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Schekin et al.

[11] **3,845,806**

[45] **Nov. 5, 1974**

[54] **HIGH-VOLTAGE DISCHARGE ARRANGEMENT FOR STRIPPING FOUNDRY MOULDS OFF CASTINGS**

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[21] Appl. No.: **360,947**

[52] **U.S. Cl.** **164/250,** 134/1, 134/133, 134/157, 164/131, 164/404

[51] **Int. Cl.** **B22d 29/00**

[58] **Field of Search** ..... 164/48, 49, 131, 250, 252, 164/344, 404; 134/1, 58 R, 133, 157, 184

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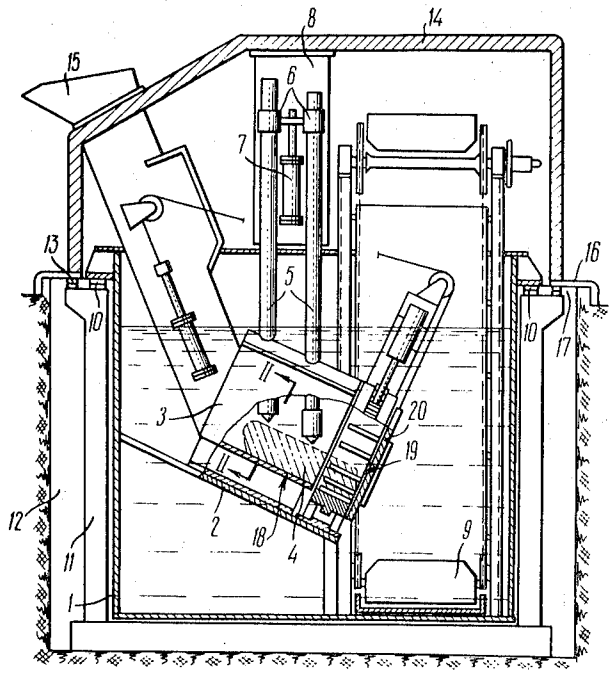
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Primary Examiner—Robert D. Baldwin
Attorney, Agent, or Firm—Waters, Roditi, Schwartz & Nissen

[57] **ABSTRACT**

An arrangement for stripping foundry moulds off castings by using high-voltage electrical discharges in fluid comprising a container for castings to be treated which container is inclined to a horizontal plane, fitted at the outlet with a slide gate linked mechanically with a means for charging and discharging the castings to enable time correlation of the charging and discharging operations. The container is so designed that it ensures the orientation of the castings in relation to the electrodes to create the requisite conditions for high-voltage electrical discharges and is able to come into engagement with the castings to be treated and to turn them with respect to the longitudinal axis of the container to ensure exposure of the entire surface of the casting being treated successively to the effect of the high-voltage electrical discharges.

