

April 6, 1965

C. A. RIETZ ET AL
BLENDING APPARATUS

3,176,966

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2 Sheets-Sheet 1

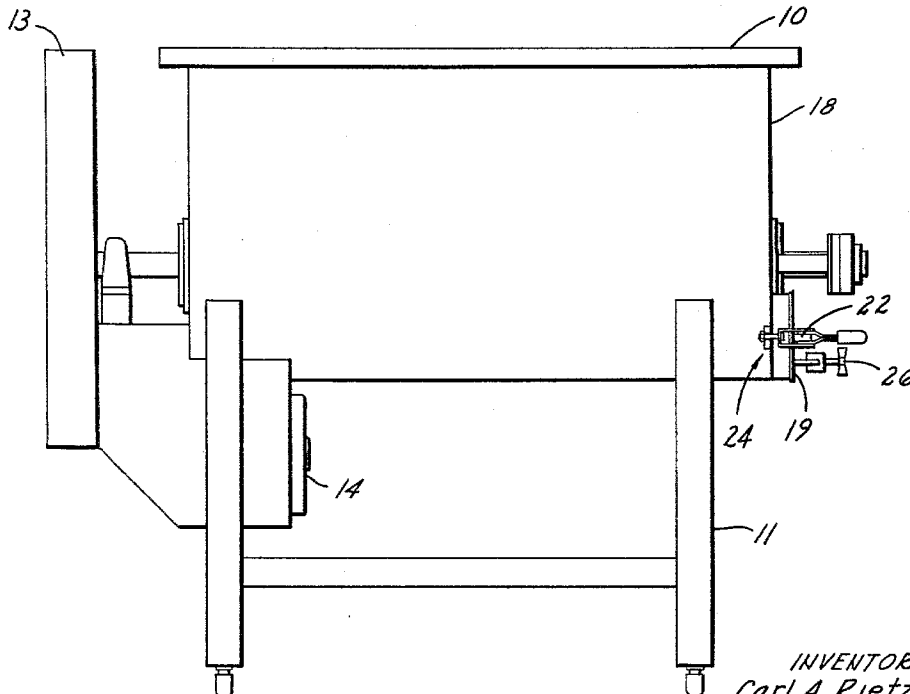
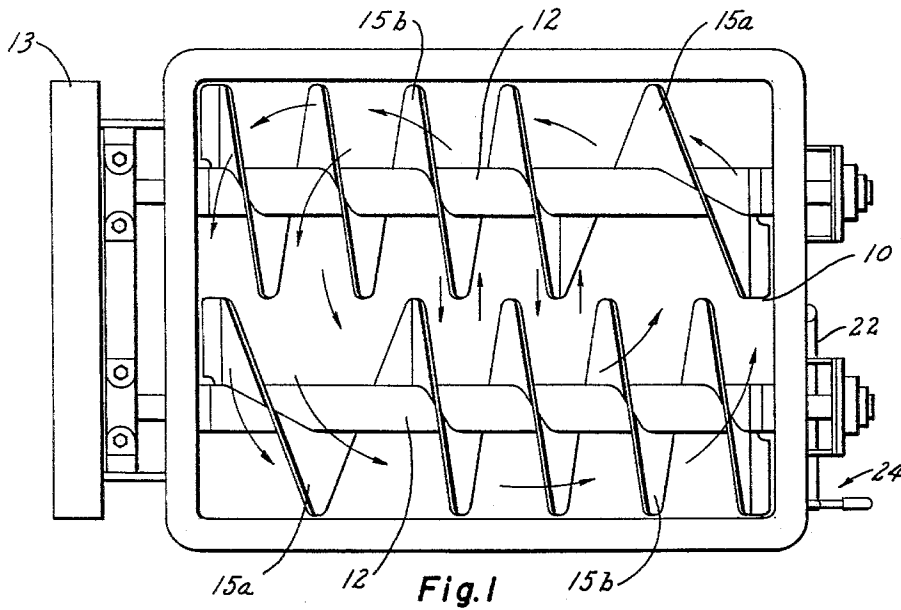


