

May 9, 1933.

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1,907,621

FLUID PRESSURE OPERATED SLICING MACHINE

Filed March 20, 1929

2 Sheets-Sheet 1

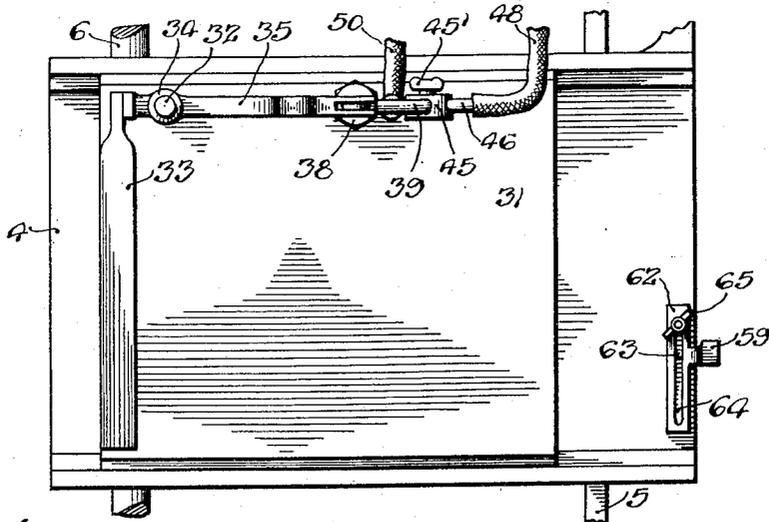
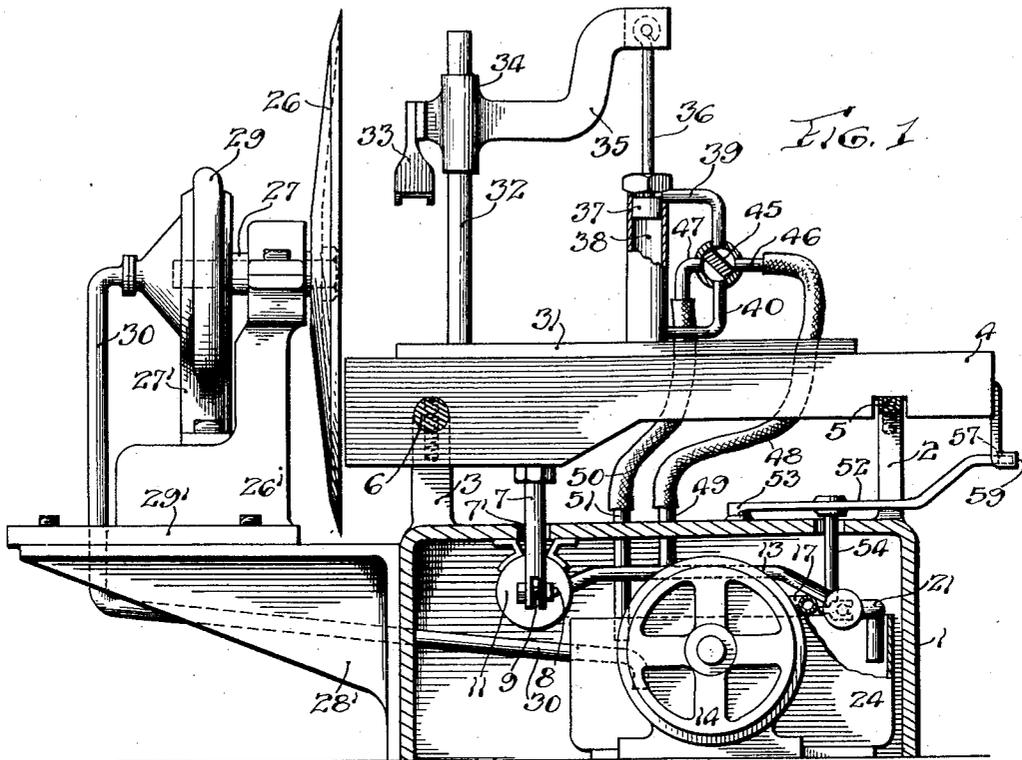