8 Claims, 12 Drawing Figures



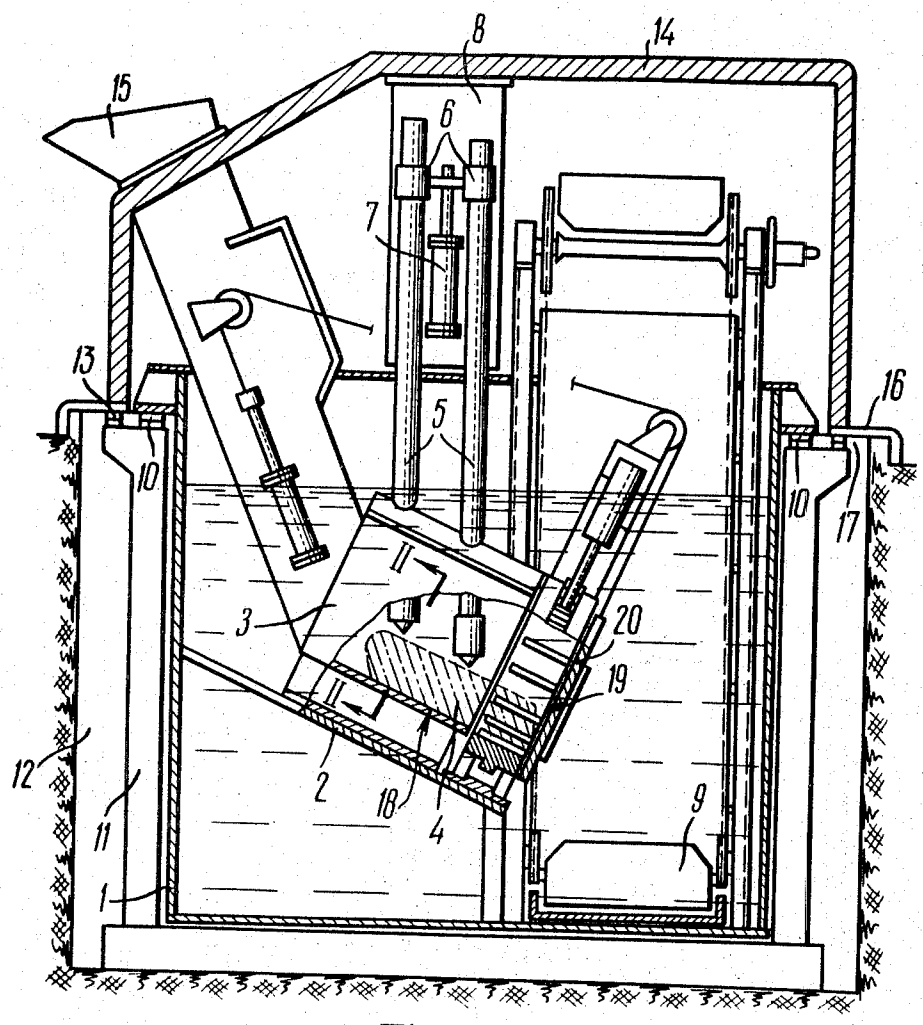


FIG. 1

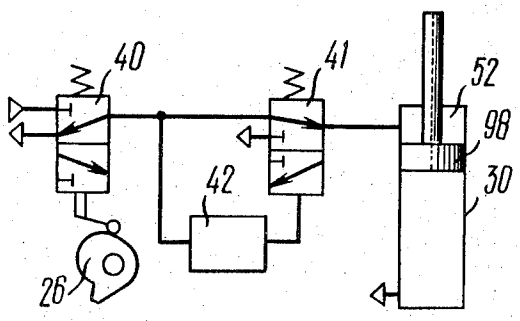


FIG. 4

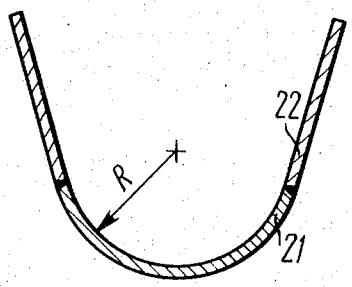


FIG. 2

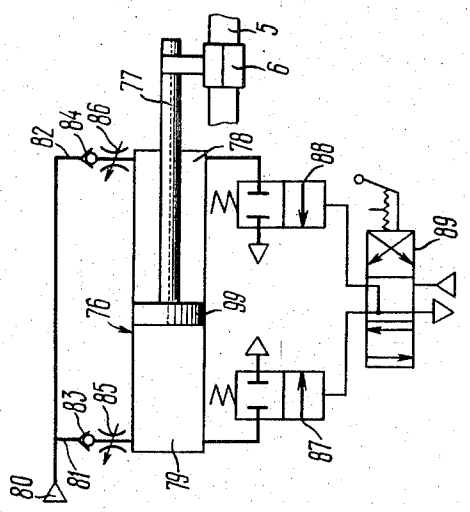

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FIG.10

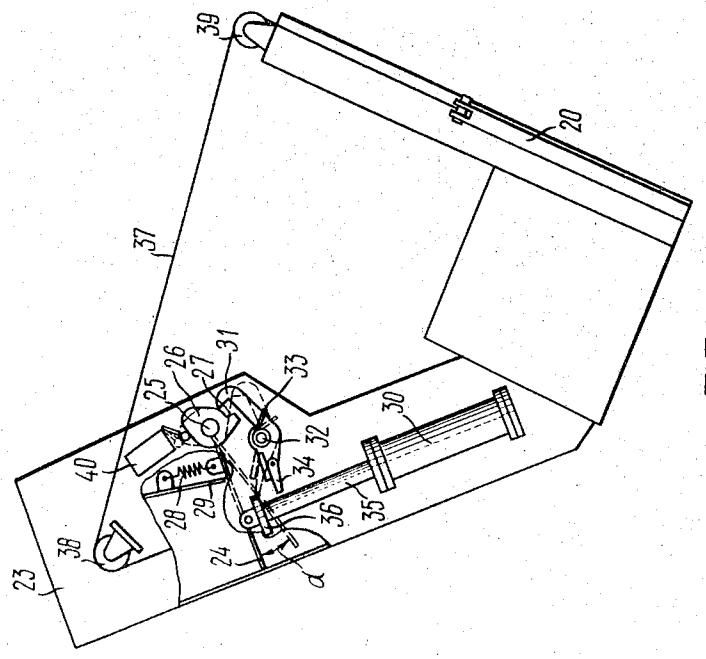

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FIG.3

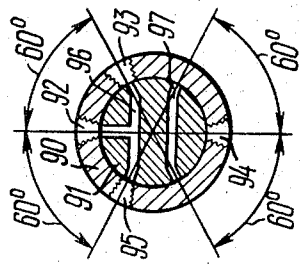


FIG. 11

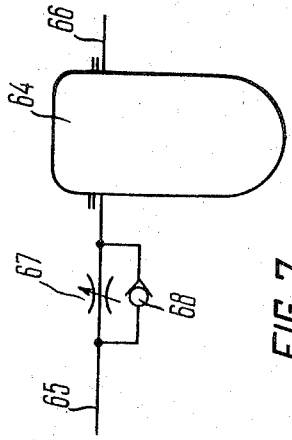


FIG. 7

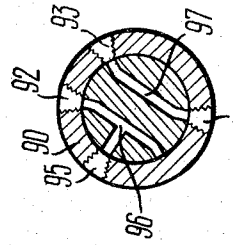


FIG. 12

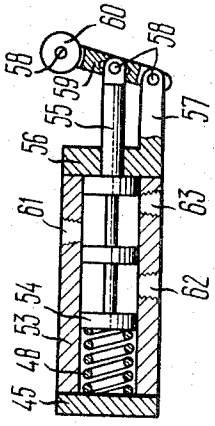


FIG. 6

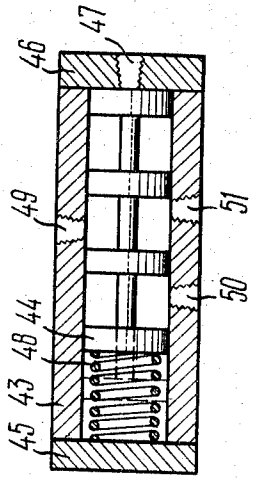


FIG. 5

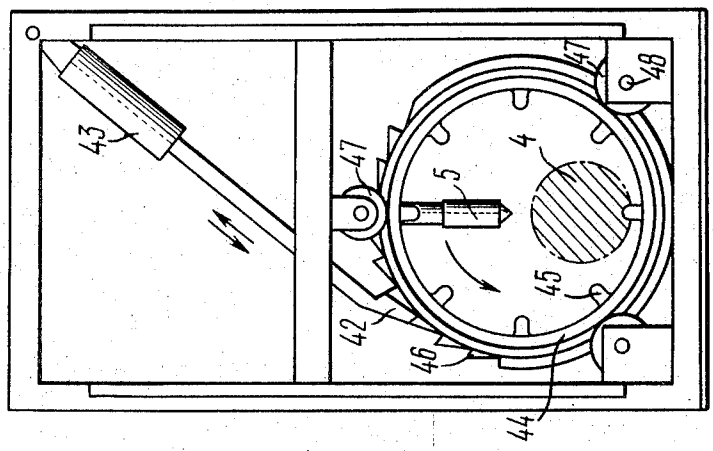


FIG. 9

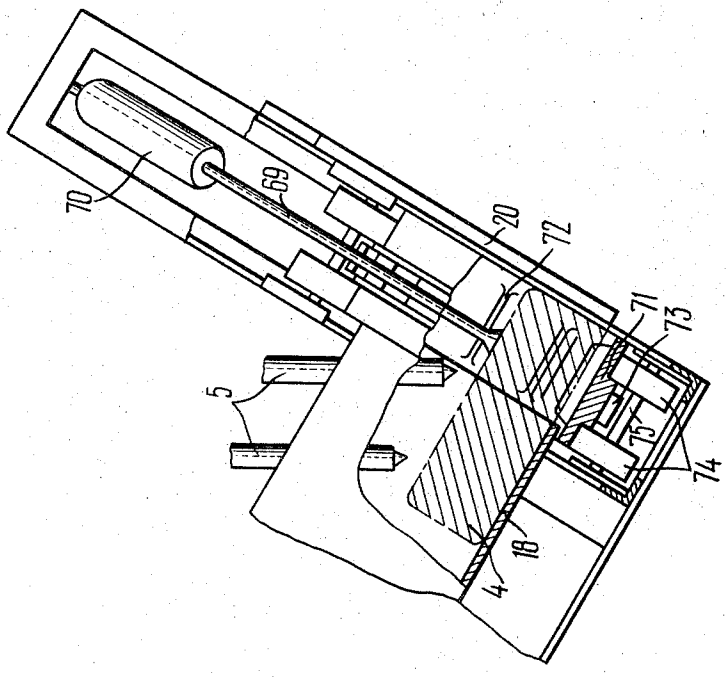


FIG. 8

HIGH-VOLTAGE DISCHARGE ARRANGEMENT FOR STRIPPING FOUNDRY MOULDS OFF CASTINGS

The present invention relates to equipment for electrohydraulic fettling of castings and more particularly to arrangements for stripping foundry moulds off castings by using high-voltage electrical discharge in fluid.

The invention may prove to be useful for crushing various materials, such as brittle plastics, mica and ores. Moreover, it may prove to be advantageous for cleaning the surface of parts from various impurities and slushing compounds, such as, scale, rust, dross, oils.

Known in the art is an arrangement for stripping foundry moulds off castings with the help of high-voltage electrical discharges in fluid.

The known arrangement comprises a fluid bath tank accomodating a container with castings to be treated.

The bath tank incorporates a bed mounting a movable platform capable of descending at right angles to a horizontal plane and carrying a frame with a plurality of electrodes fastened to the frame and adapted to treat the castings. The electrodes are furnished with a gear for traversing them in relation to the container.

The arrangement has also a transporting means for removing the castings and separated foundry moulds from the arrangement. The transporting means is a hoist resting with its wheels on a platform and capable of travelling in a horizontal plane.

