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APPARATUS FOR THE INTERMITTENT AND ADJUSTABLE FEEDING OF FUEL OIL BURNERS FOR BRICKKILNS

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Fig.1

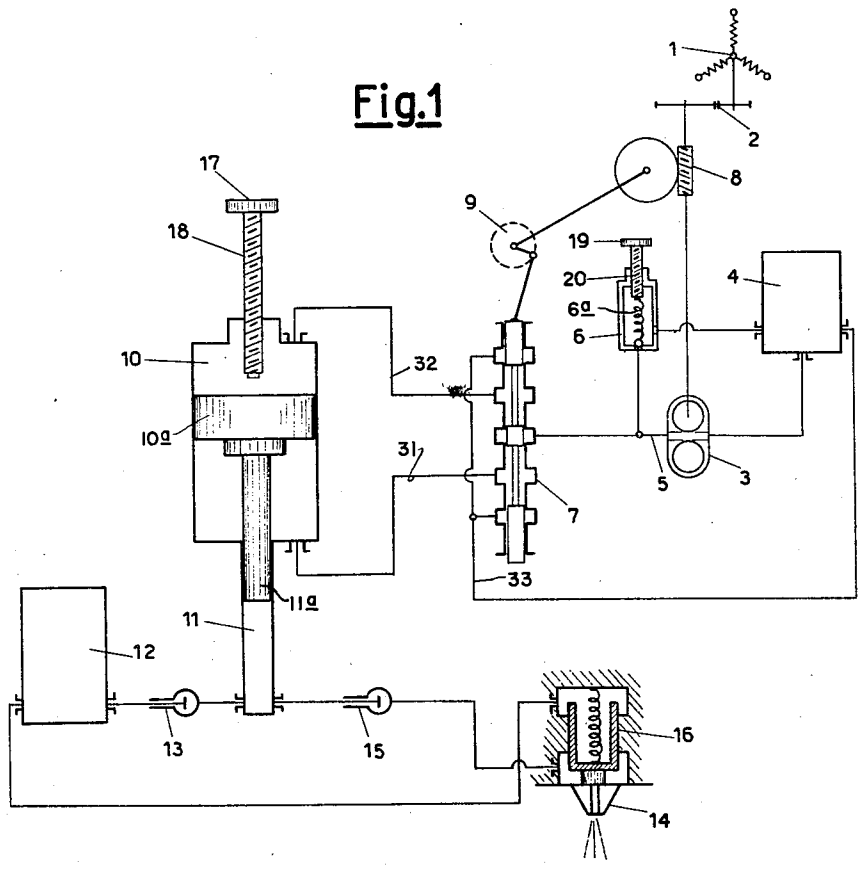
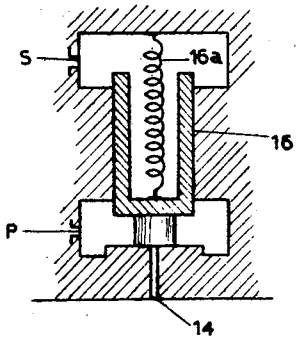


Fig.2



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APPARATUS FOR THE INTERMITTENT AND ADJUSTABLE FEEDING OF FUEL OIL BURNERS FOR BRICKKILNS

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It is known that there are various types of installations for the baking of tiles in Hoffman kilns which use fuel oil burners specially developed for that purpose.

It is also known that some of those types operate the burners in a cycle according to a predetermined rhythm and that each cycle is divided into two parts, one operating stage and one resting stage. Those types adjust the calories introduced at every individual point of the kiln (and, therefore, adjust the heat existing at that point) by adjusting with convenient systems the quantity of fuel oil that is introduced into the kiln during every individual period of operation of every individual cycle. In particular, this adjustment may take place either by adjusting the duration of the period or by previously measuring the volume of fuel oil introduced during every period.

The apparatus according to the present invention belongs to that second category, but has the characteristic of being a completely autonomous apparatus which—in lieu of being necessarily fed and governed from and by one single station—comprises in itself all the parts necessary for the application to every individual hole of the kiln and for its completely automatic operation, including all its adjustments, thereby enabling a "fire control" that is much more adaptable to the requirements of the individual kilns and of the individual types of tiles or bricks.

The apparatus is illustrated in the accompanying drawing wherein:

FIGURE 1 represents diagrammatically all the component parts and connecting pipings and

FIGURE 2 represents the particular of the device for antidripping of the fuel-oil.

The apparatus illustrated in FIGURES 1 and 2 is formed of a small electric motor 1 which by means of the reducer 2 moves the oil pump 3 that sucks the oil from the tank 4 and by means of the conduit 5 whereon the spring urged safety valve 6 is connected, sends oil under pressure to the slide valve 7.

The motor 1 after the reducer 2 drives also by means of the high ratio reducer 8 the small crank 9 which is connected to the mobile distributor of the slide valve 7.

From said slide valve 7 the oil under pressure and in discharge alternately passes through the conduits 31 and 32 to the two upper and lower chambers of the cylinder 10 with which the cylinder 11 is rigid, the latter having a small diameter and an equal stroke. A piston 10*a* is workingly disposed in the cylinder 10, while a piston 11*a* is workingly disposed in the cylinder 11. The piston 11*a* in the cylinder 11 acts as a piston pump for the fuel oil by sucking it from the tank 12 through the check valve 13 and sending it to the nozzle 14 through the other valve 15 and through the antidripping device 16. The oil is returned from the slide valve to the tank 4 through the return conduit 33.