FIG. 2

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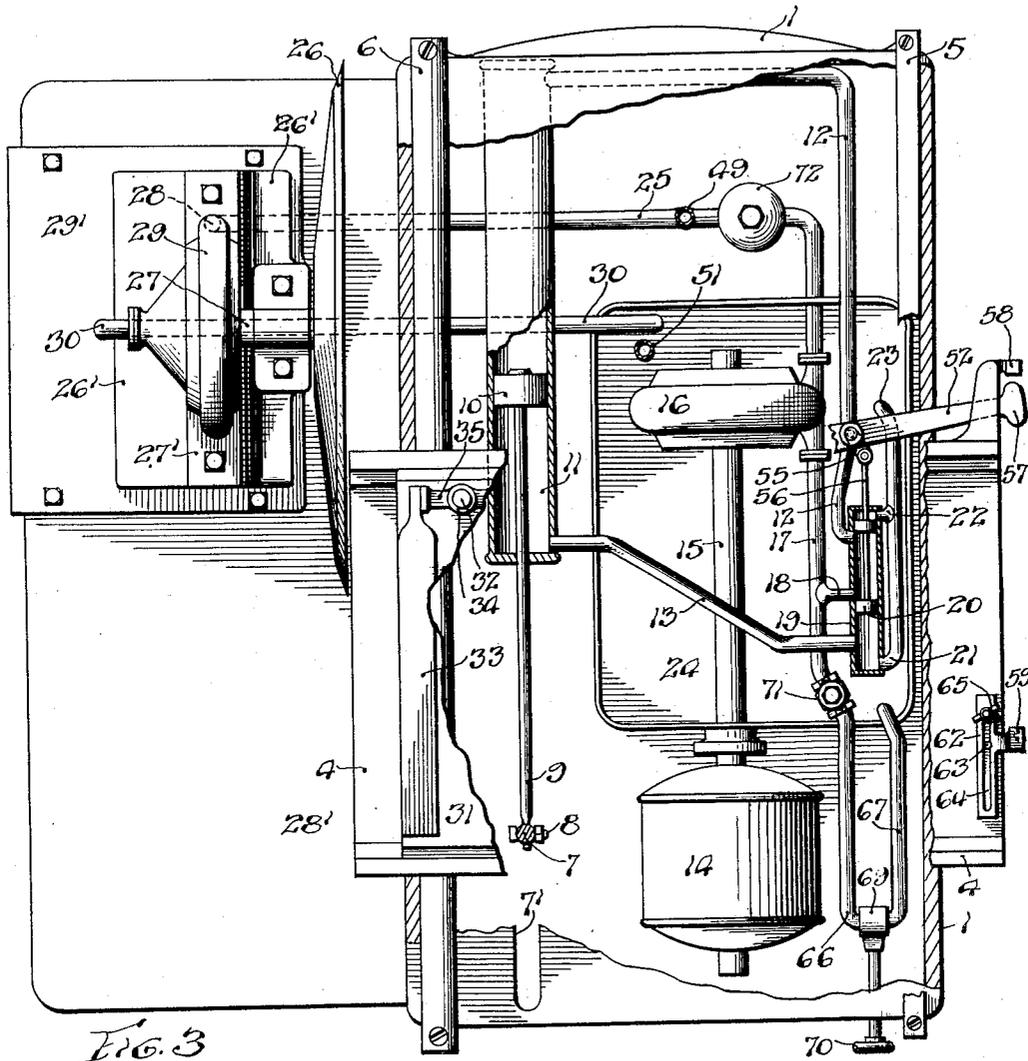


FIG. 3

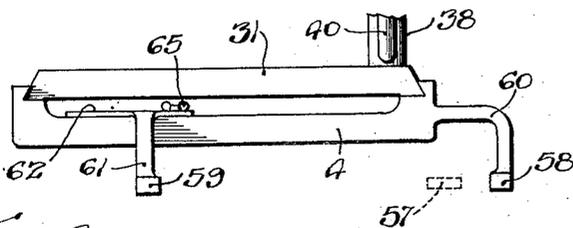


FIG. 4

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FLUID PRESSURE OPERATED SLICING MACHINE

Application filed March 20, 1929, Serial No. 348,373, and in Great Britain March 30, 1928.