The hoist handles the container with the castings from a shop conveying device to the arrangement platform.

With the above arrangement the casting is fed to a treatment section by using the following operational sequence: placing the castings into the container; mounting the container on the hoisting device on the electrode frame; setting the latter up on the platform to be thereupon immersed together with the platform into the bath tank until they strike against the bed. Thus, in the known arrangement the charging and discharging operations cannot be combined with the treating process and require considerable non-productive time. Moreover, a large number of operations complicate arrangement servicing and control.

Since the relative position of the electrodes and castings does not change during treatment, only one sie of the casting, namely, that facing the electrodes, can be treated with one setting of the electrodes. To provide requisite quality of treatment, the position of the castings in relation to the electrodes must be changed several times in the course of treatment, which is liable to augment still more the non-productive time.

A large number of intermediate members between the electrodes and the casting to be treated (the frame, hoist, platform, container) lacking rigid connection therebetween results in that the relative position of the electrode and casting cannot be defined precisely in the working position. In this case the foundry moulds can be stripped off the castings relatively simple in shape and having no narrow spaces, with the foundry moulds featuring a compression strength not exceeding $\iota_{comp.}$=40 kg/cm^2.

The main object of the invention is to provide an arrangement for stripping foundry moulds off castings by

using high-voltage electrical discharges in fluid, which would allow stripping off the castings of the foundry moulds featuring $\iota_{comp.}$ over 40 kg/cm^2.

