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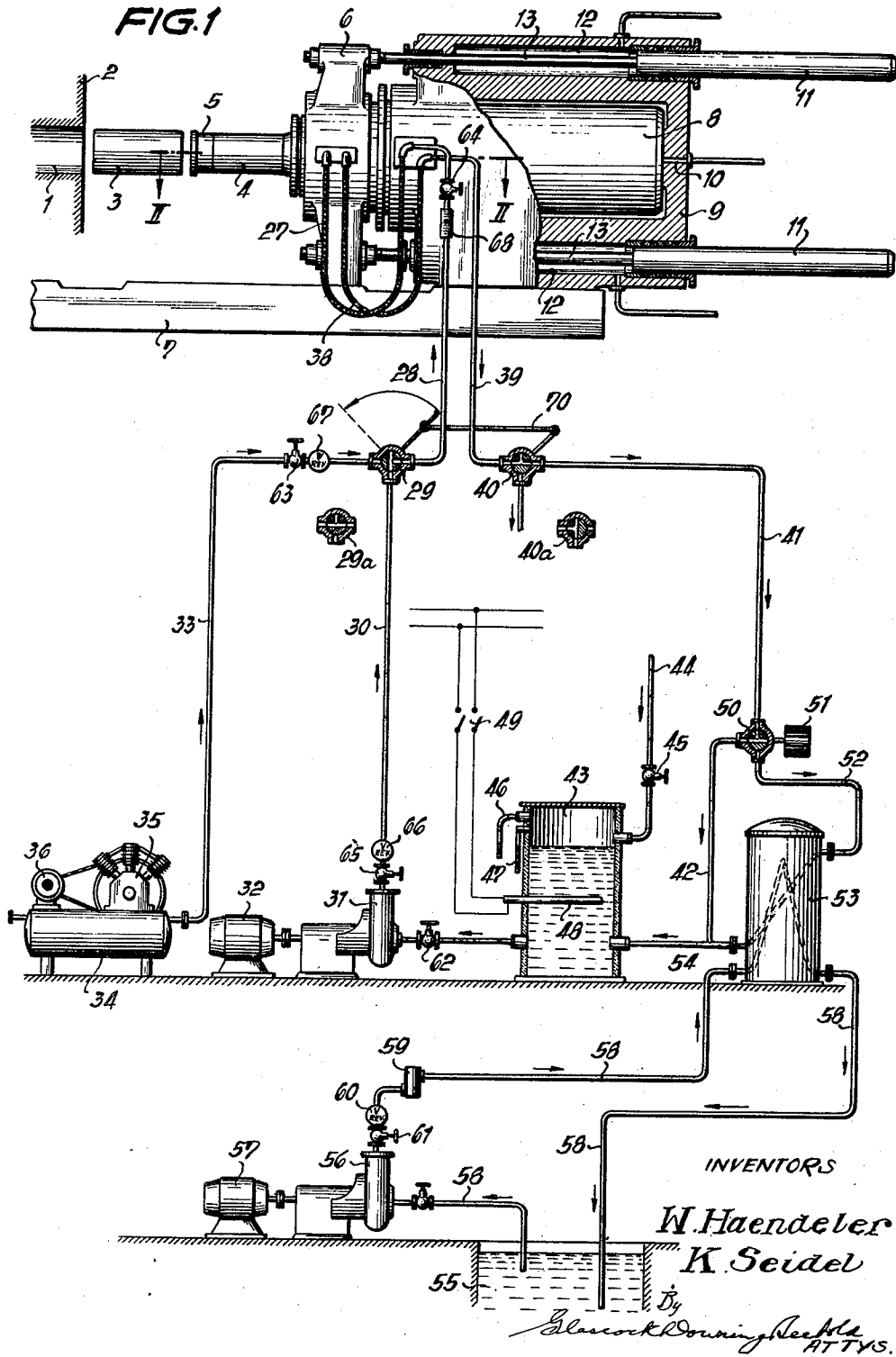
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COOLING OF PRESS DISCS IN EXTRUSION PRESSES