The present invention relates to slicing machines and is shown embodied in a machine in which the carriage which holds the substance to be sliced is moved recurrently past the knife, the latter being fixed to a shaft rotatable in a fixed bearing. However, the invention is capable of being embodied in slicing machines of a type other than that illustrated.

10 The present invention has for one of its objects the provision of fluid operated means for operating the various movable parts of the slicing machine. More specifically, the invention contemplates the use of a fluid operated means to reciprocate the work supporting carriage, rotate the knife, and exert a clamping pressure on the clamp which holds the substance to be sliced on the carriage.

20 Another object of the invention is the provision of a novel apparatus for accomplishing the above-noted results.

25 Still another object of the invention is the provision of automatic means for changing the direction of movement of the work supporting carriage.

Other objects of the invention will appear hereinafter, the novel features and combinations being set forth in the appended claim.

In the drawings:—

30 Fig. 1 is a view looking from the front of the machine with the parts thereof in section;

Fig. 2 is a plan view of the work support and clamping mechanism;

35 Fig. 3 is a view looking down on the machine shown in Fig. 1 with parts of the machine broken away for the sake of clearness; and

40 Fig. 4 is a detail view showing the arrangement of the stops for effecting automatic reversal of the carriage.

The device, as shown, comprises a base member 1 having supports 2 and 3 supporting guides 5 and 6, respectively, upon which guide rods the carriage 4 is adapted to reciprocate. Projecting downwardly from the under side of the carriage is a rod 7 rigidly fastened thereto and this rod is pivotally connected at 8 to the piston rod 9 having the piston 10 mounted on the opposite end thereof. The piston is adapted to reciprocate within

the cylinder 11 and is caused to move longitudinally thereof by means of pressure fluid introduced into the cylinder, first on one side and then on the opposite side of the piston 10, the pressure fluid being introduced through the pipe connections 12 and 13. A slot 7' is provided in the base member 1 in which the rod 7 is adapted to reciprocate as it moves with the carriage.

An electric motor 14, driven from any suitable source of electrical energy, drives the pump 16 by means of the shaft 15 which operatively connects the motor and the pump. The pump is located in the trough 24 in which is located a suitable fluid which is adapted to be pumped into the pressure line which comprises the branches 17 and 25. Any other suitable means may be used to introduce fluid under pressure into the system, such as a pressure pipe line from a remote source.

Fluid pressure entering the branch 17 passes into the pipe section 18 connected thereto into the cylinder 19. A slide valve 20 which is adapted to be reciprocated in the cylinder 19 regulates the flow of fluid from the pressure line 17 into either of the pipes 12 and 13 connected to opposite ends of the cylinder 11. With the parts in the position shown, the pressure fluid enters the cylinder 19 and passes out through the pipe 12 into the upper end of the cylinder 11, as seen in Fig. 3. This forces the piston to the opposite end of the cylinder and, as a result, moves the carriage 4 in the same general direction. The pressure fluid at this end of the cylinder escapes through the pipe 13 into the cylinder 19 and out through the exhaust port 21 through the pipe 23 to the trough 24 where the fluid can again be used by the pump. With the valve in its opposite extreme position, the fluid from the branch 17 enters the cylinder 19 and the pipe 13 to the cylinder 11 and moves the piston and the carriage in a direction opposite to that in which they moved when pressure fluid was introduced through the pipe connection 12. The exhaust fluid from the cylinder 11 passes through the pipe 12 into the cylinder 19 and out through the exhaust port 22 to the pipe 23 by which it is discharged into the trough 24.

The other branch 25 of the pressure conduit provides a fluid for operating both the rotary knife 26 and the clamp 33. The knife 26 is mounted on a spindle 27 rotatably mounted in a bracket 26' which has a base 29' secured to the bracket 28' fastened to one side of the base 1. A second bracket 27' is adapted to support the motor 29 and pressure fluid is introduced to this motor from the pipe connection 25 through the opening 28' in the lower part of the motor. The rotating part of the motor 29 is directly connected to the shaft 27 so that rotation thereof imparts rotation to the shaft 27 and, consequently, to the knife 26. Exhaust fluid from the motor 29 passes through the pipe 30 back into the trough 24 where it can again be used.

