

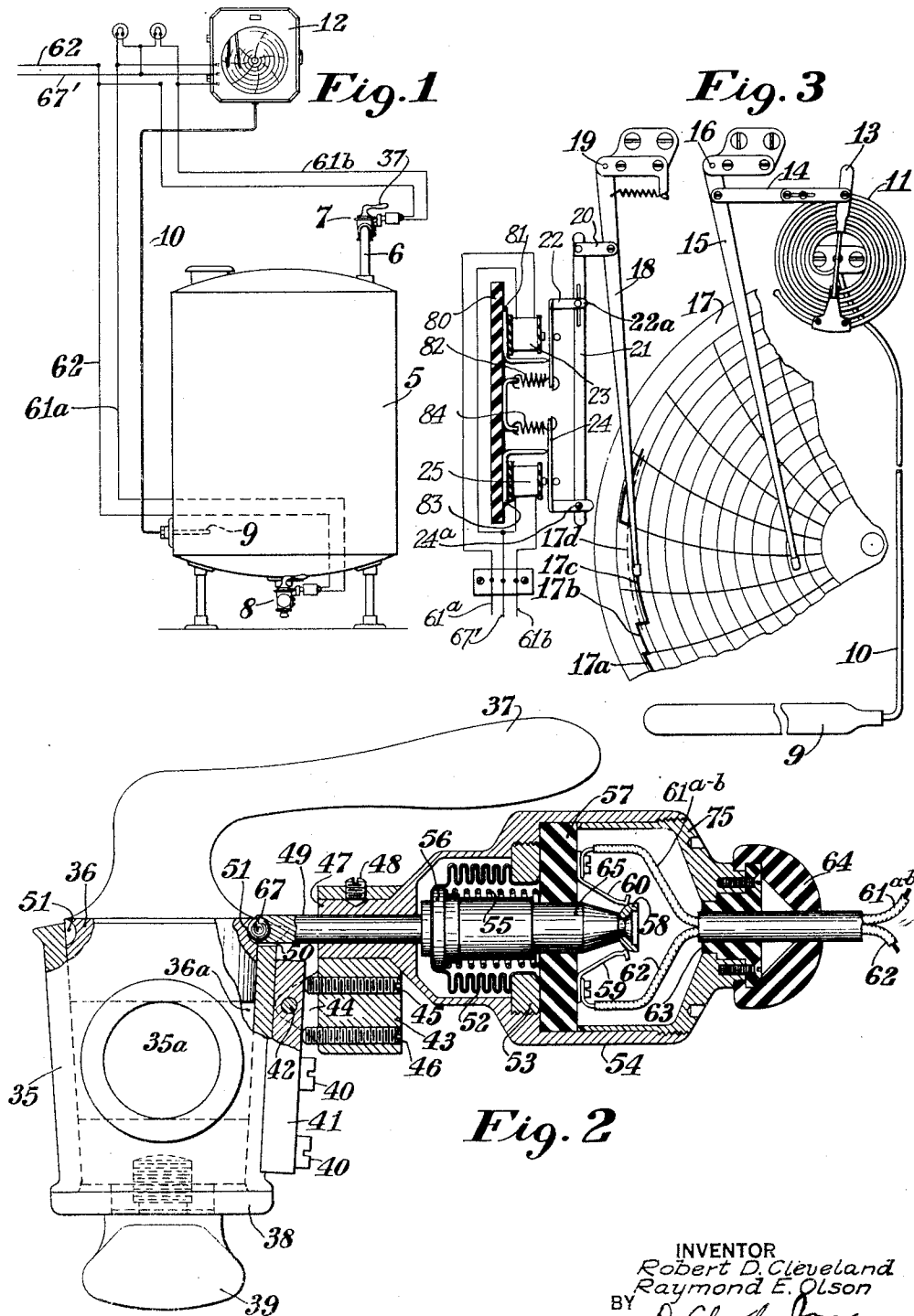
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EXHIBITING AND RECORDING MECHANISM

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EXHIBITING AND RECORDING MECHANISM

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This invention relates to exhibiting and recording mechanism.

In various industrial processes it is important to make a record of the duration of any step or steps in a given process. For example, in the pasteurization of milk it is desired to make a record of the time when milk is introduced into the pasteurizer or when it is withdrawn therefrom, since in accordance with the requirements of the health authorities each given quantity of milk must be subjected to a prescribed temperature for a certain interval of time in order to be acceptable for distribution.

In accordance with the present invention it is proposed to provide a system for showing and recording the opening or closing of an inlet valve or an outlet valve of a pasteurizer. A further feature of the invention relates to an electrical switch which may be attached to or formed as a part of a valve and which in one position of the valve opens certain electrical contacts and in another position of the valve closes these contacts. These and other features of the invention will appear from the detailed description and appended claims when taken with the drawing in which Fig. 1 indicates a pasteurizer and diagrammatically shows a recorder together with an electrical system cooperating therewith under the control of certain valve switches; Fig. 2 is a side elevation with parts broken away of a plug suitable for use in the system of Fig. 1, together with a plug switch shown in cross section; and Fig. 3 indicates certain of the important parts of the recorder.

