A. M. BATES.

PROCESS OF FILLING BARRELS.

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Fig. 1.

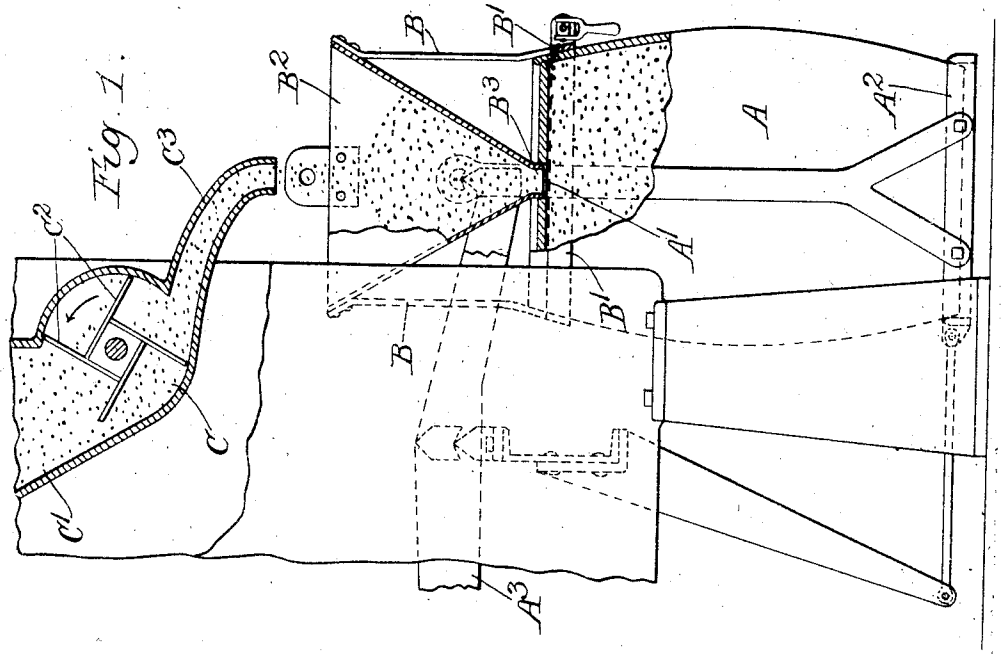
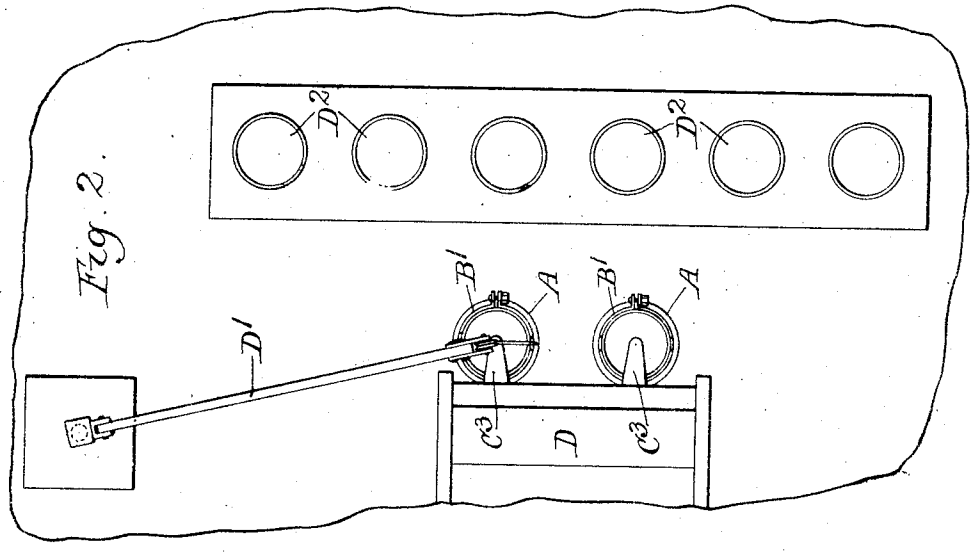


Fig. 2.



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UNITED STATES PATENT OFFICE.

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PROCESS OF FILLING BARRELS.

Application filed January 4, 1919. Serial No. 269,654.

To all whom it may concern:

Be it known that I, ADELMER MARCUS BATES, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Processes of Filling Barrels, of which the following is a specification.

My invention relates to a barrel or package filling machine and while it or part of the process involved might be used for filling flexible walled receptacles, the invention is primarily intended for filling rigid or permanent receptacles such as barrels, boxes, casks and the like.