A cross slide 31 is mounted on the carriage 4 and carries an upright 32. The clamping member 33 has a bearing member 34 slidable on the upright 32 and has an extension or arm 35 pivotally connected at one end to a piston rod 36 which has a piston 37 at the opposite end thereof. This piston 37 is adapted to reciprocate in the cylinder 38 causing the clamp 33 to move up and down along the upright 32. To move the piston back and forth in the cylinder, means are provided whereby a pressure fluid may be introduced into the cylinder, first on one side of the piston and then on the other. This means comprises the pipes 39 and 40 adapted to be connected to the pressure conduit 46 by means of a valve 45. This valve is so constructed that fluid is caused to flow through the pipes 39 and 40 alternately, to cause the aforesaid result.

With the parts in the position shown in Fig. 1, fluid pressure enters the valve 45 and passes into the pipe 39 and cylinder 38 causing the piston 37 to move downwardly. The fluid in the lower portion of the cylinder 38 is caused to move out of the cylinder through the pipe 40 into the valve 45 and out through the exhaust port 47 connected by means of a flexible hose 50 to a pipe 51 mounted in the base 1 and positioned over the trough 24 so that fluid may be discharged into said trough. Turning the valve 45 in either direction through an angle of 90° causes the pressure fluid to pass through the pipe 40 into the cylinder 39 to raise the piston 37 and at the same time the fluid in the upper part of the cylinder is caused to flow through the pipe 39 into the valve 45 and out through the exhaust port 47. The pressure conduit 46 is connected by means of a flexible tube 48 to a pipe 49 which is integral with the branch 25 and has communication with the pressure fluid therein.

Means are provided whereby the carriage 4 is automatically moved first in one direction and then in the opposite direction. This means comprises a lever 52 pivoted at 53 and

connected by means of an extension 54 on the lever 52 and a link 55 to the piston rod forming a part of the slide valve 20. It will readily be seen that movement of the lever 52 in opposite directions causes the valve 20 to reciprocate within the cylinder and direct the pressure fluid first to the pipe 12 and then to the pipe 13 for the purposes hereinbefore set forth.

In order to automatically shift the lever 52, this lever is provided with an extension 57 adapted to engage stops 58 and 59 mounted on the carriage 4. The stop 58 is integral with the arm 60 forming part of the carriage 4. The stop 59 is carried by an arm 61 mounted on a plate 62 which is adjustable towards and from the stop 58 by means of a pin and slot connection 63 and 64. A wing nut 65 mounted on the end of a screw rigid with the carriage 4, is used to clamp the plate 62 in adjusted position. The purpose of this adjustment is to regulate the amount of travel of the carriage 4 during its reciprocation. As the carriage moves, first in one direction and then in the other, the stops 58 and 59 alternately strike the extension 57 on the lever 52 which causes the automatic reversal of the carriage travel, as previously described.

To regulate the speed of the various moving parts, a bleeder valve 69 is interposed between the pipe sections 66 and 67, the former being an extension of the branch 17. A hand wheel 70 is used to operate the valve 69. When the valve is opened, the pressure fluid in the branches 17 and 25 can pass through the pipes 66 and 67 and lessen the pressure in said branches 17 and 25, causing the parts to be moved at a slower rate of speed.

If desired, a valve similar to the valve 69 may be placed in the pipe section 13 so that the working stroke of the carriage may be slowed down independently of the return stroke to suit the nature of the substance being sliced. If desired, leak valves may be fitted in the ends of the cylinder 19 so that a cushioning effect may be obtained as the valve 20 approaches the ends of the cylinder. Preferably, a safety valve 71 and an air chamber 72 are arranged in the pressure pipe sections 17 and 25 in a well known manner so that vibration or water hammer is eliminated especially when the bleeder valve 69 is closed.

