Aug. 24, 1954 A. FAVA 2,687,205

DRYING TUNNEL FOR LONG-SHAPED ALIMENTARY PASTE

Filed Nov. 2, 1950 3 Sheets-Sheet 1

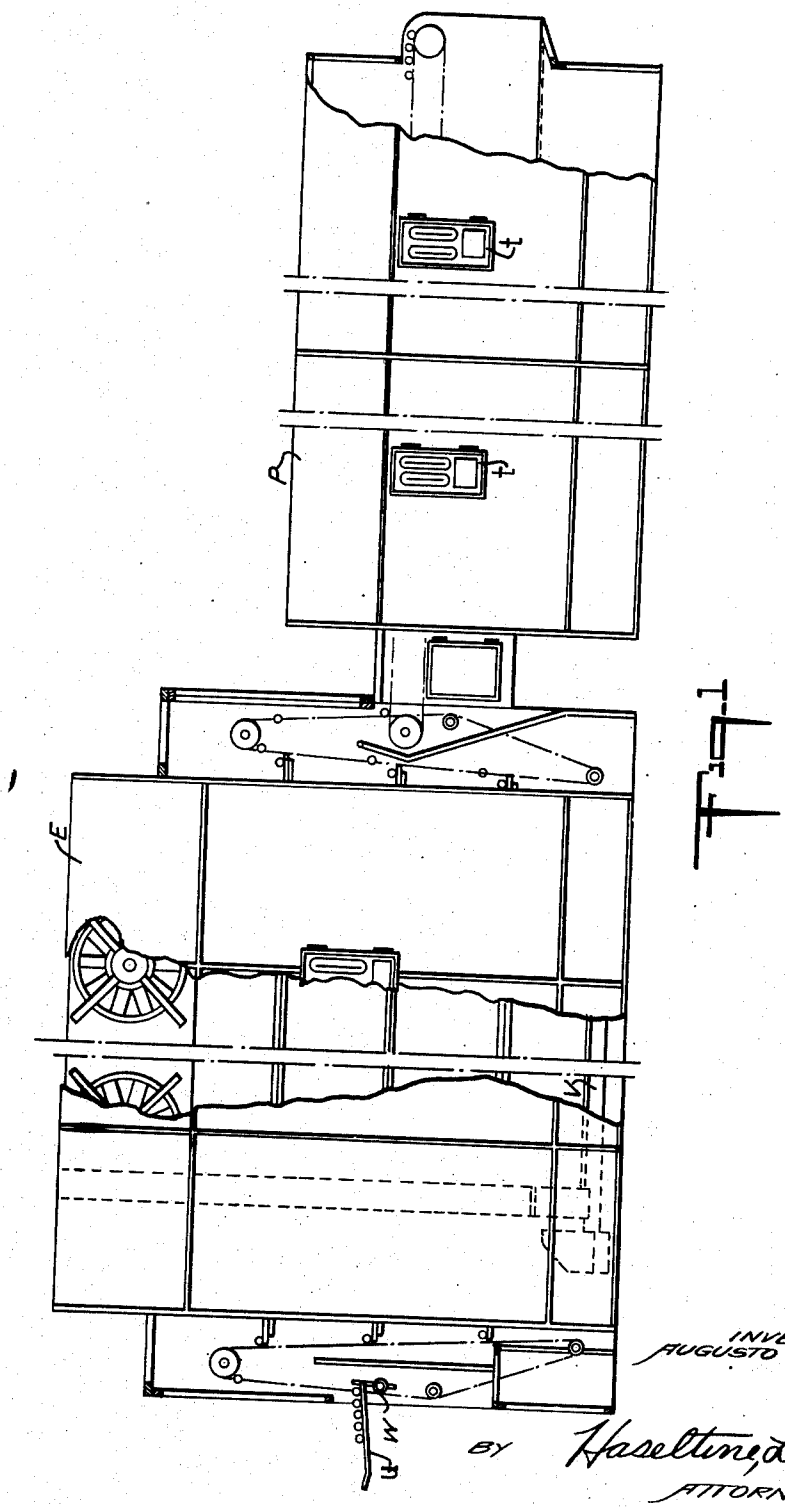


