March 31, 1964 J. BOUREL 3,127,035

PROCESS FOR THE CHARGING AND DISCHARGING OF ROTATING HEARTH FURNACES, AND MEANS FOR CARRYING OUT THIS PROCESS

Filed Feb. 19, 1960 3 Sheets-Sheet 1

Fig. 1

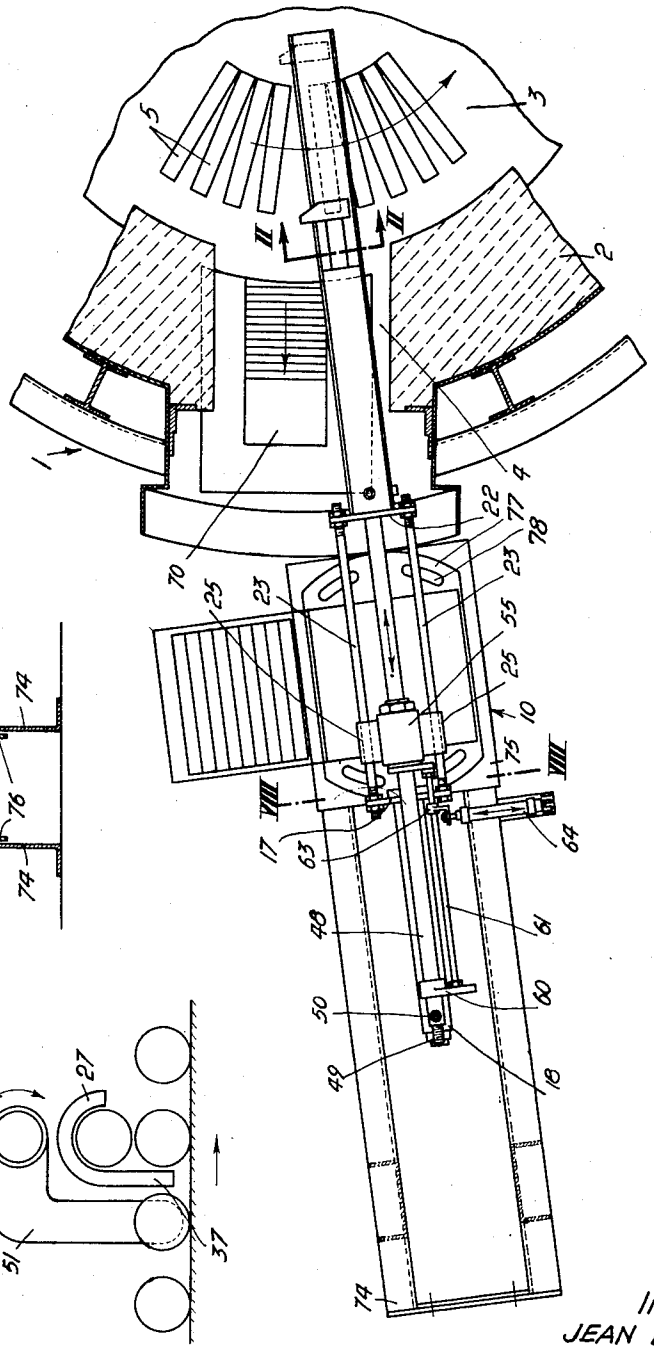

Fig. 8

Fig. 2

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Filed Feb. 19, 1960 3 Sheets-Sheet 2