Another object of the invention is the provision of an arrangement for stripping foundry moulds off castings by making use of an electrohydraulic effect, which would allow separation from the castings of the foundry moulds with deep spaces practically unrestricted in length.

Apart from the above-specified objects, still another object of the invention is to provide an arrangement which would ensure separation from the castings of the foundry moulds fitted with holes having a minimum spacing between the walls of down to 0.5 mm.

Yet another object of the present invention is to provide an arrangement which would make it possible to combine non-productive time needed for charging, discharging and varying casting position in relation to the electrodes, with the casting treating time (for stripping foundry moulds).

A further object of the invention is to provide an arrangement which would enable complete automation of the treating process control from the moment of charging the castings to the moment of discharging said castings and the separated foundry moulds.

These and other objects are accomplished in an arrangement for stripping foundry moulds off castings by using high-voltage electrical discharges in fluid, said arrangement comprising a fluid bath tank accommodating a container for castings to be treated with the help of a plurality of electrodes furnished with a gear for their traverse in relation to the container, coupled with a means for charging the castings into the container and discharging them onto a transporting means for their subsequent removal from the arrangement together with the separated foundry moulds, in which arrangement, according to the invention, the container is inclined to a horizontal plane, fitted at the outlet with a slide gate which serves to provide a mechanical linkage with the casting charging and discharging means to enable time correlation of the charging and discharging operations, and is made up of a casing ensuring the orientation of the castings to be treated to create the requisite conditions for high-voltage electrical discharges, and of a tilter made so as to enable its engagement with the castings to be treated and their turning in relation to the longitudinal axis of the container to ensure exposure of the entire surface of the casting being treated successively to the effect of the high-voltage electrical discharges.

The above-described construction allows stripping the foundry moulds featuring enhanced strength with $\iota_{comp.}$ amounting to 100 kg/cm^2 and over off the castings having well developed spaces with a restricted outlet to the surface and with slots whose dimensions may amount to 0.5 mm.

By tilting the container to the horizontal plane the casting can be discharged from the chamber by gravity only without recourse to any mechanization.

Mechanical linkage between the slide gate and charging means provides the attainment of a natural harmony between the operation of the arrangement and feeding the castings which enables the use of conveyors of various types with irregular intervals between the castings being fed to the arrangement. Manual charging is also feasible in this case. The discharge of the castings and broken moulds from the container onto the

transporting means to be subsequently removed from the arrangement allows combining the operation with the principal treating process which results in a more efficient utilization of the operation cycle due to the principal and non-productive time overlapping one another. Owing to the orientation of the castings in the container in relation to the electrodes, they may be placed arbitrarily when fed into the arrangement which facilitates automation of the charging operation. By turning the casting in the course of treatment with respect to the longitudinal axis of the container, the effect of the high-voltage electrical discharges may be uniformly distributed on the surface of the castings being treated, this resulting in a reduction in both the principal and non-productive time needed for changing the casting position relative to the electrodes to detach the foundry mould from all sides.

It is expedient that the means for charging and discharging the castings comprise an inclined chute shut off in its upper portion by a spring-biased damper mounted on a shaft which carries a cam with a projection interacting with an air cylinder arranged on the side surface of the chute and intended for raising the container slide gate, and a rest with a pawl which is brought into engagement with the cam projection when the damper is turned through a certain angle α under the effect of the weight of the casting being charged and impedes thereby further rotation of the damper until the treated casting emerges from the container. To release the damper and to let the casting pass into the container when the damper drops down, a washer is secured on the piston rod of the air cylinder bringing the rest out of engagement with the cam.

The inclined chute enables the use of the casting weight for charging it into the container without recourse to additional mechanical means. The upper portion of the chute before the damper serves as a receiver wherein the casting remains until the container is cleared from the casting which has been fed earlier into it. When the damper turns together with the shaft and with the cam fitted on it through a certain angle under the effect of the casting weight, the cam sends a control signal to the air cylinder to raise the slide gate and only after it has been raised, held in its upper position and dropped down, the washer of the piston rod takes the rest aside releasing the damper which continues its rotation to let the casting, lying up to this moment in the upper portion of the chute, pass into the container. This precludes the charging of the second casting into the container, which could have disturbed the operation of the arrangement on account of jamming of the castings at the container outlet or during the subsequent transportation.

Since in the course of operation the arrangement components can acquire an electric potential, it is expedient that the charging and discharging device be controlled by pneumatic appliances, namely, the air cylinder which raises the slide gate under the effect of the cam of the charging and discharging means be controlled by a three-line two-position normally closed distribtor with a limit switch, operating under the effect of the charging means cam, and by a three-line two-position normally open distributor with a pneumatic control, connected in succession, through a time relay by an input signal, which allows the piston of the air cylinder to be moved from its initial position when the slide gate is raised and the return of the two members.

Owing to the above-described arrangement the container charging and discharging operations may be fully accomplished in a clear-cut operational sequence by one signal and by using a minimum number of the requisite simple elements which enhances the reliability of air cylinder control. The adjustable relay employed in this arrangement, apart from its main function — to enable a delay in the operation of the normally open distributor — makes it possible to utilize various control elements meeting relatively low accuracy requirements.

It is quite reasonable to provide a wire rope as a means of mechanical linkage between the slide gate and charging and discharging means, with the wire rope encompassing the rollers located on the container and chute and with one end of the rope being secured on the slide gate and the other on the rod of the air cylinder of the charging and discharging means.

