June 21, 1949. A. D. WILSON ET AL 2,474,136

PACKING OF PLASTIC MATERIAL

Filed April 23, 1946 2 Sheets-Sheet 1

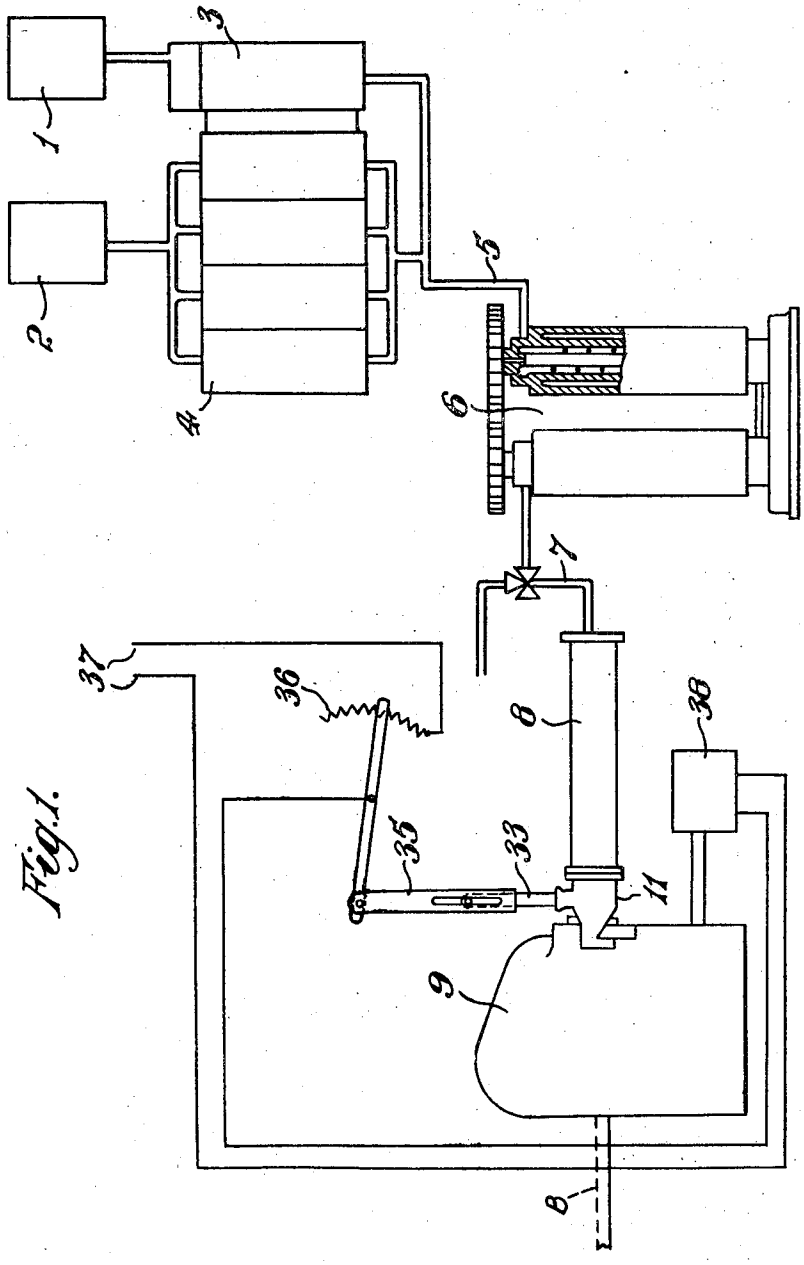

Fig. 1.

Inventors
ARTHUR DACRE WILSON
WILLIAM DALZIEL
by Hoyeud, Avery & Campbell
their ATTORNEYS.