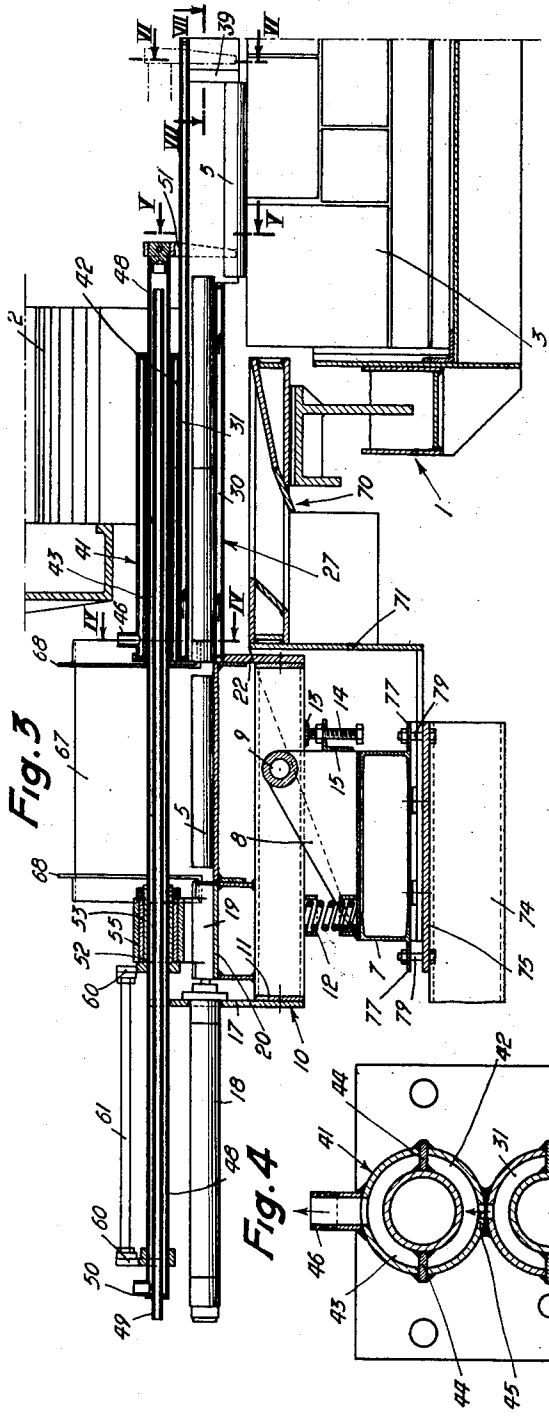

Fig. 3

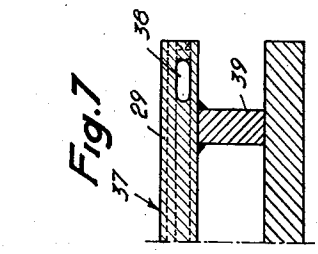

Fig. 7

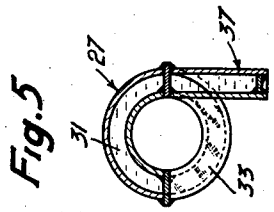

Fig. 5

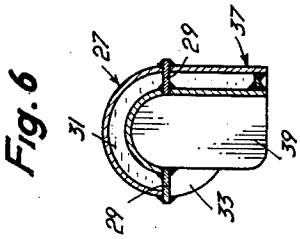

Fig. 6

Fig. 4

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Filed Feb. 19, 1960 3 Sheets-Sheet 3