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FIG. 2

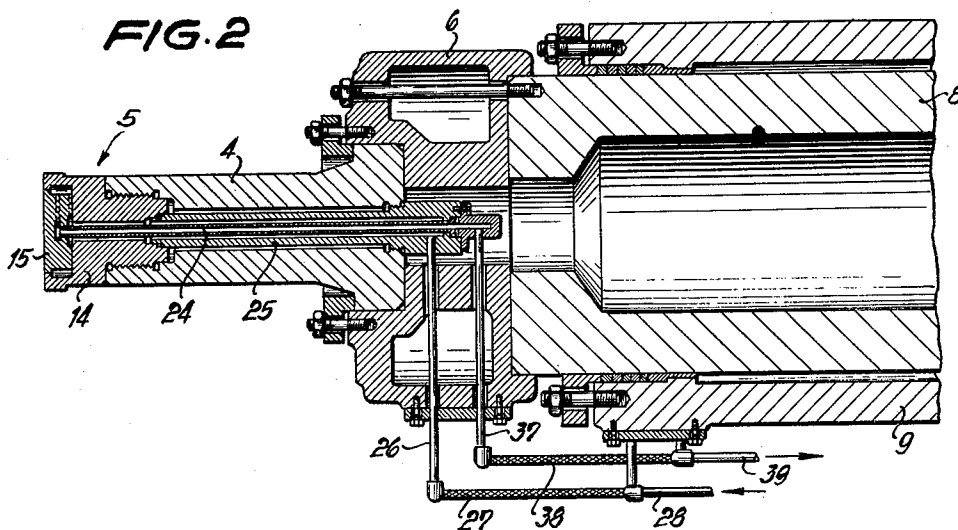


FIG. 3

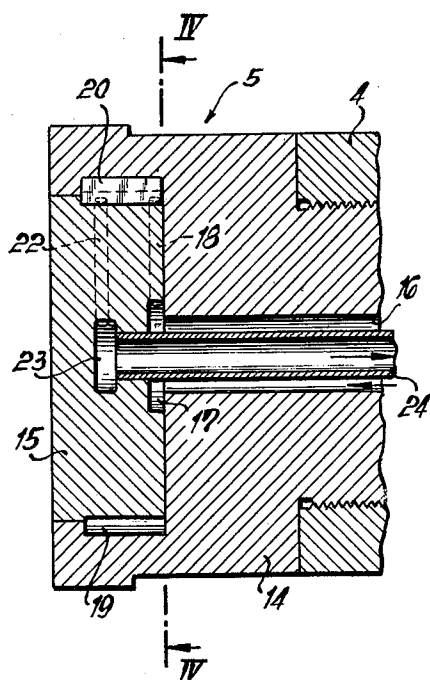
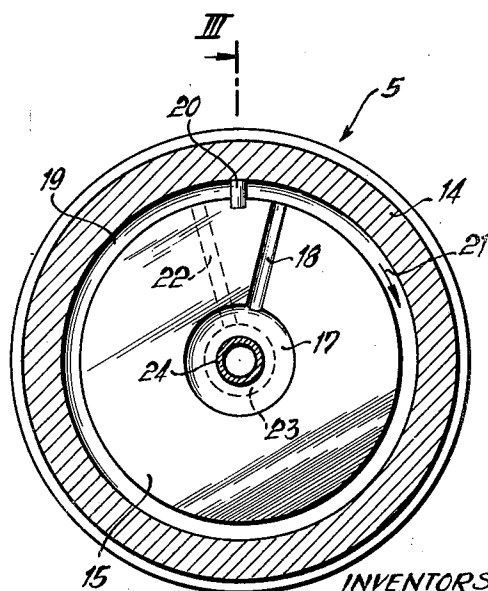


FIG. 4



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## COOLING OF PRESS DISCS IN EXTRUSION PRESSES

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5 Claims. (Cl. 207—16)

This invention relates to a method of and means for cooling press discs in extrusion presses by passing a cooling medium through them or along them, and is particularly intended for use in extruding aluminium. Normally, water is employed as the cooling medium. Water brings with it the risk that the press disc may occasionally become cooled than is desirable. On account of the danger of rupturing the cool press disc when it comes into contact with the hot material that is being extruded it is usually desired not to allow the disc to cool down below a definite temperature, for instance, 300° C. Now if there is water present in the cooling bores of the disc or between the ram and the disc, the cooling still does not cease with the closing of the cooling-water pipe, for the water that is in contact with the hot disc evaporates, and during the time of its vaporisation it continues to exert a marked cooling effect.

If work is being done with extrusion material at a temperature of about 500° C. or more, it is on the other hand desirable not to increase the temperature of the press disc above a definite limit, for instance 300° C.

This desire exists particularly in the extrusion of aluminium, because aluminium, with a rising temperature, exhibits an increasing tendency to adhere to the steel.

The invention obviates these disadvantages by employing a gaseous cooling medium, and preferably an incombustible gas, such as nitrogen, which does not attack steel and aluminium or only attacks them slightly.