One object of my invention is to provide a process by which a predetermined amount of material of a granular or fragmentary or comminuted or subdivided character may be weighed out, the material weighed being partially in the container to be filled and partially in some other receptacle, and by which the total amount of material may subsequently be packed, or compacted or compressed within the container to fill it to the maximum and give the contents such rigidity and stone-like strength or texture as will protect the light, flexible walls of the container against distortion or destruction.

In the preferred form of my invention I mount upon a barrel an auxiliary reservoir or receptacle, preferably a hopper. I then provide means for projecting a high pressure, high velocity, stream of the material through the hopper into the barrel or container at a velocity greater than it would normally fall by gravity. This tends to more or less compact the material in the container, but soon the container will be filled with a more or less compacted, though still relatively loose, mass of material, and this material will not be enough to permanently fill the container, therefore, I provide the hopper and it is also filled with a predetermined quantity of the material. When the weight of the container and hopper and the load equals the predetermined quantity, the feed is cut off and the container or barrel and the hopper are placed upon a jigging apparatus which may be coincident with the filling and weighing apparatus or may be separate as the case may be and the jigging is continued until the material in the container has been compacted and until all the material in the hopper has passed through the narrow mouth between it and the container to fill the container.

The operator can tell when the process is complete because as long as there is in the hopper any material, it will feed smoothly and regularly down into the container but as soon as the material has all been discharged from the receptacle, the narrow mouth through which the feed has taken place commences to spout and puff like a volcano.

It is an important fact that the weight of the material itself in the receptacle or hopper is sufficient to do this work and it is further an important fact that unless you have a small mouth connection between the hopper and the barrel you do not get a satisfactory result, otherwise, with a wide open mouth barrel you get a result much less satisfactory both in the density of the packing and the speed with which filling can take place.

My apparatus and process are illustrated diagrammatically in the accompanying drawings wherein

Figure 1 is a side elevation with parts in section.

Figure 2 is a plan of the layout, of a preferred form.

Like parts are indicated by like characters in the figures.

A is a barrel closed at the bottom and also at the top except for a small central opening A^1. This barrel rests upon a scale platform A^2 supported from a scale beam A^3 which permits weighing of the filled package and by means of apparatus, forming no part of my present invention and therefore not here illustrated in detail, permits cutting off of the feed when the proper weight is reached.

B is a framework clamped to the barrel by means of a compression ring B^1. It carries a hopper or auxiliary receptacle B^2, funnel shaped and terminating at its lower end in a tube B^3 which extends into the opening A^1 in the head of the barrel. This frame provides the handle bail by which the barrel may be manipulated as it is being filled and also holds the barrel and hopper in proper register. The tube B^3 might be long enough only to rest against the top of the barrel and it is not essential that it project into the side of the barrel.

C is the propeller chamber of a feeding and weighing machine. This chamber is at the bottom of a hopper C^1 and contains a feeding propeller C^2 adapted to discharge the material at high speed, through the tube C^3 which tube is curved down and discharges along the axis of the tube B^3 into the barrel in such wise that while the material is being fed into the barrel itself the high speed stream of material passes through the hopper possibly impinging slightly on the walls thereof but passing therethrough at high speed down into the barrel.

D is the filling and weighing machine. It has place for two barrels to be filled as shown. D^1 is a crane by which the barrels may be handled and D^2 D^2 are jigging machines arranged three for each barrel filling machine. Obviously the proportion might vary but experience shows that as a general proposition it takes three times as long to jig and pack the barrel as it does to supply and weigh the necessary amount of material. Under certain conditions it might be desirable to have the jigging done at the weighing station in which case, of course, it would only be necessary to stop the jigging just at the time that the material was to be weighed. Jigging could go on while filling was taking place, stop for the weighing and then the jigging job could be finished before the next barrel was weighed. This could be accomplished by attaching such a jigging apparatus as is diagrammatically shown in Figure 2, to the weighing base A^2 of Figure 1. The details of such an arrangement form no part of the present invention, and it could be of any operative form. My preferred form, however, I operate as indicated with a battery of separate jigging apparatuses or jigging heads upon which the barrels are placed.

It will be evident that while I have shown in my drawings an operative device, still many changes might be made both in size, shape and arrangement of parts without departing materially from the spirit of my invention. I wish, therefore, that my drawings be regarded as in a sense diagrammatic.