The use of a flexible element — a wire rope — as a mechanical linkage enables the most simple mode of transmission of efforts between the slide gate and air cylinder piston travelling in the planes located arbitrarily relative to each other, and does not call for a high accuracy as to the relative position of the said components of the arrangement.

Further, it proved to be most effective that the container casing ensuring the orientation of the castings in relation to the electrodes have a convex bottom with a radius R passing into inclined walls.

On account of this casing the casting will always be located axially of the container, and this in turn will make it possible to mount the electrodes, shifted in relation to the container chamber, in a requisite position with respect to the casting.

As it has been noted above, when electrohydraulic arrangements are concerned, it is expedient that pneumatic devices be used. It is therefore advantageous from technological aspects that the tilter be fitted with a pusher, interacting with the casting placed in the container to ensure its turning, and furnished with a pneumatic drive.

The use of a pneumatic drive and a pusher which serves as an element transmitting the efforts allow to dispense with intermediate elements for the conversion of motion.

If the pusher proper cannot be utilized for imparting motion to the casting on account of a hazard of pusher jamming in casting spaces or damaging the casting, it is expedient that the pusher be fitted with a shell with ribs, located on the internal surface of the container along its longitudinal axis and adapted to come into engagement with the castings, and with a ratchet wheel fastened to the external surface of the container and brought into engagement with the pusher.

Owing to the use of the ratchet wheel, a conversion of reciprocating motion into a rotary one can be accomplished without rigid connection with the drive and with a relatively low accuracy of the drive components. The ribs provided on the internal surface of the shell augment cohesion with the casting surface during its rotation and do not interfere in the meantime with the casting outgoing from the container.

The next feature of the present invention consists in that the gear for traversing the electrodes in relation to the container comprises a two-way air cylinder with the

electrodes being attached to the cylinder piston rod and cylinder spaces communicating with the atmosphere through normally closed two-line two-position switches and being constantly connected to a compressed air main through additional channels with non-return valves to provide a requisite spacing between the electrode and the casting ensuring a high-voltage electrical discharge capable of destroying foundry moulds.

The fact that both spaces of the air cylinder are in communication with the compressed air main makes it possible to adjust the rate of traverse of the piston by varying the difference between the flows: air main — space and space — atmosphere, which may be as small as desired. The non-return valves prevent air from overflowing from one cylinder space into another along the compressed air main; they also do not allow the piston to shift under the effect of external forces. The low rate of traverse and lack of spontaneous transfer of the piston and the electrode linked to it afford the possibility of providing and maintaining with a high degree of accuracy of the requisite clearance between the casting and electrode, which is a prerequisite for ensuring a high-voltage electrical discharge capable of destroying foundry moulds.

Since the two-line two-position distributors are controlled by a four-line three-position switch, a possibility of sending two control signals simultaneously to both distributors is completely eliminated, which could, however, have happened with the distributors controlled independently.

The present invention will be better understood from a consideration of a detailed description of an exemplary embodiment thereof, to be had in conjunction with the accompanying drawings, wherein:

FIG. 1 shows a general view of the arrangement for stripping foundry moulds off castings by using high-voltage electrical discharges in fluid, according to the invention (longitudinal section);

FIG. 2 is a view along the line II—II of FIG. 1 depicting a cross-sectional view of the container casing;

FIG. 3 is a schematic diagram of the means for charging and discharging castings with the container, according to the invention;

FIG. 4 is a control circuit of the pneumatic drive adapted for raising the slide gate, according to the invention;

FIG. 5 is a schematic diagram of the three-line two-position distributor with a pneumatic control (longitudinal section);

FIG. 6 is a schematic diagram of the three-line two-position distributor with a limit switch (longitudinal section);

FIG. 7 is a layout of the time relay;

FIG. 8 shows a partial side view of the container with the casting being treated connected to the pneumatic drive;

FIG. 9 — ditto, front elevation;

FIG. 10 is a schematic diagram of the electrode traversing gear;

FIG. 11 shows a cross-sectional view of the four-line three-position switch (initial position);

FIG. 12 — ditto in one of extreme positions.

A herein-proposed arrangement for stripping foundry moulds off castings by using high-voltage electrical discharges in fluid comprises a fluid bath tank 1 (FIG. 1). The bath tank 1 accommodates a foundation 2 on which is located a container 3 for castings 4 to be treated by a plurality of electrodes 5 secured in electrode holders 6. The electrodes 5 are furnished with a traversing gear 7 located on a bracket 8. The arrangement incorporates also a casting charging and discharging means and a transporting means 9 for the removal of the castings and separated foundry moulds from the arrangement. The fluid bath tank 1 is mounted on shock absorbers 10 set up of a bed 11 which is located in a reinforced concrete pit 12. The same bed 11 mounts shock absorbers 13 with a hood 14 which covers the bath tank 1 accommodating the above-specified facilities. Secured on the hood 14 is a trough 15 for the castings 4 and a shield 16 closing a clearance 17 between the hood 14 and the edges of the pit 12.

The container 3 is tilted to a horizontal plane and consists of a casing 18 ensuring the orientation of the castings in relation to the electrodes, and a tilter 19 which comes into engagement with the castings to be treated and is made so that it is able to turn relative to the longitudinal axis of the container 3 to ensure the exposure of the entire surface of the casting being treated successively to the effect of the high-voltage electrical discharges.

The container 3 is fitted with a slide gate 20 mounted at its outlet (in the direction of movement of the casting) and linked mechanically with the casting charging and discharging means ensuring time correlation of the above processes.

The casing 18 and tilter 19 may be joined together either by welding or mechanically.