The operation of the device is as follows:—

With the parts in the position shown, the electric motor 14 is started and the pump 16 draws fluid from the trough 24 and forces it through the pipe sections 17 and 25. The fluid passing through the pipe section 25 enters the pump 29 to rotate the knife 26 at a uniform speed. At the same time the pressure fluid in the pipe section 17 passes into the cylinder 19 and out through the pipe section 12 to the cylinder 11, causing the car-

riage 4 to be moved towards the front side of the machine, as seen in Fig. 1. When the carriage has completed its movement in this direction, the stop 58 strikes the projection 57 on the lever 52, shifting the valve to the opposite end of the cylinder from that shown and causing the fluid from the branch pipe 17 to enter the cylinder 19 and pass out through the pipe section 13 to the cylinder 11, causing the carriage to move in a reverse direction. After the carriage has moved a sufficient distance, the stop 59 strikes the extension 57 and shifts the lever 52 back into its original position and causes the carriage to move in the direction first described. By adjusting the stop 59 by means of the wing nut 65, the length of the stroke of the carriage may be varied. This variation in the length of the working stroke of the carriage is very desirable where substances of various widths are being sliced as it provides a means whereby the forward movement of the carriage is shortened so that the carriage does not have to move any farther than is necessary to cut the slice from the substance, thus eliminating unnecessary movement of the carriage and speeding up the time required to slice a given amount of the substance.

When it is desired to move the carriage at a slower rate of speed, the hand wheel 70 is operated to open the valve 69 to permit the fluid to pass therethrough into the trough 24 so that there is a pressure reduction in the connections 17 and 25 and a consequent reduction of the speed of movement of the carriage and of the knife. To stop the carriage, it is only necessary to move the valve 20 by means of the lever 52 into a neutral position so that the pressure fluid cannot pass through either the pipe 12 or the pipe 13 and must pass through the pipe section 25 to rotate the knife or through the bleeder valve 69 into the trough 24. However, it is found more desirable to stop the rotation of the knife simultaneously with the reciprocation of the carriage and to accomplish this it is only necessary to turn off the motor 14 which causes the pump 16 to cease its operation. This causes the pressure in the pipe sections 17 and 25 to be reduced until it reaches the point where it will no longer move the carriage or the knife.

To clamp the substance, it is only necessary to turn the valve 45 by means of the member 45' until it is in the position shown in Fig. 1. The pressure fluid in this position passes into the upper end of the cylinder 38, causing the piston 37 to descend and carry with it the clamp 33 which is positioned over the substance and is adapted to hold the same. To release the clamp 33, the valve 45 is turned through an angle of 90° so that the fluid passes to the lower part of the cylinder 38 and raises the piston and clamp thereby. The clamp 33 may be maintained in its upper-

most position while the valve 45 is in the last-mentioned position, by the pressure of the fluid entering the lower part of the cylinder from the pressure pipe section 46 connected to the pressure pipe section 25.

In places where there is sufficient pressure in the ordinary water supply main, the pump 16 and motor 14 may be dispensed with and the pipe sections 17 and 25 directly connected to the ordinary water supply main, the waste water being carried away through suitable drains. Also, it may be desirable at times to use air as the fluid which moves the various parts and in such a case, the pressure lines will be filled with air under pressure instead of a liquid as in the device illustrated, the pump 16 being of the type to pump air instead of a liquid. Or, if desired, the air pressure may be generated at some remote source and supplied to the machine by a suitable conduit.

If the carriage is one which rotates instead of reciprocates, a motor similar to the motor 29 may be used to give rotation to the carriage.

Obviously those skilled in the art may make various changes in the details and arrangement of parts without departing from the spirit and scope of the invention as defined by the claim hereto appended, and I therefore do not wish to be restricted to the precise construction herein disclosed.

Having thus fully disclosed an embodiment of my invention, what I claim and desire to secure by Letters Patent of the United States is:—

In a slicing machine the combination with a hollow base member, of a fluid container in said base member, a pump for pumping fluid from said container, means for actuating said pump, a rotary slicing knife, a table reciprocable relatively to said knife, fluid pressure means for rotating said knife, fluid pressure means for moving said table relative to said knife, a clamp on said table, fluid pressure means for actuating said clamp, means for supplying fluid from said pump to each of said fluid pressure means, and means for returning the used fluid from each of said fluid pressure means to said fluid container.

In testimony whereof I have signed my name to this specification on this 25th day of February A. D. 1929.

CORNELIS F. M. VAN BERKEL.