The use and operation of my invention are as follows:

The barrel is first made up in the usual way except that the open end is closed by a head which is only apertured with a small central aperture a few inches in diameter. Upon this barrel is placed the frame which carries the auxiliary hopper or receptacle in such wise that the frame may be clamped firmly in position on the barrel and the mouth of the hopper will discharge into the open hole in the end of the barrel. The barrel, frame and hopper are then placed upon the weighing platform of the measuring and feeding apparatus. The operator then starts the feed and the propeller projects a stream of material in a high speed jet downwardly through the hopper, through the open neck thereof into the barrel. It is desirable, of course, that this jet shall pass directly through the opening in the barrel but if it impinges slightly on the walls of the hopper no particular harm will be done. This material will rush in until it fills the barrel and then will back up into the hopper even above the level of the discharge end of the filling tube, the power being sufficiently great to overcome any slight pressure developed by such covering of the end of the discharge pipe. As soon as the weight has reached the predetermined point, the stream is automatically cut off, the operator is warned either by the mere cutting off of the stream or by other means not herein shown or claimed and he knows that the proper amount has been weighed out.

He then operates the crane to lift the barrel and hopper and place it at one side upon one of the jigging heads. He starts the jigging head in any desired manner and jigging takes place at the rate of possibly one hundred strokes per minute, the barrels dropping about an inch and a half at each stroke and then being brought to a sudden stop upon an anvil, in the usual manner. This jigging tends to compact the material in the barrel and as it is compacted the material in the hopper is fed down in through the small opening into the barrel until the barrel is filled and the hopper is entirely empty. As long as the hopper contains any material at all there is no apparent escape of air through the hopper and the material just runs down like water running out of a tub. As soon as all the material has gotten out of the hopper, however, the barrel begins to belch forth great clouds of air and dust so great that the operator is immediately warned and turns off the jigging apparatus.

Barrels are not ordinarily tight about the top or about the neck but it appears to make no difference. A loose barrel or an air tight barrel can be filled equally well. If you work with a loose barrel ordinarily the material that is thrown in via the jet is compacted at the bottom so that there will be no escape of air. When jigging takes place we notice the escape of air between the staves at the top but as the material runs down into the barrel and is more and more compacted in the barrel, this escape of air is cut off and finally when the barrel is filled there is no escape or at least no apparent escape of any air at all until the hopper is entirely empty.

This would seem to suggest at least, that the air which is entrained with the jet and which is contained within the barrel and in the pores or interstices between the particles themselves is compressed in the barrel to escape later, possibly, in a gradual way or to

escape violently if the jigging continues beyond the point at which the material is fed from the hopper into the barrel.

It has been suggested that this compression of the air with the material in the barrel tends to cause a vacuum in the top of the barrel which then sucks the material from the hopper into the barrel. The action would seem to bear this out because the flow of the material from the hopper into the barrel is more rapid than would naturally be expected, if the feed were from gravity alone.

It has also been suggested that the fact that the barrel is headed in makes a back stop which prevents the rebound of the material as a result of the jigging down stroke, in other words, as the material goes down and is compressed, the material from the hopper is drawn in and when the material would normally fling back up and re-expand slightly if the barrel had an open top, it cannot do so because the space it previously occupies is now occupied by something else. This probably explains, in part at least, the reason for the very rapid and smooth action of the jigging apparatus and process in filling and compacting the material in the barrel.

When the process has been completed, and the proper amount of material is in the barrel, it develops that the material in the barrel is so rigid that it would stand alone and you can take the barrel off and leave a monolithic mass of cement in shape of the barrel.

I claim:—

1. The method of packing pulverulent material in a container which consists in feeding such pulverulent material therein in a forced jet until it is substantially full, feeding an additional quantity to a receptacle connected to the container and subsequently jarring container and receptacle until all the material is packed into the container.

2. The method of packing pulverulent material in a container which consists in feeding such pulverulent material therein in a forced jet until it is substantially full, feeding an additional quantity to a receptacle connected to the container to reach a predetermined total quantity, and subsequently jarring container and receptacle until all the material is packed into the container.

3. The method of packing pulverulent material in a container which consists in feeding such pulverulent material through a small hole therein in a forced jet until it is substantially full, feeding an additional quantity to a receptacle connected to the container and subsequently jarring container and receptacle until all the material is packed into the container.

4. The method of packing pulverulent material in a container which consists in feeding such pulverulent material through a small hole therein in a forced jet until it is substantially full, feeding an additional quantity to a receptacle connected to the container to reach a predetermined total quantity, and subsequently jarring container and receptacle until all the material is packed into the container.

5. The method of packing pulverulent material in a container which consists in feeding such pulverulent material in a forced jet through a receptacle connected with said container, until the container is substantially filled, then feeding a further quantity into said receptacle and subsequently jarring said container and receptacle until all the material is settled in the container.

In testimony whereof, I affix my signature in the presence of two witnesses this 30th day of December, 1918.

ADELMER MARCUS BATES.

Witnesses:
MINNIE M. LINDENAU,
AGNES C. LARSEN.