Fig. 2

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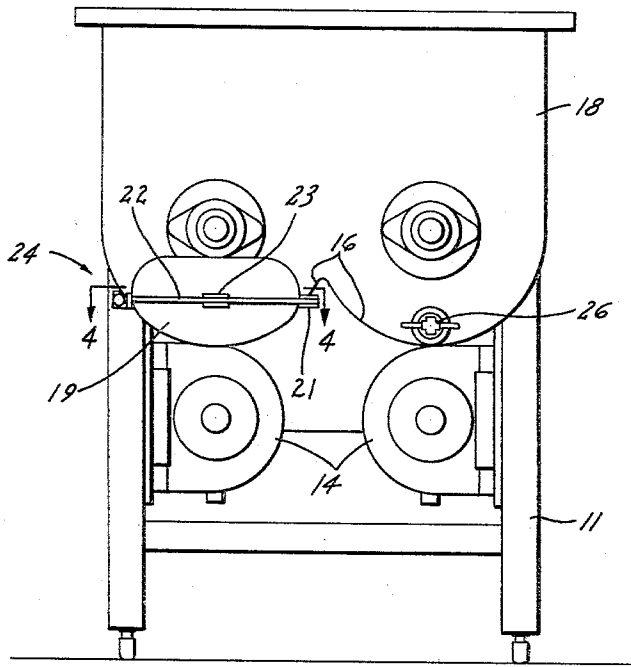


Fig. 3

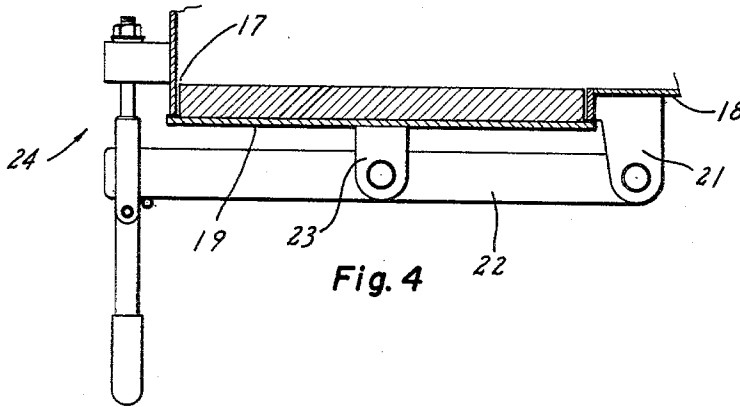


Fig. 4

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BLENDING APPARATUS

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2 Claims. (Cl. 259-41)

This invention relates generally to apparatus for carrying out various blending or mixing operations.

In the food and chemical industries there are many instances where it is desired to subject materials undergoing processing to mixing or blending operations. Particular reference can be made to operations where the material forms a mix of semi-fluid or paste-like consistency, as for example moist food mixes. One type of apparatus which has been used for this purpose employs a body equipped with inclined mixing paddles. The body is carried by a supporting stand in such a manner that it can be tilted for discharge of the mixed contents. This type of apparatus is subject to a number of disadvantages. The tilting action discharges the material as one batch, which in many instances is objectionable. The tilting discharge operation is not thorough or efficient, in that varying amounts of material remain within the hopper. This makes it necessary for an operator to manually clean out the machine after each mixing operation, as by use of a paddle or scraper. The tilting arrangement also unduly complicates the apparatus, and requires manual labor for its operation.

In general it is an object of the present invention to provide a blending or mixing machine of which effectively discharges the mixed material without tilting.

Another object of the invention is to provide apparatus of the above character which carries out a discharge operation in a thorough and efficient manner, thus obviating manual clean out as in prior apparatus.

Another object of the invention is to provide a mixing apparatus of the above character which is well adapted for use in processing systems. For example it may be operated for uniform discharge of a batch of mixed material to a succeeding processing stage, or it may be operated continuously with continuous introduction of material and continuous discharge therefrom.

Another object of the invention is to provide apparatus of the above character having a novel mixing method, and which is characterized by maintenance of a relatively uniform level of material within the apparatus during a mixing operation.

Another object of the invention is to provide an apparatus of the above character having a novel circulatory mixing action.

Additional objects and features of the invention will appear from a following description in which the preferred embodiment has been set forth in detail in conjunction with the accompanying drawing.

Referring to the drawing:

FIGURE 1 is a plan view illustrating apparatus incorporating the present invention.

FIGURE 2 is a side elevational view of the apparatus shown in FIGURE 1.

FIGURE 3 is an end view of the apparatus shown in FIGURE 2.

FIGURE 4 is a detail in section taken on the line 4-4 of FIGURE 3.