FIG. 1

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3 Sheets-Sheet 2

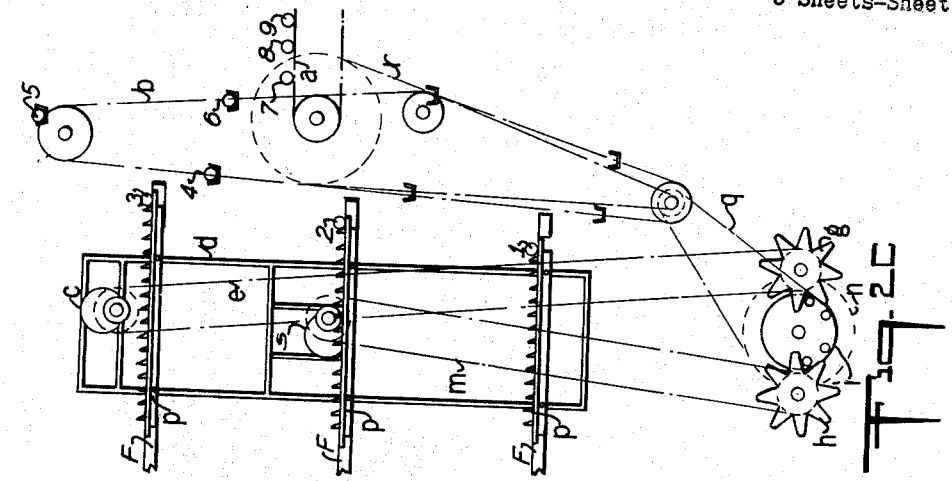


Fig. 2C

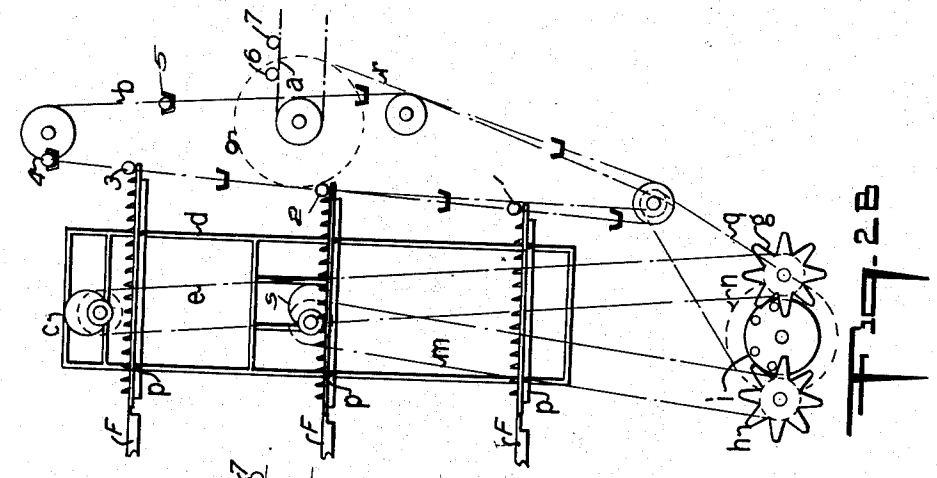