The casing 18 has a convex bottom 21 (FIG. 2) with a radius R passing into inclined walls 22. The bottom 21 may be connected to the walls 22 by welding together or it may be made integral.

The charging and discharging means shown in FIG. 3 comprises an inclined chute 23 shut off in its upper portion by a damper 24 mounted on a shaft 25 on which is secured a cam 26 with a projection 27. The damper 24 is held in its initial position (shown by solid lines) with the aid of a spring 28 pressing it (the gate) against a plate 29 enclosed in the chute between its side surfaces. The side surface of the chute 23 carries an air cylinder 30 adapted to raise the slide gate 20, and a rest 31 mounted freely on a pivot 32 and held in its initial position (shown by solid lines) by a torsion spring 33. The rest 31 is fitted with a pawl 34. Fastened to a rod 35 of the air cylinder 30 is a washer 36 and one end of a wire rope 37, encompassing a roller 38, secured on the side surface of the chute 23, and a roller 39 attached to the chamber of the tilter 19. Another end of the wire rope 37 is fastened to the slide gate 20. Attached to the inclined chute 23 near the cam 26 is a threeline two-position normally closed distributor 40 with a limit switch.

Other control elements of the slide gate raising air cylinder include a three-line two-position distributor 41 (FIG. 4) and a time relay 42 which may be arranged either on the chute 23 or on the hood 14.

Referring to FIG. 5, the distributor 41 comprises a body 43 accommodating a slide valve 44. From its end faces the body 43 is protected with a blind cover 45 and a cover 46 which has a hole 47. The slide valve 44 is held in its initial position by a spring 48. The body is fitted with holes 49, 50 and 51. When the above-described distributor is employed in the arrangement of the invention, the hole 49 communicates with a rod

space 52 of the air cylinder 30 of the slide gate 20, the hole 50 with the atmosphere and the hole 51 with the distributor 40 and with the time relay 42 through the hole 47.

Thus, in the initial position the rod space 52 of the air cylinder 30 of the slide gate 20 communicates with the distributor 40 through the holes 49 and 51. When compressed air is fed into the hole 47 from the relay 42, its pressure overcomes the force of the spring 48 and traverses the slide valve 44 in a position shown by a dotted line. In this case the rod space 52 of the air cylinder 30 adapted for raising the slide gate 20 communicates with the atmosphere through the holes 49 and 50, the hole 51 being plugged. When the hole 47 is in communication with the atmosphere the slide valve 44 returns to its initial position.

The distributor 40 shown in FIG. 6 differs from the distributor 41 in that it has a shorter body 53, a slide valve 54 made integral with the rod 55 and a cover 56 which is different in shape and is fitted with a bracket 57.

The bracket 57 of the cover 56 carries a lever 59 with a roller 60 attached to the bracket 57 by means of a shaft 58. The latter also serves to couple the lever 59 with the rod 55 of the slide valve 54.

The distributor 40 communicates with the time relay 42 and distributor 41 through a hole 61. A hole 62 communicates with the compressed air main and a hole 63 with the atmosphere.

By acting on the roller 60 the lever 59 transmits the effort to the rod 55 of the slide valve 54 and traverses it (the slide valve 54) overcoming the force of the spring 48. Then the hole 61 is disconnected from the hole 63 and is brought in communication with the hole 62. Compressed air is admitted through the holes 62 and 61 to the time relay 42 and distributor 41. When the roller 60 is released, the spring 48 returns the slide valve 54 to its initial position.

The schematic diagram of the time relay 42 is illustrated in FIG. 7. The time relay 42 comprises a vessel 64 having a volume V and fitted with two channels 65 and 66. The channel 65 is equipped with an adjustable throttle 67 with a non-return valve 68.

In the herein-described arrangement the time relay 42 communicates with the hole 61 of the distributor 40 through the channel 65 and with the hole 47 of the distributor 41 through the channel 66. When the channel 65 is connected to the compressed air main, the pressure in the vessel 64 will rise. As soon as the pressure becomes sufficient for overcoming the force of the spring 48 of the distributor 41, the latter is switched over. The length of time during which the pressure inside the vessel 64 attains the value necessary for switching over the distributor 41 depends on the volume V of the vessel 64 and on the setting of the throttle 67. When the channel 65 communicates with the atmosphere, the compressed air is allowed to escape freely through the non-return valve 68.

The tilter 19 ensuring the turning of the castings is fitted with a pusher 69 (FIGS. 8,9) interacting with the casting introduced into the container and furnished with a pneumatic drive 70. Besides, the tilter 19 comprises a shell 71 with ribs 72 located on the internal surface of the container along its longitudinal axis and adapted to come into engagement with the castings; the external surface of the container carries a ratchet wheel 73 which is attached to it, being brought into engagement with the pusher 69. The shell 71 rests on rolls 74 mounted freely on axles 75.

The gear 7 for traversing the electrodes in relation to the container, illustrated in FIG. 10, comprises a two-way air cylinder 76 on whose rod 77 are secured the holders 6 of the electrodes 5. A rod space 78 and a piston space 79 of the air cylinder 76 are in communication with a compressed air main 80 through additional channels 81 and 82 respectively and fitted with non-return valves 83 and 84 and throttles 85 and 86. The spaces 78 and 79 of the cylinder 76 communicate with the atmosphere through two-line two-position distributors 87 and 88 respectively controlled by a four-line three-position switch 89 (FIG. 11).

The distributors 87 and 88 are a modfication of the distributor 41 whose hole 51 is plugged, the hole 50 communicates with the atmosphere, hole 49 is in communication with the space of the cylinder 76 and the hole 47 with the switch 89.