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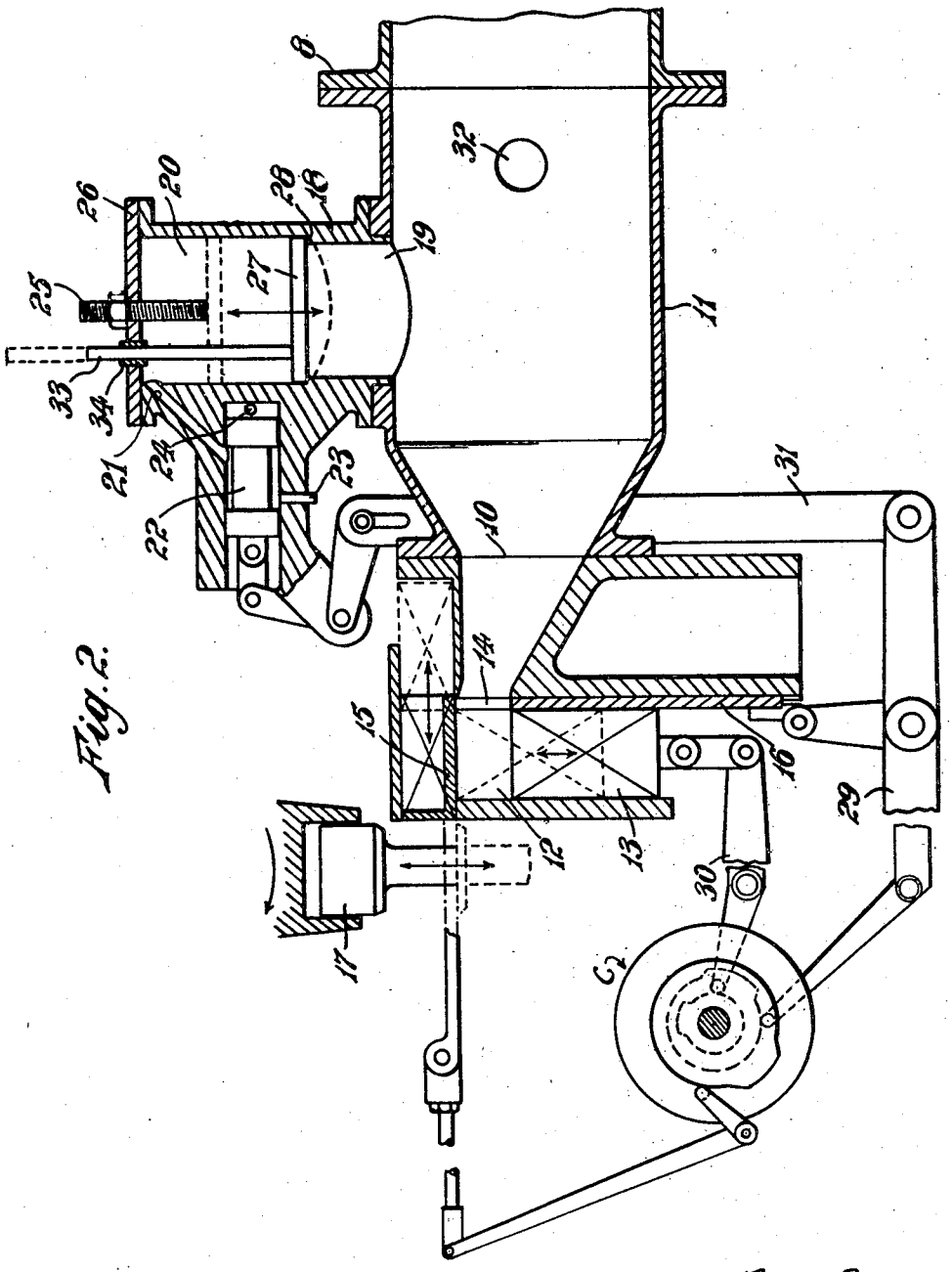

Fig. 2.

Inventors
ARTHUR DACRE WILSON
WILLIAM DALZIEL
by Hoguet, Mealy & Campbell
their ATTORNEYS

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PACKING OF PLASTIC MATERIAL

Arthur Dacre Wilson, Grays, and William Dalziel, Birkenhead, England, assignors to Lever Brothers Company, a corporation of Maine

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6 Claims. (Cl. 31—14)

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The present invention relates to the packing of plastic materials such as margarine, lard and other materials of similar plasticity, and it relates particularly to devices for rapidly forming into blocks or "prints" the output from a machine producing the material continuously.

According to the present invention an arrangement for coupling a continuously operating machine for producing plastic materials such as margarine to an intermittently operating packing machine, comprises a connection between the outlet of the producing machine and the inlet of the packing machine for conducting the material under the output pressure of the producing machine to the packing machine, and means for applying additional pressure to the material in said connection while said packing machine is open to be charged and for releasing said pressure while said packing machine is closed, said means serving to accommodate the material issuing from the producing machine during the period of closure of the packing machine.

The said means may comprise a cylinder and piston connected as a branch to said connection. While the packing machine is closed the piston moves up the cylinder to accommodate the continued feed of material into the connection from the producing machine. When the packing machine opens, compressed air or mechanical pressure is applied behind the piston which forces the material at increased pressure to fill the packing machine. As soon as the latter closes the pressure behind the piston is released.

In what follows reference will be made, for simplicity of description, to the production of margarine, but it will be readily apparent that the invention can be applied to the production of other plastic materials on which similar operations are performed.