Fig. 2B

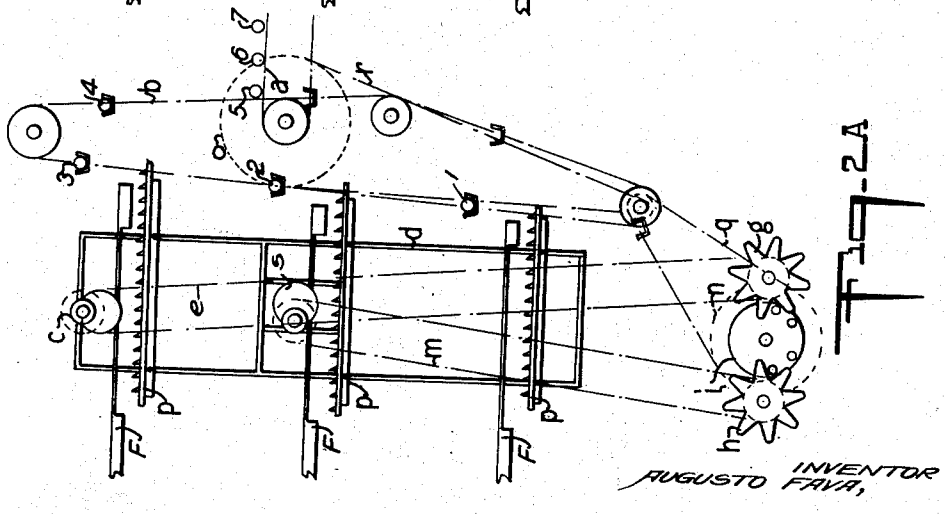


Fig. 2A

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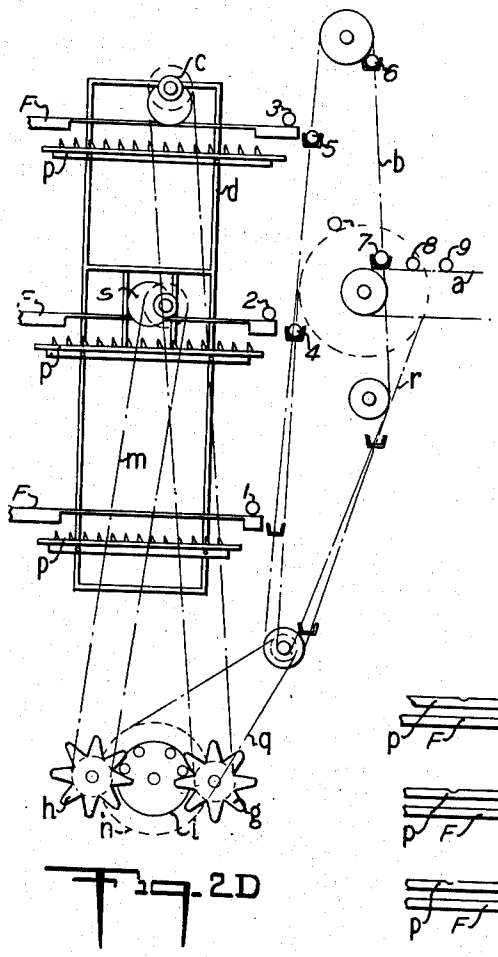