This apparatus is provided with two independent adjustments. The small handwheel 17 connected to the screw 18 that enters into the upper chamber of the piston 10 adjusts and limits the linear stroke of the two pistons 10*a* and 11*a* and, therefore, adjusts and limits the quantity of fuel oil introduced into the kiln at every pumping stroke.

The handwheel 19 connected to the screw 20 adjusts the load of the reacting spring 6*a* of the safety valve 6 and, therefore, adjusts the maximum pressure of operation of the fluid circuit and, therefore, indirectly also the pressure at which the fuel oil arrives at the nozzle 14.

Operation is as follows: the pump 3 generates oil under pressure and produces the movement of the piston 10 through the movement of the distributor of the slide valve 7.

This slide valve, as has been said, has its distributor constantly kept in reciprocating movement by the motor 1 through its two reducers 2 and 8 which run the crank 9 at low speed (in practice generally at 4 revolutions per minute). The two pistons 10*a* and 11*a*, therefore, perform some complete strokes per minute (in practice generally four) and the nozzle 14 introduces into the kiln some jets per minute (in practice generally four). Since the speed of rotation of the crank 9 is fixed and constant, the number of jets per minute is fixed and constant and so is fixed and constant the rhythm (in practice generally one jet every 15 seconds).

The quantity of fuel oil that is sprayed by the nozzle each time, on the contrary, is variable depending on the stroke which the pistons 10*a* and 11*a* are made to perform by adjusting conveniently the limiting device 17 and 18 respectively.

As is seen, this adjustment is only volumetric (the linear stroke of a piston is varied) and, therefore, it ensures in safe manner that the quantity of fuel oil to be sent into the kiln at every jet sprayed, does indeed reach the target even if owing to accidental causes (for instance partial occlusion of the sprayer) the duration of the spraying results to be different in practice from the theoretical one.

In order to ensure this valuable feature with considerable margin of safety, the central position of the distributor of the slide valve 7 is made to coincide not with the horizontal diameter of the stroke of the crank, but with a different horidontal line in such a manner that to the intake stroke there corresponds a duration equal to 3/5 of the total period and to the return stroke only 2/5 of the total time. So if the rhythm selected is equal to 15 seconds the maximum time of duration of every jet may become equal to 9 seconds while the maximum time controlled in practice is about 5 seconds. The adjustment on the operating pressure in the fluid circuit (which is felt with a fixed and constant ratio by the operating pressure of the fuel oil part) serves instead to vary for equal delivery the duration of the individual pumping stroke, as well as the characteristic of the jet leaving the nozzle (length and speed of issue) with considerable advantage to the governing of the kiln fire.

The apparatus just described is completely automatic, but may also be used connected to a centralized installation for low pressure supply without losing anything of its fundamental features. In fact it suffices to eliminate the tank 12 and to connect the intake pipe 13 of the pump cylinder 11 to a piping for low pressure delivery fed by one single pump, to embody the connection with a centralized plant.

Another feature of the apparatus is the antidripping device 16.

It consists essentially (FIG. 2) of the piston 16 which is pressed by the spring 16*a* onto the plane wherein there is provided the hole 14 of the nozzle.

If the piston 11*a* in the pump cylinder 11 does not generate any pressure the spring 16*a* lowers the piston 16 which closes the nozzle thereby preventing the dripping of the fuel oil contained in the conduits. The thrust exerted by the spring 16*a* however is smaller than the thrust exerted by the minimal operating pressure upon

the surface of the piston **16** and, therefore, as soon as the piston **11***a* in the pump cylinder **11** generates pressure the piston **16** is lifted thereby liberating the nozzle hole **14**.

I claim:

1. An apparatus for the intermittent feeding of fuel oil burners for brick kilns comprising a source of fuel oil, a burner nozzle, feed conduit means connecting the nozzle with the source, a piston pump in communication with said conduit means for delivering fuel oil under pressure from the source to the burner nozzle, fluid pressure means for operating the piston pump and including a fluid circuit having a pump means operatively disposed therein, means regulating the operating pressure in said circuit for varying the pressure in said conduit means and controlling the velocity of flow of the fuel oil from the nozzle and means directly engaging the piston pump for regulating the operating stroke of the piston pump to control the quantity of fuel oil injected through the nozzle.

2. An apparatus as claimed in claim 1, wherein last means includes an adjustable stop directly engageable with the piston of the piston pump.

3. An apparatus as claimed in claim 1, wherein said fluid pressure means further includes a slide valve operatively interposed in the fluid circuit between the pump means and the piston pump and having a slidable distributor core, a motor, means connecting the slidable distributor core of the slide valve to the motor and means connecting the pump means to the motor.

4. An apparatus as claimed in claim 1, wherein said means regulating the operating pressure of said circuit includes a spring urged pressure release valve having means adjusting the tension of the spring and, consequently, the maximum operating pressure of the circuit.

5. An apparatus as claimed in claim 1, wherein said nozzle of the burner is provided with an anti-dripping device, said device being comprised of a piston, spring means normally biasing the piston into closure relation with a hole in the nozzle, said piston being slidable between two chambers, one of said chambers being in communication with the feed conduit means for the fuel oil and the other being in communication with a discharge conduit communicating with the source.

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