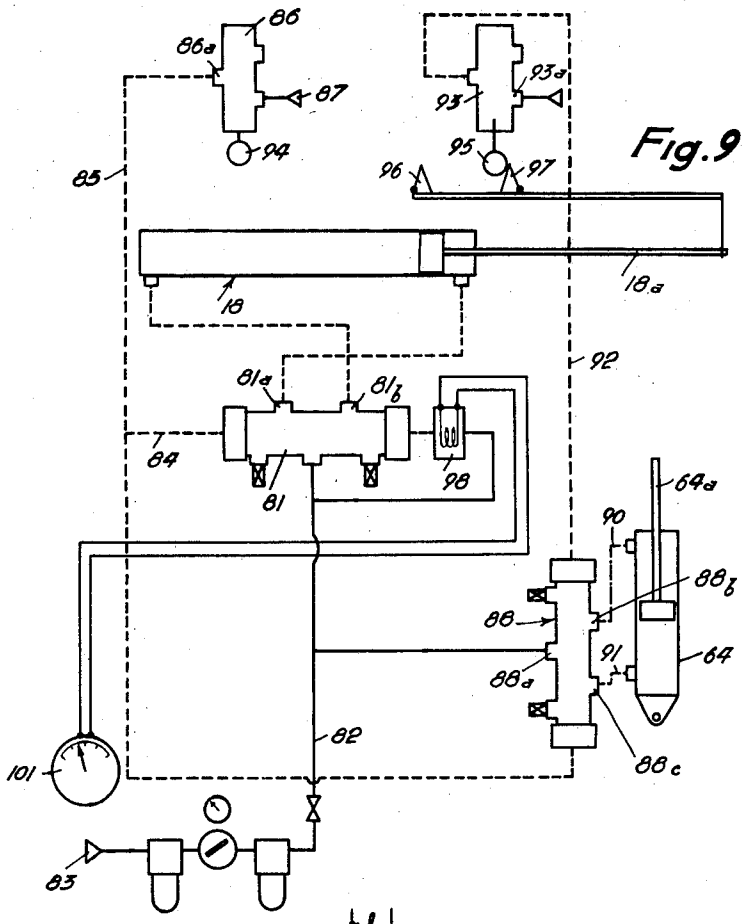

Fig. 9

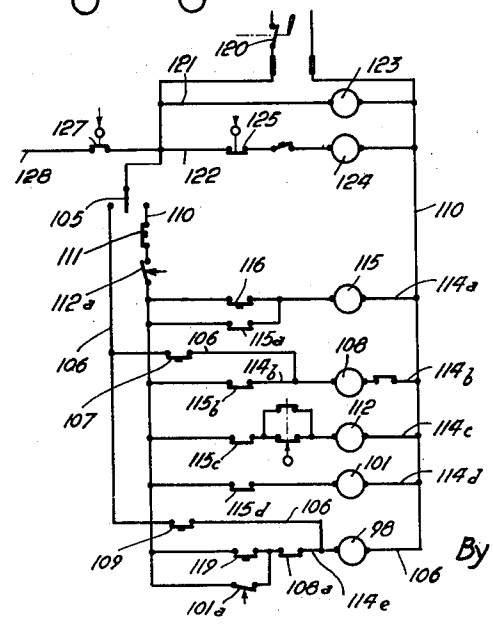

Fig. 10

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3,127,035

PROCESS FOR THE CHARGING AND DISCHARGING OF ROTATING HEARTH FURNACES, AND MEANS FOR CARRYING OUT THIS PROCESS

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2 Claims. (Cl. 214—23)

The present invention relates to the charging and discharging of rotating hearth furnaces, such as those employed in mass-production for heating billets of small size whose weight varies from a few hundred grams up to a few kilograms. Heretofore, the charging of billets of this size into rotating hearth furnaces and their discharge have been carried out manually and this work is extremely arduous owing to the high temperature prevailing at the charging and discharging stations. The operation is furthermore very costly especially as the hourly rate of salary due to this very arduous work is of course particularly high. The main object of the invention is to remedy this state of affairs by rendering this work considerably less difficult by the use of charging and discharging means actuated by a driving or motive force other than human force or energy, thereby decreasing the amount and cost of the labor required and even eliminating it entirely by rendering the charging and discharging fully automatic. Another object of the invention is to arrange that these charging and discharging operations are carried out at a very high operational rate.

To this end, the invention provides a charging and discharging process, which is advantageously automatic, for medium size billets in said rotating hearth furnaces and means for carrying out this process.

There is shown diagrammatically in the accompanying drawings by way of a non-limitative example an embodiment of the means for carrying out the process of the invention, these means being, in this embodiment, so grouped as to form a self-contained unit constituting a machine for charging billets of moderate size into, and discharging them from, a rotating hearth furnace.