The invention will be described with reference to the accompanying drawings in which

Figure 1 shows diagrammatically a complete system for continuously processing margarine and

Figure 2 shows the packing machine embodying the invention.

In the complete system for processing margarin shown in Figure 1, the starting materials (usually oil and milk) from supply tanks 1 and 2 are fed by pumping devices 3 and 4 through a conduit 5. The pumping devices 3 and 4 preferably are such as to supply the materials from the tanks 1 and 2 in the required proportions automatically.

The material passes along the conduit 5 to a processing apparatus 6 which may be of the well

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known type in which the ingredients to be mixed, emulsified and cooled, are passed through thin-walled nickel tubes surrounded by a cooling medium of evaporating liquid ammonia. The tubes are provided with internal rotating blades which remove the thin film of chilled material from the wall of the tubes. In this way the oil and milk are rapidly cooled and mixed. Details of such an apparatus, being well known, need not be fully illustrated in the present specification. The cooled mixture passes through from this processing apparatus 6 through conduit 7 into a large diameter tube 8 in which the margarine sets and is brought to the final consistency desired by being passed through wire mesh screens fitted therein. From this tube 8 the product is extruded under the pressure from the input pumping devices 3 and 4, and passes through a suitable connection 11 into a packing machine which is indicated at 9. After wrapping, the packets of the product leave the packing machine 9 along the conveyor belt B. The packing machine, which has already been described, together with the means for connecting it to the producing machine, are illustrated in more detail in Figure 2, to which reference will now be made.

Between the extrusion outlet of the tube 8 and the inlet aperture 10 of the packing machine is a horizontal connection 11 having such a suitable varying cross-section along its length that the margarine can flow without substantial restriction from the circular outlet 8 to the rectangular aperture 10 of the packing machine.

The top of the connection 11 branches into a vertical cylindrical reservoir 18 fitted with a movable piston 19. A space 20 above the piston is connected, through a passage 21 opening into the top of the space beyond the permissible movement of the piston, with a slide valve 22 which can open the passage either to a source 23 of compressed air or to an exhaust hole 24 communicating with the atmosphere.

The piston 19 in the reservoir 18 has its permissible movement in the upward direction limited by an upper stop, here, for exampie, illustrated in the form of a threaded rod 25 screwed into the top 26 of the reservoir 18, and adjustable from the outside. In the downward direction its movement is limited by providing it with a flange 27, which engages a step 28 in the reservoir wall when the piston moves to the lowest desired limit of its travel. Preferably this lower stop 28 is so arranged that at the end of the down stroke the piston, suitably shaped, would form part of

the wall of the connection 11 so that there is no "dead" pocket of margarine formed.

The cycle of operations is as follows: assume that a print has just been ejected from the die-chamber 12, the die-chamber 12 being closed to the connection by the knife 16, and the piston 19 being at some intermediate position between the two stops.

When the top 15 of the die-chamber 12, which had opened to allow the print to be ejected, closes, the plunger 13 in the die-chamber 12 moves downwards, and at the same time the knife 16 moves downward to open the side opening 14 of the die-chamber 12 to the store of margarine in the connection 11 which is under the output pressure from the continuous producing machine. At the same time as the knife 16 exposes the opening 14, the slide valve 22 connects the space 20 above the piston 19 in the cylinder 18 through the passage 21 to the source of compressed air 23, the pressure from which forces the piston 19 downward, and forces margarine very rapidly into the die-chamber 12. When the die-chamber 12 has been filled, the knife 16 closes the opening 14 and at the same time the slide valve 22 connects the space 20 to the exhaust 24, thus releasing the pressure on the margarine in the connection 11 from the compressed air source. The cover plate 15 moves to open the top of the die-chamber 12, the plunger 13 moves upwards to eject the print, which is pushed off the plunger 13 by the cover plate 15 of the die-chamber as it slides back to the left to close the latter. During the time that the die-chamber is closed by the knife 16, more margarine is extruded from the producing machine into the connection 11, and this continued production is accommodated by margarine passing into the cylinder 18, the piston 19 in which moves upwards to accommodate this continued production.

The plunger 13 and knife 16 in the die-chamber 12 move downward again, and the cycle of operations is repeated.

The movements of the print into the wrapping machinery may be as described in the British patent specification 565,143, accepted October 27, 1944.

The movements of the knife 16, plunger 13 and airvalve 22 and so forth are all controlled by lever systems 29, 30, 31 respectively operated by cams as shown in British patent No. 565,143. The levers 29 and 31 operating the knife 16 and the valve 22 are connected to work together.

