a pneumatically-operated vibrator 10 mounted on bracket 9a.

The powdered material is supplied to the sifting tray from a suitable supply (not shown) through an inclined chute 11 which may also be vibrated by any suitable means. In Figure 2 the powdered material in the chute is shown at 12 and at 12a in the tray. As will be seen from Figure 1 the end of the chute 11 is positioned so that the powdered material is deposited on the screened section of the tray and is more or less evenly distributed along the length of this section.

The screen 6 is selected to have a mesh which is smaller than the smallest wall thickness to be molded. For example, if a tubular sleeve is to be molded having a wall thickness of $\frac{1}{32}$ of an inch, the screen 6 would be formed of mesh

preferably not less than 30 per inch. Since the wire of the screen is of appreciable thickness, the mesh openings will be considerably smaller than the wall thickness of the molded article. The length of the screen 6 along the path of travel of the dies will be determined by the speed of movement of the table 1 and the rate at which the powdered material passes through the screen. It should be of sufficient length so that each die cavity will be completely filled by powdered material as it falls directly from the screen 6 in a free and unconfined condition. The screen 6 screens out any lumps or other particles which are too large to pass into the narrow die cavity or which might cause bridging of the material over the entrance of the cavity. Furthermore, since the upper part of the die cavity is not covered or sealed off by a pile of powdered material, the freely falling and separted grains of material will pass down to the bottom of the cavity, and the air will be freely displaced from the cavity, thereby avoiding trapping of air in the cavity.

The excess material deposited on the face of the rotary table between the die cavities and above the filled cavities is first deflected inwardly on the surface of table 1 by the end wall 8 which extends down and has contact with the upper face of the table 1 as shown in Figure 2. This arrangement causes the accumulation of a pile of powdered material as shown at 12b in Figure 2, and the wall 8 causes this material to move in the direction shown by the arrow 12b in Figure 1. The direction of rotation of the table 1 is indicated by the arrow 1'. The excess material is finally removed from the rotating table by means of a scraper plate 13 which is arranged in contact with the upper face of the table 1 and at an angle to the radius of the table as shown in Figure 1. This scraper plate accumulates the excess material into a pile shown at 12c in Figure 2 and the accumulated material is moved outwardly and discharged over the edge of the rotary table in the direction shown by the arrow 12c in Figure 1. It will be noted that the excess material is deflected across the path of travel of the die cavities in two directions, first inwardly and then outwardly. This will insure complete filling of the cavities in case the screen should not be functioning properly.

From the foregoing it will be seen that my improved feeding device involves an arrangement for dispersing the finely powdered material at a point directly above the die cavity, the material being dispersed into freely falling, separated particles having a maximum dimension which is only a fraction of the distance of separation of the die walls, and the entire die cavity is filled by the falling particles which pass directly into the die cavity and continue to the lowermost part thereof in a continuous falling movement from the time they leave the sifting tray.

I claim:

1. In a press for molding articles from finely powdered material in the cavities of a plurality of die elements carried by a rotary die table, the transverse dimensions of said die cavities being so small as to cause bridging of said powdered material across the cavities when the cavities are filled by scraping a pile of said material across the top surface of said table, an improved feeding device for filling said cavities with powdered material without causing bridging of said material and without entrapping air in said cavities comprising, in combination, a relatively shallow tray-like element mounted above said rotary table in spaced relation to the face of said table and having a screened bottom section elevated above said table and extending over the path of travel of said die elements, the mesh openings of said screened section being less than the distance of separation of the walls forming each die cavity, and the screened section of said tray being extended along the path of travel of said die elements for a distance sufficient to completely fill each die cavity as it passes beneath said screened section, said powdered material passing directly and freely from said elevated screen section into each die cavity, a chute positioned above said tray for supplying a powdered molding material to said tray, and means for continuously vibrating said tray during rotation of said table.

2. A feeding device according to claim 1 wherein said tray-like element is provided with an end wall at the trailing end thereof, said end wall being extended downwardly into contact with the upper face of said rotary table and is arranged at an angle to the radius of said table whereby said end wall serves as a scraper for collecting excess material on the face of the table and deflects the same inwardly across the path of travel of said die cavities.

3. A feeding device according to claim 1 and including a scraper arranged at the trailing end of said tray-like element, said scraper being in contact with the upper face of said rotary table and at an angle to the radius thereof for collecting excess material on the face of said table and deflecting the same inwardly across the path of travel of said die cavities, and a second scraper spaced from said first scraper and arranged with an opposite angular relation for deflecting said excess material outwardly across the path of travel of the die cavities and beyond the outer edge of said table.

4. A feeding device according to claim 1 wherein said tray-like element is provided with an end wall at the trailing end thereof, said end wall being extended downwardly into contact with the upper face of said rotary table and is arranged at an angle to the radius of said table whereby said end wall serves as a scraper for collecting excess material on the face of the table and deflects the same inwardly across the path of travel of said die cavities, and a second scraper element positioned in contact with the face of said table on the trailing side of said tray-like element and arranged to deflect the excess material outwardly across the path of travel of said die cavities and beyond the outer edge of said table.

LAWRENCE H. BAILEY.

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