In the drawings:

FIG. 1 is a diagrammatic plan view of a machine, in position for charging and discharging a rotating hearth furnace, a part of which is shown in horizontal section;

FIG. 2 is a diagrammatic sectional view, taken along line II—II in FIG. 1, the thrust element for ejecting the billets being shown in its ejecting position;

FIG. 3 is a vertical sectional view, along the line or axis along which the billets to be charged are propelled, of the assembly of the apparatus shown in FIG. 1;

FIGS. 4, 5, 6 and 7 are cross-sectional views taken along lines IV—IV, V—V, VI—VI and VII—VII respectively in FIG. 3;

FIG. 8 is a vertical sectional view of the cradle on which the machine slidably rests;

FIG. 9 is a diagram of a pneumatic system for the automatic cyclic operation of the apparatus, and

FIG. 10 is a diagram of the electric connections for the operation of the whole unit.

In the drawings, the assembly of the rotating hearth furnace is designated by the reference character 1. The wall 2 of this furnace has at the level of the upper face of the hearth 3 an aperture 4 for charging and discharging billets 5.

To charge and discharge this furnace, the illustrated machine comprises a lower chassis 7 constituted by a box structure whose upper face supports two vertical parallel side members 8 which are bored out to act as bearings for a cross-shaft 9 fixed to two opposing sides of an upper

chassis 10, comprising a frame 11. The chassis 10 has its lower face resting on powerful springs 12 which are located on one side of the pivot cross-shaft 9 and rest on the upper face of the lower chassis 7. On the other side of the shaft 9, the upper chassis 10 rests, through the medium of a cross-member 13 fixed to its lower face, on an adjustable abutment 14 constituted by a vertical bolt extending through a horizontal flange of an L-sectioned member 15 fixed to the side members 8. Thus it is possible to adjust as desired the position of the upper chassis 10 by pivoting the shaft 9 in the bearings of the side members 8, relative to the horizontal plane intersecting the axis of this shaft. The position of the latter is so chosen that the center of gravity of the upper chassis 10 and everything supported thereby (described hereinafter) is located between the shaft 9 and the springs 12, and the assembly is so arranged and calculated that the moment of rotation due to the action of the springs 12 is always greater that the opposing moment of the weight of the whole of the upper chassis 10 and everything carried thereby, so that the upper chassis 10 is always applied with moderate force against the abutment 14.

Fixed on one of the sides of the frame 11, parallel with the shaft 9, is a vertical side member 17 which extends above the frame and through which extends a pneumatic or air quick-return ram or jack 18 of known type fixed thereon. At the end of the rod of this ram above the upper chassis 10 there is fixed a thrust head 19 whose lower part rests on a table 20 fixed on top of the frame 11. Fixed to the other of the sides of the frame 11 is another unapertured side member 22 parallel with the member 17, and these members 17 and 22 are rigidly inter-connected at their upper parts by tie-rods 23 which are parallel with the axis of the ram 18 but disposed some distance to each side of the latter and extend through large lateral bosses 25 projecting from the head 19 for which they thus act as longitudinal guides. Fixed to the other side member 22 in cantilever fashion is a long double-walled tube 27 whose axis is located in the extension of the axis of the ram 18. The inner face of this tube is substantially flush with the upper face of the table 20. The outer wall carries in the vicinity of the side member 22 a supply pipe 28 through which there is supplied a cooling fluid for the inside of the hollow wall which is divided by a longitudinal diametral wall 29 into two superimposed compartments 30 and 31. Some distance from the member 22, the bottom half of this tube 27 is cut away transversely and longitudinally in a horizontal plane, so that only the top half of the tube remains (FIG. 6). The cut-away end which is part-annular, of the tube 27 is closed by a part-annular end plate 33 (FIGS. 5 and 6). Under the lower face of one of the sides of this upper half of the tube 27, this face being constituted by the extension of one of the longitudinal partition walls 29, there is secured a vertical hollow wall 37 which extends along this upper half of the tube 27 up to the end plate 33 to which it is fixed in a fluid-tight manner, a part of the end of the lower half of the tube 27 not closed by the end plate 33 putting the compartment 30 of this lower half in communication with the interior of the hollow wall 37. At the end of the latter remote from the plate 33, an aperture 38 in the extension of the partition wall 29 (FIG. 7) puts the interior of the vertical wall 37 in communication with the upper compartment 31 of the tube 27. A vertical transverse partition wall 39 is furthermore fixed at its upper end to the circular inner wall of the upper half of the tube 27 and against the side of the hollow wall 37 throughout the height of the latter (FIGS. 5 and 7).