The switch 89 (FIG. 12) comprises a body 90 and a plug 91. The body 90 is fitted with holes 92,93,94 and 95 and the plug 91 with two shaped channels 96 and 97. The plug 91 can turn in both sides through an angle of 60°. The hole 92 communicates with the atmosphere, the hole 94 with the compressed air main, the holes 93 and 95 with the holes 47 of the distributors 87 and 88 respectively. In the initial position the holes 95 and 93 are in communication with the atmosphere and the hole 94 is plugged. When the plug 91 is turned through an angle of 60° (FIG. 12) the hole 93 comunicates with the hole 94, whereas with the plug 91 turned to another side (not shown in the drawing) the hole 94 communicates with the hole 95.

The herein-proposed arrangement functions in the following manner.

To prepare the arrangement for operation it is sufficient to connect it to a power supply source (not shown in the drawing).

When the arrangement is ready for operation, a transporting means 9 and a pneumatic drive 70 of a pusher 69 commence to operate irrespective of the fact whether the casting is fed or not. A casting 4 to be treated is thrown by a shop conveying device (not shown in the drawing) into a through 15 wherefrom it slides down immediately into an inclined chute 23 of the charging and discharging means. On its way to a container 3 the casting 4 interacts with a damper 24 turning it through a certain angle α (FIG. 2), with a shaft 25 and a cam 26 being turned together with the damper 24. The above position of the damper 24 and cam 26 is shown in FIG. 3 by a dotted line. The cam 26 rests with its projection 27 against a rest 31 retaining the shaft 25 and damper 24 so that they cannot turn further and the casting 4 cannot pass into the container 3. Simultaneously the cam 26 presses against a roller 60 of the distributor 40, which will bring a rod space 52 of a slide gate raising cylinder 30 and a time relay 42 into communication with the compressed air main through a distributor 41.

A piston 98 (FIG. 4) of the air cylinder 30 shifts raising the slide gate 20 with the aid of a wire rope 37 and the castings enclosed up to now in the container 3 are removed from it. After a certain interval which is equal to the setting time of the time relay 42, the latter will send a signal to switch over the distributor 41. Then a rod space 52 of the air cylinder 30 will communicate with the atmosphere with the piston 98 moved to its

original position (shown by a solid line) by the descending slide gate 20. When the slide gate 20 approaches its initial position, a washer 36 is secured on a rod 35 of the air cylinder 30 and strikes against a pawl 34 diverting the rest 31 to a position shown in FIG. 2 by a dotted line, i.e., releasing the projection 27 of the cam 26. In this case the damper 24 is allowed to turn further under the effect of the weight of the casting 4 which is let pass into the container 3. Upon being brought into its initial position the washer 36 releases the pawl 34 of the rest 31 which will be returned to its initial position by a spring 33.

Upon passing the casting 4 into the container the damper 24 is returned to its initial position by a spring 28. As a result the cam 26 will release a roller 60 of the distributor 40 which will return to their original positions to bring the time relay 42 in communication with the atmosphere. The signal sent by the distributor 41 is taken off, whereupon the latter returns also to its initial position. The charging means is ready to receive the next casting. The latter, on being admitted into the container 3, is located in a casing 18 ensuring the orientation of the castings in relation to the electrodes 5. Naturally, the casting will take an extreme lower position which corresponds to its location axially of the container 3. Any other position will be very unstable and even if the casting will occupy it for some reasons at the first moment, after the first one or two discharges it will take a stable position along the axis of the container 3.

The tilter 19 ensures the turning of the casting with a shell 71; a pusher 69 is brought into engagement with a ratchet wheel 73 turning it together with the shell 71 by one step during each stroke or a pneumatic drive 70.

Upon occupying the extreme lower position the casting 4 strikes against the slide gate 20 and interacts with the tilter 19. In this case the casting is acted upon tangentially to its generating surface either by the pusher 69 carried by the pneumatic drive 70 or by ribs 72 of the shell 71 turning the casting over so that all its surfaces will face successively the electrodes 5.

The position of the electrodes during treatment is controlled by one of the commonly adopted procedures utilized in electric-discharge arrangements:

-according to the magnitude of discharge current;

-according to a scale graduated on the traversing gear, but in this case one should know dimensions of the casting which should have a shape approaching to a cylinder;

-according to a discharge magnitude determined either by a pressure transducer or audially.

The procedure selected depends upon technical potentialities of an enterprise and a requisite degree of automation of the arrangement operation.