It may also be advantageous to proceed in such a way that the gas is passed through the cooling disc alternately with water, namely water during intervals of time when the need for cooling is great, and gas at intervals of time when the need for cooling is less. Since in this case water and gas pass in or on the press disc alternately, it is then of particular importance to choose a gas which will have as little oxidising effect as possible, even in the presence of water, upon the press disc or the press ram, and also, it may be, upon the aluminium, for instance nitrogen which is free from oxygen.

The invention is illustrated by way of example in the accompanying drawings, representing apparatus with which filling can be effected by air and by water alternately. In these drawings:

FIGURE 1 shows diagrammatically the essential parts of an extrusion press, equipped with the appliances necessary for selective cooling with water and air;

FIGURE 2 shows on a larger scale, in section on the line II—II in FIGURE 1, the press ram of the extrusion press, with inlet and outlet pipes to the press disc;

FIGURE 3 shows the press disc alone, on a still larger scale, in an axial section on the line III—III in FIGURE 4; and

FIGURE 4 shows a section on the line IV—IV in FIGURE 3.

Into the bore 1 of a receiver 2 there can be inserted a hot cylindrical aluminium billet 3, which, when brought in, has a temperature of about 500° C. The introduction and extrusion are effected with the aid of a press ram 4, which at its front end carries a press disc 5. The press ram 4 is mounted on a platen 6, which travels upon a track 7, when impelled by a piston 8, which is displaced in a hydraulic cylinder 9 when pressure water is intro-

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duced through the aperture 10. The retracting of the platen 6 is effected by means of plungers 11, which travel in retraction cylinders 12, and are connected with the platen 6 by rods 13.

As FIGURES 2 to 4 show, the press disc 5 consists of two parts, 14 and 15. The part 14 is mounted in the press ram 4, and accommodates the part 15 in a recess in its front end. The part 14 has a longitudinal bore 16 for the admission of the cooling medium. With this longitudinal bore there communicates a recess 17 milled out of the part 15 of the press disc, and from this milled recess a duct 18 passes into an annular space 19, which is turned partly in the part 15, and partly in the part 14.

The annular space 19 is shut off at one place by a stop member 20, so that the cooling medium flows round the press disc in the direction of the arrow 21, and then through the duct 22 into a central chamber 23 in the part 15, from which it can flow back through a return tube 24, which extends through the bore 16. With the bore 16 is connected a second tube 25, which is connected by way of a tube 26 and a hose pipe 27 to an inlet pipe 28. The inlet pipe 28 comes from a three-way valve 29, which, in the position illustrated in FIGURE 1, connects the pipe 28 with a pipe 30, which comes from a water pump 31, driven by a motor 32. In the position 29a, however, the three-way valve 29 connects the pipe 28 with a pipe 33, which comes from a pressure tank 34, which can be filled with compressed air by means of a compressor 35 driven by a motor 36.

The return tube 24 is connected, by way of a further tube 37 and a hose pipe 38, with an outlet pipe 39, which leads to a second three-way valve 40. This three-way valve, in the position shown in FIGURE 1, connects the pipe 39, through pipes 41 and 42, with a tank 43 containing water, which can be sucked out by the pump 31. The water tank 43 has an inlet pipe 44, with a manually controlled valve 45, by which the tank can be filled to the desired height. Moreover an overflow 46 is provided, and a gauge glass 47. Finally in the water tank 43 an electrical heating appliance 48 is arranged, which can be put into and out of operation by a switch 49. Between the pipes 41 and 42 is interposed a third three-way valve 50, which is controlled by a thermostat 51, in such a way that it delivers the water coming from the pipe 41, when its temperature lies below a predetermined point, for instance 70° C. or 158° F., into the pipe 42; but if the temperature of the water is higher, the thermostat 51 controls the three-way valve 50 in such a way that it sends the water from the pipe 52 into a cooler 53, from which the water, after being cooled, is supplied to the water tank 43 by a pipe 54.

The cooler 53 is cooled by water from a pond 55, which can be circulated through pipes 58 by a pump 56, driven by a motor 57. By 59 is denoted a filter, by 60 a non-return valve, and by 61 a manually controlled valve, which serves for shutting off the pipe, particularly in cases of repair. Further manually actuated valves 62, 63, 64 and 65 serve for closing the pipes, particularly in cases of repair. The admission of cooling medium to the press disc 5 can also be controlled by means of the valve 64. By 66 and 67 two further non-return valves are denoted. 68 is an instrument, preferably a turbo-flowmeter, which indicates the quantity of water or air flowing at any time through the pipe 28.