Fig. 2D

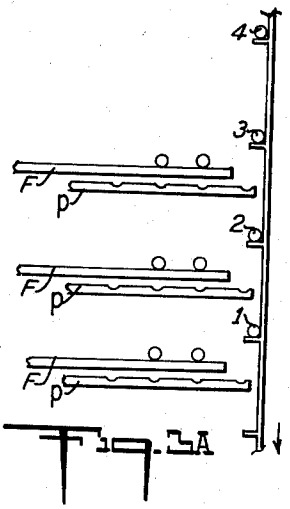


Fig. 3A

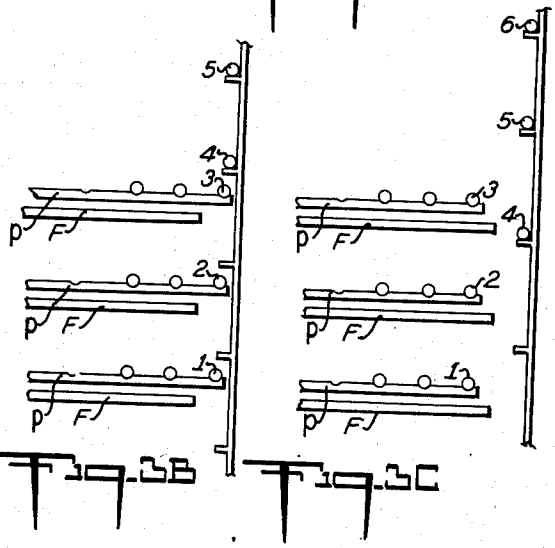


Fig. 3B

Fig. 3C

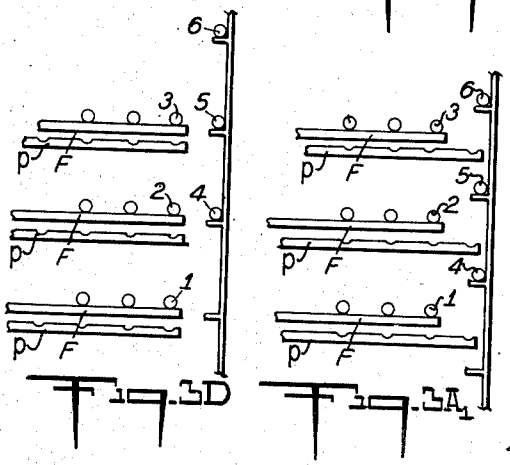


Fig. 3D

Fig. 3A1

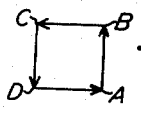


Fig. 4

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DRYING TUNNEL FOR LONG-SHAPED ALIMENTARY PASTE

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Claims priority, application Italy March 10, 1950

2 Claims. (Cl. 198—31)

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The present invention relates to drying tunnels and more particularly to an apparatus specifically designed to carry sticks or canes of alimentary paste through a drying tunnel.

In the manufacture of alimentary paste, machines are used which lay out the paste on canes or sticks on a moving belt or conveyor. The canes or sticks are then passed through a drying tunnel. Since the sticks come from the laying out machine on a single level, it has been the practice heretofore to put the canes in the drying tunnel on a single level and permit the canes to pass through successive floors of the tunnel. However, such a procedure resulted in unsatisfactory drying and improper ventilation of the paste. The present invention provides a means whereby the canes are taken off the conveyor from the laying out machine at a single level and are placed in the drying tunnel at a plurality of levels.

It is an object of the present invention to provide a drying tunnel including means for automatic loading and simultaneous distribution to a number of floors at different levels of the canes coming from a simple conveyor and further including means for collecting the dried paste on a single floor.

The invention is illustrated by way of example and not by way of limitation in the accompanying drawings which represent a drying tunnel with three floors, with stepwise conveying in the tunnel, with automatic and simultaneous loading and distributing of the canes on three floors of said tunnel and with collection of the canes carrying the paste on one floor.

Figure 1 is the general view of the assembly constituted by a preliminary wrapping tunnel P and by a drying tunnel E;

Figures 2A to 2D show in elevation the four successive positions for the distribution and loading of the canes from the preliminary wrapping tunnel to the three levels of the drying tunnel;

Figures 3A to 3D and $3A_1$ show the relative positions of the operative parts and conveyed canes through a complete cycle of operation showing a modified form of comb structure featuring detents instead of teeth; and

Figure 4 illustrates the path of movement of one of the comb conveyors.

Referring to Figure 1, the drying tunnel is shown at E and it can be seen that the tunnel is provided with a plurality of levels or floors. A preliminary operation is performed within the casing P and the canes of paste pass through this machine to the drying tunnel on a horizontal

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conveyor or belt *a*. By means of mechanism hereinafter described, the canes are shifted from the single conveyor *a* to a plurality of floors within the drying tunnel. There is additionally provided means at the end of the drying tunnel whereby the dried canes may be transferred from the plurality of levels within the tunnel to horizontal collecting rails.

One complete cycle of operation will now be described, starting with the elements in the position shown in Fig. 2A. The canes of alimentary paste are represented by the reference numerals 1 to 9. The canes are fed onto a vertical conveyor chain *b* from a horizontal belt *a*. There is provided any suitable driving means (not shown) to drive a gear or pulley *n* which through chains or belts *q* and *r* drive conveyor chains *b* and *a*. The drive is so arranged and the canes so spaced that as a cane progresses to the end of belt *a* an empty conveyor element on chain *b* moves up vertically to lift the cane.

The gear *n* carries an interrupted gear *i* having teeth disposed thereon as shown in Fig. 2. Gear *i* rotates continuously with rotation of gear *n* and it can be seen that the gear *i* will sequentially cause half revolutions of gear *g* and *h*. Gear *h* is connected through chain *m* with an eccentric *s* and correspondingly gear *g* is connected through chain *e* with an eccentric *c*. The eccentrics *c* and *s* engage a frame *d* which carries comb members *p* fixedly secured thereon. The floors or shelves of the drying chamber are represented by the letter F.