Secured to the side member 22 is a tube 41 which also has a hollow wall like the tube 27 and rests on the latter to which it is welded (FIG. 4). It is also divided into two superimposed compartments 42 and 43 by horizontal lon-

gitudinal partition walls 44. The lower compartment 42 communicates, on the one hand, in the vicinity of the member 22, with the upper compartment 31 of the tube 27 through an aperture 45 extending through the adjoining and welded walls of the tubes 41 and 27 and, on the other hand, at its opposite end, with the upper compartment 43 through apertures formed in the partition walls 44. Formed at the upper part of the tube 41 in the vicinity of the member 22 is an outlet pipe 46 for the cooling fluid. There is thus provided a complete circuit for this fluid, for example water, which is supplied by a source of fluid under pressure, not shown in the drawings, and enters by way of the pipe 28, circulates in the lower compartment 30 of the tube 27 up to the end of this compartment, thereafter flows in the hollow wall 37 up to the end of the latter, whence it flows by way of the aperture 38 into the upper compartment 31 of the upper half of the tube 27, wherein it circulates up to the vicinity of the side member 22 and thereafter flows through the aperture 45 in the lower compartment 42 of the tube 41 up to the end of the latter, whence it returns by way of the upper compartment 43 to the outlet pipe 46 through which it is discharged. In the part of this tube situated above the ram there axially penetrates a supply pipe 49 supplying cooling fluid and extending within the tube 48 almost up to its opposite end, there being an annular space left between the pipe 49 and the tube 48 to permit the cooling fluid to return to the end of the tube 48 above the ram 18 and flow out by way of a discharge pipe 50 carried by this tube in the vicinity of its end. At the opposite end of the tube 48, there is fixed an ejecting element 51 bent as shown in FIG. 2 so that its end is capable of being placed in the vicinity of the lower end of the guide wall 37. This tube 48 extends through the thrust head 19, to which it is rigidly fixed in the axial direction while it is free to rotate therein about its axis, which rotation is produced, in the presently-described embodiment, by means of a shouldered collar 52 fixed to the outside of the tube by foot screws extending through another collar 53 which forms a bearing in the central enlarged upper part 55 of the head 19 (FIGS. 1 and 3). The collar 52 axially projected from this central part 55 and, on this projecting and screw-threaded part, there is screwed a nut constituting an axial shoulder on the side of the bearing 55 opposed to the other shoulder of this collar 52. Two cranks 60 are disposed parallel to the one another, one being keyed on the tube 48 in the vicinity of its end above the ram 18 and the other on the collar 52. These two cranks are interconnected by a bar 61 which is parallel with the tube 48 and on which is keyed a crank 63 pivoted at its end to a pressurized fluid ram 64 which is perpendicular to the tube 48 and whose other end is pivoted to the support structure so as to be pivotable about an axis parallel with this tube 48. It can be seen that when this ram operates, it turns the tube 48 in the bearing 55 of the thrust head and, with the latter, the ejecting element 51 which can thus be brought to a position in which it is wholly higher than the horizontal plane tangent to the upper part of the tube 27.