Referring especially to Fig. 1, 5 designates a pasteurizer of any well-known type having an inlet 6 controlled by valve mechanism generally designated 7 and having an outlet controlled by valve mechanism generally designated 8. There is mounted within the pasteurizer a bulb 9 which communicates through capillary tube 10 with a Bourdon spring or other pressure-responsive device 11 (Fig. 3) of a temperature recorder generally designated 12. The bulb 9, capillary tube 10, and the Bourdon spring 11 are filled with a thermo-sensitive medium. As is well-known, the free end of the Bourdon spring 11 through the arm 13 and the link 14, actuates a pen arm 15 which is pivotally mounted at 16. This pen arm carries a stylus (not shown) adapted to draw a temperature curve on a chart 17 which is rotated by clock mechanism (not shown). It will be noted that a second pen arm mechanism 18 actuated electrically in a manner to be described is also provided to make a record on the chart 17 to

indicate the several positions of valves 7 and 8. This second pen arm pivotally mounted at 19, is connected by a link 20 to the member 21 which is operated under the individual or joint control of the armature 22 of the electromagnet 23 and the armature 24 of the electromagnet 25, in a manner that will be further set forth.

The electromagnet 23 which is mounted on a fixed support 30 of insulating material includes as a part of its magnetic circuit an angular iron piece 31. The piece 31 terminates at its free end in a knife edge which serves as a pivotal mounting for the armature 22 of the electromagnet. This armature is biased toward its normal rest position by the coil spring 32 having its ends respectively attached to the support and to the free end of the armature. The other end of the armature is pivotally connected at 22a to the member or lever 21. Similarly, the electromagnet 25 is mounted on the support 30, and is likewise provided with an angular iron piece 33 forming a part of its magnetic circuit. The free end of piece 33 terminates in a knife edge on which the armature 24 is mounted for rocking movement. This armature is normally held in its position of rest by means of a coil spring 34 having its ends respectively connected to the support and to the free end of the armature. The other end of this armature is pivotally connected at 24a to the lever 21.

The valves 7 and 8 as shown in detail in Fig. 2 are preferably of the plug type, having a valve body 35 and a valve plug 36 with its actuating handle 37. The plug 36 is preferably retained in the body 35 by means of washer 38 engaging the lower part of the body and held in position by a thumb screw 39, screwed to the lower end of the plug. The body 35 and the plug 36 have openings 35a and 36a, respectively, to permit the passage of milk or other liquid therethrough, when they are brought into registry. On the side wall of the body 35 there is detachably supported by screws 40 a relatively narrow mounting bracket 41 having near its upper end a pin 42 on which the ears 44 of the block 43 are mounted for rocking movement. This block has screw-threaded therein to engage the mounting bracket 41, the set screws 45 and 46 by which its angular relation with respect to the valve body 35 may be adjusted about the pin 42 so that the block can be used with various shapes of valve bodies. The block 43 is provided with an opening to receive the reduced portion 47 of the casing 54 of a plug type electrical switch, which portion may be held in the opening of the block, as shown, by means of set screw 55

48. This switch includes within the casing thereof a plunger 49 movable through the reduced portion 47. The body 35 of the valve has a cut-out portion 50 so positioned that the plunger 49 may move readily therethrough, while the plug 36 has two notches 51 on opposite sides arranged to receive when the valve is closed, a steel ball 67 carried on the end of the plunger. The other end of the plunger engages the face of a flexible diaphragm preferably in the form of a metal bellows 52. This bellows at its open end is secured by a fluid-tight joint to a nut 53 threaded into the casing 54. A second plunger 65 has its head portion 56 forced against the closed end of the bellows 52 by spiral spring 55 engaging at one end the face of the disc of bakelite 57, and at its other end engaging the plunger head 56, normally tending to hold the second plunger in the position shown. The casing 54 is closed by a screw-threaded cap 75 having its edges engaging the face of disc 57 to hold it tightly against the nut 53 and the inner shoulder of the casing. The plunger 65 is formed of insulating material and has fastened at its end a hemispherical conducting cap 58, while the bakelite disc 57, on the other hand, has mounted thereon the terminals of spring contactors 59 and 60 which, in the position shown, make engagement with metal cap 58 to close a break point in a circuit extending there-through. The contactors 59 and 60 have connected thereto the electrical conductors 61a—b and 62 which are insulated from each other and lead to the outside of the plug through the bakelite closure 63 and the rubber cap 64, to provide a liquid-tight joint. These conductors lead to electromagnets 23 and 25 which operate the pen arm 18 in a manner to be described.