When the machine starts, the following movements take place: the interrupted gear *i* causes a half-turn of the gear *g* which in turn rotates the eccentric *c* so that the frames *d* rise to lift the teeth of the combs *p*, fixed to the frames, above the level of the stationary guides F. At the same time, the chains *a* and *b* have moved a predetermined distance by the gears or pulleys *n* and *o* and the chain transmissions *q* and *r*. By this movement of the chains *a* and *b* the canes 1, 2 and 3 have become hooked on the first teeth of the combs *p*, each on a different floor, whereas the cane 5 has been gripped by the chain *b* and the cane 6 occupies the position previously occupied by the cane 5. Thus the position shown in Fig. 2B is reached. Subsequently, the interrupted gear *i* continuing its rotation causes a half-revolution of the gear *h* so that the eccentric *s* by means of chain transmission *m* displaces the combs *p* towards the outlet of the tunnel. The canes 1, 2 and 3 are thus moved one step along the tunnel on the stationary guides F and

at the same time the chains *b* take in their course the cane **6**. Thus the position shown in Fig. 2C is reached. The combs are subsequently lowered as the interrupted gear *i* again rotates gear *g* through a half-revolution to shift the position of eccentric *c*. As the combs are lowered they leave the canes **1**, **2** and **3** on the guides or shelves F. The canes are deposited on the shelves F and do not roll from the initial deposited position due to friction between the canes and the shelves. Simultaneously, the conveyor *b* picks up cane **7** from belt *a*. The elements are now in the position shown in Fig. 2D. It can be readily seen that as the interrupted gear *i* again rotates gear *h* through a half-revolution, the combs *p* will be shifted to the right in position to receive the canes **4**, **5** and **6**.

The whole of the mechanism for loading the tunnel is, of course, based on fixed ratios and proportions, so that the sequence of the steps will not cause unbalance in the synchronism of all the movements hereinbefore described.

The tunnel P where wrapping is effected, constitutes the first element of the assembly and is located at the bottom of the extruding machine, where it collects the canes just loaded by the laying-out machine and transports them on the two parallel chains *a* as far as the distributing chain *b*.

The drying tunnel E is constituted by a series of elements with a number of paste floors and their number varies according to the quantity of the product to be dried. Each of said elements has predetermined ambient conditions, maintained constant with electric and/or mechanical regulators *t*.

There is provided a general conduit *v* for ventilation, terminated by one or more exhaust fans and having exhaust vents in each element.

The same system used for loading may serve to collect the paste from the various floors and to convey it to a single floor for unloading the tunnel E. There is provided means for the deposition of a certain number of canes at the outlet, on collecting rails *u* where, as the canes arrive, a pair of lever spurs *w*, actuated by the unloading chains, exert a pressure on the ends of said canes, thus pushing them against one another.

I claim:

1. In a tunnel for drying elongated alimentary pastes, wherein the paste is supported by horizontal canes from which it depends, and wherein the canes carrying the paste are delivered to the tunnel in succession along a substantially horizontal path, a plurality of vertically spaced drying floors extending horizontally from a point in substantially vertical alignment with the end of said horizontal path, first, continuous means for conveying canes from said end of said horizontal path in a substantially vertical path past said drying floors, a stationary horizontal cane-supporting guide rail at each drying floor, second, stepwise conveying means at each drying floor movable into and out of said substantially vertical path to pick up a cane from said first conveying means as it is conveyed past the drying floor and to deposit it on said guide-rail, said second conveying means extending throughout the length of said guide-rail to convey canes supported thereon stepwise from end to end, drive means for actuating said first and second conveying means, and separate transmission means from said drive means to each conveying means, the drive ratio of the first transmission means to the second transmission means being such that the first conveying means advances as many canes as there are drying floors while the second conveying means completes one cycle of operation.

2. A drying tunnel as in claim 1 wherein the stepwise conveying means comprise a pair of horizontal combs at each drying floor with upwardly directed teeth, and wherein the second transmission means comprise a common movable support for all the combs, and cam means for imparting to the support a first movement of the combs below and out of engagement with canes on the guide rails to a position intercepting canes on the continuous conveying means, a second vertically upward movement to a level above the guide rails, a third movement toward the drying floors, and a fourth movement to a position below and out of engagement with the canes, whereby the combs pick up canes on the guide-rails and on the continuous conveying means during the second movement and deposit them during the third movement.

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