The mixing or blending apparatus shown in the drawing consists of a hopper-like body 10, fabricated of suitable sheet metal, and carried by support stand 11. The top of the body is shown open to receive material to be mixed, although in commercial installations a suitable cover can be provided. Also when the apparatus is used

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as one unit of a processing system, the preceding unit of the line may be provided with suitable means extending over the body to deliver material to the same. Within the body we provide a pair of spaced side-by-side screws 12. Preferably these feed screws are provided with continuous or substantially continuous flight means for moving the material, and for exerting a form of working action which is conducive to good mixing. Within the housing 13, the extended shafts of the two feed screws connect to gearing or like means whereby normally they are separately driven in opposite directions by the electric motors 14.

The flight means for each of the feed screws includes a portion 15a near one end of the screw, and a portion 15b which extends the remaining length of the screw. The pitch of portion 15a is substantially greater than the pitch of portion 15b. It will be seen in FIGURE 1 that portions 15a are at opposite ends of the body 10.

As shown in FIGURE 3 the lower wall portions 16 of the body are curved to conform to segments of a cylinder, whereby the inner surface of these wall portions are in proximity with the peripheries of the feed screws.

The discharge means provided consists of an opening 17 in the end wall 18 of the body, which normally is closed by plate 19. As viewed in FIGURE 3, the opening 17 is located generally below the axis of the corresponding feed screw, and the lower perimeter of this opening corresponds with the inner surface of the wall portion 16. Plate 19 may be held in place by suitable clamping means as shown in FIGURES 2 and 4. Thus at one side of the closure plate, there is a bracket 21 forming a hinge support for the clamp arm 22. This arm is loosely connected to the central portion of the plate by the ears 23. The free end of arm 22 is retained by a latch 24, whereby upon releasing this latch the closure may be swung to an out of the way position.

At the other side of the body, the end wall 18 is shown provided with a removable drain closure 26.

Operation of the apparatus described above is as follows. With the two feed screws being rotated continuously a batch of material to be mixed or blended is introduced into the body, whereby it is operated upon by the flights. In general the uppermost feed screw as viewed in FIGURE 1, moves the material toward the left and the lower feed screw moves the material to the right. At the left hand end of the upper feed screw the material tends to expand into the left hand end portion of the lower feed screw, because of the greater pitch of the flight portion 15a. Likewise the compressed material from the right hand end portion of the lower feed screw, continuously expands into the region occupied by the flight portion 15a, of the upper feed screw. Thus because of the greater flight pitch provided at the ends of the two feed screws, general circulation of the material is promoted, with material transferring from one feed screw to the other, near the ends of the body. In addition and simultaneously with this general circulation, the entire body of the material is subjected to continual working and intermixing, with a substantial amount of direct interchange of material between the feed screws. In FIGURE 1 the general circulatory movement of the material has been indicated by the arrows of greater length, and the shorter arrows indicate direct interchange of materials between the two feed screws. Because of the greater flight pitch at one end of each feed screw, the material is not subjected to excessive pile-up at the end of the body, but on the contrary the surface of the body of the material undergoing mixing is relatively constant and level.

After the mixing operation has continued for a period of time sufficient for the desired mixing action, the closure plate 19 is removed, while operation of the feed screws is continued. This results in continuous discharge of the

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batch of material, and because of the general circulation continuous during discharge, the discharge operation progressively removes all of the material undergoing treatment. It will be noted in this connection that the outlet opening 17 is adjacent a region of greatest pressure, because it is at the end of one of the feed screws, where the flights have the smaller pitch.

It will be evident that the apparatus described above is well adapted to use in blending and mixing a wide variety of materials, including pulps, slurries, paste-like materials and the like, containing solid materials together with water or other liquid medium. The manner in which the material is discharged avoids all tilting of the body, and facilitates the use of the apparatus as one part of a complete processing system. Manual operations such as are required with prior apparatus, are completely eliminated or greatly minimized. The apparatus lends itself to maintenance of sanitary conditions, such as are important in the processing of the various food materials. The use of separate motors for the two screws simplifies the drive connections. Also it permits driving of either one or both screws in a reverse direction, to aid in clean out operations.

We claim:

1. In apparatus for carrying out blending operations, a body into which feed material to be blended may be introduced, a pair of material conveying screws disposed side-by-side within the body, each of said screws being provided with continuous flight means, means for rotating

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said screws whereby material acted upon by the flight means of one screw is moved in a direction opposite to that which the other screw moves feed material, the flight means at remote end portions of the two screws being of a pitch greater than the flight means at the other end thereof whereby material acted upon by the two feed screws is caused to move in a generally circuitous path with material being transferred into portions of the screws than have flight means of greatest pitch.

2. Apparatus as in claim 1 in which the body is provided with a discharger outlet adjacent one end of the same, said outlet being disposed adjacent an end of one of said screws which has flight means of lesser pitch.

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