When the pasteurizer is set up at the beginning of each daily run of milk, the valves 7 and 8 are moved to their closed positions, and consequently the plug switches controlled by the respective valve plugs are closed. This condition exists, since when the handle 37 of the plug is brought to the closing position where the openings 35a and 36a are out of registry, the ball 67 at the end of the plunger 49 enters one of the notches 51 in the plug. This movement of the plunger 49 is effected through the expansion of the bellows 52 due to its natural resilience and due to the spring 55 forcing the end of plunger 65 against the closed end of the bellows. The movement of the plunger 65 brings the conducting cap 58 into electrical engagement with the contactors 59 and 60. Therefore, when the valve 8 is closed, its related switch completes a circuit (Figs. 1 and 2) from one side of the current source, conductor 62, contactor 59 in valve assembly 8, conducting cap 58, contactor 60, conductor 61a, winding of the electromagnet 23, conductor 67', to the other side of the current source. The closure of this circuit causes the electromagnet 23 to attract its armature 22, thereby changing the position of the pivot 22a (carried by armature 22) on which lever 21 is mounted and consequently moving lever 21. This movement of the lever 21 through the link 20 causes the pen portion of the pen arm 18 to move toward the outer margin of the chart 17 to a position indicated by the line 17a. Similarly when the valve 7 is closed, its related plug switch is closed to complete a circuit from one side of the current source, conductor 62, contactor 59 in valve assembly 7, conducting cap 58, contactor 60, conductor 61b, winding of the electromagnet 25, conductor 67, to the other

side of the current source. The electromagnet 25 is thus energized and attracts its armature 24 to change the position of the pivot 24a (carried by armature 24) on which the lever 21 is mounted. This moves the lower end of the lever toward the left which movement, through link 20, causes the pen portion of the pen arm to move toward the center of the chart to a point marked by the position 17b of the curve.

When it is desired to charge the pasteurizer 10 with milk, valve 8 is closed and the valve 7 is opened by moving its plug 36 to bring the valve openings 35a and 36a into registry. As a result of this action, the ball 67 and plunger 49 of valve 7 are forced toward the right as the notch 51 in the plug is moved out of engagement with the ball 67. The plunger 49 engages the end wall of the bellows 52 to force the plunger 65 to the right, thereby moving the conducting cap 58 out of engagement with the contactors 59 and 60. 20 When the cap 58 disengages these contactors, it opens the previously described circuit of the electromagnet 25 which immediately de-energizes, thereby moving the lower end of the lever 21 toward the right. This lever, through the link 20, causes the pen portion of the pen arm 18 to move away from the center of the chart, thereby making a mark such as 17a (as the chart is rotated by the clock mechanism) to indicate that milk is being supplied to the pasteurizer. After the pasteurizer has been charged, the valve 7 is closed with the result that its plug switch closes its circuit to energize again the electromagnet 25 which operates through lever 21 and link 20 in the manner previously indicated, to move the pen portion of the pen arm 18 to a point where it inscribes the arc designated 17b as the chart is rotated in accordance with time. At the end of the pasteurizing period herein assumed to be thirty minutes, the valve 8 is opened with the result that its cooperating plug switch opens the energizing circuit of the electromagnet 23 which releases its armature 22. As previously pointed out, this movement of the armature through the lever 21 and the link 20 moves the pen portion of the pen arm 18 toward the center of the chart where it inscribes the arc designated 17c as the chart rotates.

In the event that there is a failure in the current supply or if, for any reason, both valves 7 and 8 are opened at the same time, the electromagnets 23 and 25 will both be released. The armature of electromagnet 23 on releasing swings the upper end of lever 21 toward the right (Fig. 3), while the arm of electromagnet 25 swings the lower end of lever 21 to the left. The resultant of these movements of lever 21 is that the lever moves the pen portion of the pen arm 18 by means of link 20, to a position indicated by dotted line arc 17d. Since the chart is graduated according to time and since it is rotated by clock mechanism, it is possible by a study of the positions 17a, 17b, 17c and 17d of the curve inscribed by the pen of arm 18 to determine whether the milk has been added to or withdrawn from the pasteurizer during any given period of time.

We claim.

1. In a system of the class described, a container, a valve controlling the inlet and a valve controlling the outlet of said container, and a recording device including time-controlled chart-actuating mechanism, and means responsive to the adjustment of said valves for making on a chart carried by said chart-actuating mechanism, 75

a record indicating in accordance with time the respective positions of adjustment of said valves.

2. In a system of the class described, a container, a valve controlling the inlet and a valve controlling the outlet of said container, a recording device including time-controlled chart-actuating mechanism, a stylus, and means responsive to a change in the open or closed condition of said valves for actuating said stylus.

3. In a system of the class described, a container, a valve controlling the inlet and a valve controlling the outlet of said container, and a recording device including time-controlled chart-actuating mechanism, a stylus, and electro-magnets arranged to actuate said stylus individually or jointly, said electro-magnets being responsive

to a change in the open or closed positions of said valves.

4. In a system of the class described, a container, a valve controlling the inlet and a valve controlling the outlet of said container, and a recording device including time-controlled chart-actuating mechanism, a stylus, and electro-magnets arranged to actuate said stylus individually or jointly, each electro-magnet being individual to one of said valves, an operating circuit for each electro-magnet and a switch individual to each circuit, said switch being actuated in response to the adjustment of its valve to its open or closed condition for completing or interrupting its circuit.

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