The two three-way valves 29 and 40 are connected with one another by a setting rod 70, in such a way that they both assume either the positions 29 and 40 or the positions 29a and 40a.

In the position of the controlling members illustrated, the water pump 31 delivers cooling water into the bore 16, from which it flows through the part 15 of the press disc and cools this part, and also the front end of the

part 14. This water then flows back through the tube 24, the pipe 39, the second three-way valve 40 and the pipe 41, into the water tank 43. If its temperature is about 70°, it is passed by the third three-way valve 50 through the cooler 53 into the water tank 43. If however its temperature is below 70°, it is sent directly through the pipe 42 into the water tank 43, from which it can be sucked out afresh by the pump 31.

When cooling is to be effected with air instead of with water, which is the case for example when the press disc 5, for a somewhat lengthy time, is not in contact with the billet 4, the two three-way valves 29 and 40 are shifted into the positions 29a and 40a, so that air under pressure from the compressed-air container 34 then penetrates through the three-way valve 29 into the pipe 28, in which case it expels the water from the succeeding pipes, and from the press disc 5. This residual water, and the cooling air that follows it, then pass through the three-way valve 40, which has assumed the position 40a, into the atmosphere. When cooling is again to be effected with water, the setting rod 70 is brought back into the position illustrated.

Modifications of the constructional example illustrated and described are obviously possible within the ambit of the invention. Instead of the hose pipes 27 and 38, some other movable connecting means may be employed, for instance a sword tube or a so-called socket tube. The first and second three-way valves 29 and 40 may receive, instead of the manual operating means described, a remote-control appliance. This remote-control appliance may in its turn be controlled in dependence upon the temperature of the press disc 5, or in dependence upon the position of the press ram 4, for instance in such a way that the air cooling is switched on as soon as the ram 4 moves out of the container. The pressure tank 34 may be filled with nitrogen instead of air, or with some other gas that does not chemically attack either steel or aluminium.

We claim:

1. In combination with an extrusion press, a press disc to be interposed between the press ram and a billet which is to be extruded, and means for cooling the press disc, comprising:

a first conduit and a second conduit, both extending through the press ram, a first pipe connected with the first conduit, a first three-way valve in the first pipe, means for supplying a gaseous cooling fluid under pressure through the first three-way valve to the first pipe, a water tank, means for alternatively supplying cooling water from the tank through the first three-way valve to the first pipe, a second pipe

connected with the second conduit, a second three-way valve in the second pipe, this second three-way valve being adapted to put the second pipe into communication either with the atmosphere or with the water tank, and the press disc being formed with ducts therein through which cooling fluid can pass from the first conduit to the second conduit.

2. In combination with an extrusion press, a press disc and means for cooling the press disc as claimed in claim 1, further comprising: a third three-way valve interposed between the second three-way valve and the water tank, and a cooler for cooling water, the third three-way valve being adapted to pass water coming from the second three-way valve either directly to the water tank or through the cooler.

3. In combination with an extrusion press, a press disc and means for cooling the press disc as claimed in claim 2, further comprising: a thermostat so controlling the third three-way valve that when and so long as the temperature of the water coming from the second three-way valve is below a predetermined magnitude, the water is passed directly into the water tank, whereas when the water coming from the second three-way valve is above the said magnitude, the third three-way valve passes it through the cooler.

4. In combination with an extrusion press, a press disc and means for cooling the press disc as claimed in claim 1, further comprising: means coupling the first and second three-way valves together in such a way that when the first three-way valve is supplying gaseous cooling liquid to the first pipe, the second three-way valve puts the second pipe into communication with the atmosphere, and when the first three-way valve is supplying cooling water to the first pipe, the second three-way valve puts the second pipe into communication with the water tank.

5. In combination with an extrusion press, a press disc, and means for cooling the press disc as claimed in claim 1, further comprising: means for heating the water in the water tank.

#### References Cited in the file of this patent

#### UNITED STATES PATENTS

|           |               |                |
|-----------|---------------|----------------|
| 2,231,761 | Hill          | Feb. 11, 1941  |
| 2,380,722 | Brown         | July 31, 1945  |
| 2,385,574 | Hyprath       | Sept. 25, 1945 |
| 2,698,683 | Martin et al. | Jan. 4, 1955   |
| 2,740,519 | Sparks        | Apr. 3, 1956   |
| 2,755,926 | Horn          | July 24, 1956  |
| 2,778,494 | Kreidler      | Jan. 22, 1957  |
| 2,781,903 | Buffet et al. | Feb. 19, 1957  |
| 2,950,816 | Arenz         | Aug. 30, 1960  |