Preferably the connection 11 is fitted with a pressure gauge and a relief valve fixed at 32, and both the connection 11 and the cylinder 18 are preferably water jacketed so that the margarine may be made to flow as a plug by maintaining the jacket at a suitable temperature.

In order that the packing machine may accommodate the material at the rate it issues from the producing machine, the movement of the mean position of the piston, which indicates the excess or deficiency of material being produced by the producing machine in relation to the rate of working of the packing machine, may be used to control the relative speeds of two machines. For example, the rod 33 connected to the piston and passing through an air-tight gland 34 in the top 26 of the cylinder 18 may be used to operate an electrical control which alters the speed of an electric motor driving the packing machine. This control operates in such a way that when the piston moves within a range at the upper end of the cylinder, the packing machine is speeded

up, as this position indicates that more material is being produced than is being taken up by the packing machine, the excess flowing into the cylinder and keeping the piston at the upper limit of its permitted travel. If the piston remains at the lower end of its travel the opposite condition is indicated, and the packing machine is slowed down. Such control means may take any suitable form. In Figure 1 such control means are illustrated by the rod 33, lost motion device 35 (serving to lose the motion of the piston due to the actual filling and accommodating steps), and resistance 36. This latter resistance is varied according to the position of the rod 33 and, being connected in series with the electrical supply mains 37 to the motor 38 driving the packing machine, controls the speed of the latter as described above.

We claim:

1. An arrangement for coupling a continuously operating machine for producing plastic materials to an intermittently operating packing machine, said arrangement comprising a connection between the outlet of the producing machine and the inlet of the packing machine for conducting the material under the output pressure of the producing machine to the packing machine, means for opening and closing said inlet, a chamber communicating with said connection, displaceable means in said chamber for varying the capacity of said chamber, and means for applying pressure to said displaceable means to reduce the capacity of said chamber while said inlet is open and for releasing said pressure to permit the capacity of said chamber to increase while said inlet is closed.

2. An arrangement for coupling a continuously operating machine for producing plastic materials to an intermittently operating packing machine, said arrangement comprising a connection between the outlet of the producing machine and the inlet of the packing machine for conducting the material under the output pressure of the producing machine to the packing machine, means for opening and closing the inlet of said packing machine, a variable capacity chamber communicating with said connection, and means for applying pressure to said chamber to decrease its capacity while said inlet is open to be charged and for releasing said pressure applied to said chamber to permit its capacity to increase while said inlet is closed, said chamber serving to accommodate the material issuing from the producing machine while the inlet of said packing machine is closed.

3. An arrangement for coupling a continuously operating machine for producing plastic materials, to an intermittently operating packing machine, said arrangement comprising a connection between the outlet of the producing machine and the inlet of the packing machine for conducting the material under the output pressure of the producing machine to the packing machine, a cylinder connected as a branch to said connection, a piston within said cylinder, and means for applying pressure behind said piston and thence to the material in said connection while said packing machine is open to be charged and for releasing said pressure while said packing machine is closed.

4. An arrangement for coupling a continuously operating machine for producing plastic materials to an intermittently operating packing machine, said arrangement comprising a connection between the outlet of the producing machine and

the inlet of the packing machine for conducting the material under the output pressure of the producing machine to the packing machine, a cylinder connected as a branch to said connection, a piston within said cylinder, a source of compressed air, and means for connecting the space in said cylinder behind said piston to said source while said packing machine is open to be charged and for connecting said space to the atmosphere while said packing machine is closed.

5. An arrangement for forming prints of plastic material from a machine continuously producing said material, said arrangement comprising a die-chamber, means for cyclically opening said die-chamber to permit it to be filled and thereafter closing it, means for ejecting prints therefrom, a connection to said die-chamber from said machine, a branch on said connection for accommodating material issuing from said machine during closure of said die-chamber, a piston within said branch, a source of compressed air, and means for connecting said source to the space in said branch behind said piston while said die-chamber is open to apply pressure to the material in said connection, and for connecting said space to the atmosphere during closure of said die-chamber.

6. An arrangement for forming prints of plastic material from a machine continuously producing said material, said arrangement comprising a die-chamber, means for cyclically opening

said die-chamber to permit it to be filled and thereafter closing it, means for ejecting prints therefrom, a connection to said die-chamber from said machine, a piston forming at least a part of the bounding wall of said connection, and means for applying pressure to said piston while said die-chamber is open, and for releasing said pressure while said die-chamber is closed, so that said piston can move to accommodate plastic material entering the connection during the closure period of said die-chamber.

ARTHUR DACRE WILSON.
WILLIAM DALZIEL.

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