In case the electrodes 5 need not be traversed, the components of the electrode traversing fear 7 will occupy a position shown in FIG. 7. In this case both spaces 78 and 79 of the air cylinder 76 are in communication with a compressed air main 80 through channels 81 and 82 respectively. Distributors 87 and 88 are shut insulating the spaces 78 and 79 of the cylinder 76 from the atmosphere. A constant connection between the spaces 78 and 79 of the cylinder 76 and the compressed air main 80 allows compensating for potential air losses in the spaces 78 or 79 owing to leaks from seals, whereas non-return valves 83 and 84 prevent the compressed air from flowing over from one space into the othe through the compressed air main 80 when a piston 99 (FIG. 10) of the air cylinder 76 is subjected to the effect of an external force. It if is necessary to shift the electrodes 5, i.e., to displace the rod 77 of the air cylinder 76, a switch 89 is brought to one of its extreme positions. In this case a control signal is sent to one of the distributors 87 or 88, say 88. The distributor 88 is switched over bringing the rod space 78 of the air cylinder 76 in communication with the atmosphere. The pressure in this space will diminish, insofar as the space 78 is constantly in communication with the compressed air line 80 through the channel 82. The pressure will drop to a quite definite level which is determined by a difference in flows: main 80 — space 78 and space 78 — atmosphere. This is of great importance. If with the piston 99 moving the compressed air will not be fed into the space 78 communicating with the atmosphere, the pressure drop will depend on the flow rate: space 78 — atmosphere, and in view of a high critical speed of the effluent air, the flow rate will not be sufficiently low. As to the difference in flows, it may be as small as desired. This ensures smooth transfer of the piston 99 with a low speed. As the piston 99 in conjunction with the electrode 5 reaches the requisite position, the switch 89 and distributor 88 return to their initial position and the piston 99 of the air cylinder 86 comes to a standstill without "overrunning" as the pressure in both spaces 78 and 79 is equalized due to the inflow of compressed air admitted through the channel 82.

Operating conditions are so selected that the length of time during which an adequate stripping of the foundry mould is attained be equal to a minimum time interval between two castings found on the shop conveying device delivering them to the arrangement.

Thus, at the instant the next casting is thrown into the trough 15, the treatment of the preceding casting is completed. When a new casting is charged, the arrangement components will operate in the above-described operational sequence and the casting enclosed in the container 3 will proceed to the transporting means 9 to be thereupon removed outside the arrangement while the next casting is being treated. In this case the operating cycle of the arrangement is not interrupted. The time interval during which the castings enclosed in the container 3 will change amounts to about 2 sec.

The arrangement does not require any interference in its operation on the part of attending personnel whose functions are confined to supervision to ensure uninterrupted flow of the castings to be treated and trouble-free operation of supervisory instruments.

When the arrangement is cut out, the container 3 usually accommodates one casting. If this is undesirable, prior to shutdown it is necessary to charge either a rejected casting or some load, or the damper 24 may be turned to operate the charging and discharging means. The fragments of the separated foundry moulds are removed continually when the arrangement is in operation by the same transporting means 9 which is utilized for the removal of the treated castings.

What we claim is:

1. An arrangement for stripping foundry moulds off castings by using high-voltage electrical discharges in fluid comprising: a fluid bath tank; a container for castings to be separated from foundry moulds, said container being mounted in said bath tank with its bearing

surface being inclined to a horizontal plane; a plurality of electrodes secured above said container and adapted to ensure a high-voltage electrical discharge in fluid; a gear for traversing said electrodes in relation to said container; a means for charging the castings into said container and discharging them from it; a slide gate set up at the outlet of said container, secured on it to be able to turn and linked mechanically with said charging and discharging means to enable time correlation of the charging and discharging operations; said container is made up of a casing ensuring the orientation of the castings being treated in relation to said electrodes to create the requisite conditions for high-voltage electrical discharges, and of a tilter which can be brought into engagement with the castings being treated and turn them with respect to the longitudinal axis of the container to ensure exposure of the entire surface of the casting being treated successively to the effect of the high-voltage electrical discharges; a transporting means for the removal of the treated castings together with the separated foundry moulds from the arrangement.

2. An arrangement of claim 1 wherein said means for charging and discharging the castings comprises an inclined chute shut off in its upper portion with a spring-biased damper put on a shaft, on which are secured a cam with a projection adapted to control an air cylinder located on the side surface of said chute and intended for raising said slide gate of said container, and a rest with a pawl which is brought into engagement with said projection of said cam when said damper is turned through a certain angle α under the effect of the weight of the casting being charged to preclude further turning of said damper until the treated casting emerges from said container, and to release said damper and admit the casting into said container when said slide gate is lowered, a rod of a piston of said air cylinder carries a washer fastened to it and bringing said rest out of engagement with said cam.

3. An arrangement of claim 2 wherein the air cylinder adapted for raising the slide gate under the effect of the cam of the charging and discharging means is controlled by a three-line two-position normally closed distributor with a limit switch which is actuated by the cam of the charging means, and by a three-line two-position normally open distributor with a pneumatic control connected in succession through a time relay by an input signal allowing the piston of the air cylinder to be shifted from its initial position when the slide gate is raised and the return of the two members.

4. An arrangement of claim 1, wherein to enable a mechanical linkage between the slide gate and the charging and discharging means provision is made for a wire rope encompassing rollers located on a chamber and chute, with one end of the rope being secured to the slide gate and the other on the rod of the air cylinder of the charging means.

5. An arrangement of claim 1, wherein a casing ensuring the orientation of the castings in relation to the electrodes is fitted with a convex bottom with a radius R passing into inclined walls.

6. An arrangement of claim 1, wherein said tilter has a pusher acting on the casting placed in the container, and fitted with a pneumatic drive.

7. An arrangement of claim 6, wherein said tilter comprises a shell with ribs located on the internal surface of the container along its longitudinal axis and adapted to come into engagement with the castings, and a ratchet wheel secured on its external surface and coming into engagement with the pusher.

8. An arrangement of claim 1, wherein the gear for traversing the electrodes in relation to the container comprises a two-way air cylinder with a piston whose rod carries the electrodes secured on it and whose spaces are in communication with the atmosphere through the normally closed two-line two-position distributors with a pneumatic control actuated by a four-line three-position switch and are constantly connected to a compressed air main through additional channels with non-return valves to provide a requisite clearance between the electrode and the casting ensuring a high-voltage electrical discharge capable of destroying foundry moulds.

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