For the purpose of bringing the billets 5 to be charged between the thrust head 19 and the end of the charging tube 27, the machine further comprises a charging trough consisting of an inclined face 67 transversely disposed relative to the common axis of the tube 27 and the thrust head 19, and two lateral walls 68 which are slidable along this inclined plane so as to vary the width of the trough in accordance with the length of the billets to be charged. At its lower part, the inclined face 67 extends to the upper face of the table 20. An abutment, not shown in the drawings, disposed in opposed relation to the inclined face 67, constrains the billet bearing thereagainst to place itself in correct alignment between the thrust head 19 and the charging tube 27 under the effect of the pressure exerted by the other billets deposited on the inclined face.

The machine further comprises a discharging trough generally designated at 70 which is slightly offset relative to the charging tube 27. This trough is fixed by the structure 71 to the lower chassis 7, is inclined in the direction for ejecting the billets and upwardly flared to facilitate their reception.

The whole of the machine described hereinbefore rests on a cradle or slideway consisting of two U-section members 74 which have their webs vertically disposed, are parallel with the charging axis and are situated on both sides of the latter. Resting on the upper faces of the flanges of these U-section members is a plate 75 whose lower face carries depending partion walls 76 which are engaged between the members 74 and act as guide means along the latter. Resting on the plate 75 are the pads or feet of the support structure 71 for the discharging trough 70, and, resting on these feet, is the lower chassis 7 of the machine. This chassis carries projecting ears 77 provided with part-circular slots 78 through which extend bolts 79 which also extend through the plate 75. Thus it is possible to turn the lower chassis 7 and everything supported thereby relative to the lower cradle 74 and thereby complete the orientation of the charging machine with respect to the furnace to be charged.

All the above-mentioned means are associated with the furnace to be charged and discharged, as shown in FIGS. 1 and 3. The machine is disposed adjacent the furnace in such manner that the axis of the charging tube 27 is directed substantially toward the center of the rotating hearth, that this tube extends into the interior of the furnace through the charging aperture 4 and that the end of its lower half is located above the hearth 3. Further, the discharging trough 70 is also placed under this aperture 4 near the periphery of the hearth 3 and substantially at the level of the upper face of the latter or slightly below. To this end, the whole of the machine carried by the plate 75 is slid along the guide means 74 toward the furnace. Once the machine is approximately in position the orientation adjustment is completed by pivoting the chassis 7 relative to the plate 75 as described hereinbefore, it being held fast in position by means of bolts 79. Then the height adjustment is completed by pivoting the upper chassis 10 about the shaft 9 by acting on the adjustable abutment 14. The whole of the machine is held in position on the guide means 74 by clamps (not shown) which clamp round the flanges of the members 74 and the plate 75. If necessary, the ejecting position of the ejecting element 51 is once more adjusted by rotating the tube 48 carrying this element and axially sliding this tube relative to the cranks 60 whose fixing screws are temporarily loosened for this purpose.

Actuation of the ram 18 causes the billet 5 deposited on the table 20 to be pushed to its correct charging position in the charging tube 27, and, through the medium of this billet, the other billets already in the tube 27 are also pushed toward the furnace, so that the billet situated in the most forward position, relative to the direction of movement of the billets, issues from the tube and assumes a substantially radial position on the hearth 3 which undergoes rotary motion. The transverse wall 39 constitutes a stop abutment in the event that the billet has a tendency to travel too far. Repeated actuation of the ram 18 at a rate which is a function of the rotational speed of the hearth, which speed is in turn a function of the dimensions of the billets for a given heating temperature, deposits on the hearth a ring of billets each of which is substantially radially disposed (FIG. 1).

When the hearth is completely supplied with billets, the charging can only continue if the billets on the hearth are successively ejected, which is possible when the rotational speed of the hearth is so determined that the heating of a billet is complete in slightly less than one rotation of the hearth. This ejection is effected by the return movement outwardly of the furnace of the tube 48 driven by the upper part of the propelling head 19 in its return

movement. The ejecting element 51 carried by this tube 48 encounters in its path that one of the pillars on the hearth which has reached the vicinity of the abutment 37, since in its raised position in the course of the entire centripetal travel of the tube 48 (which position permits the element to pass over the billets 5 resting on the hearth 3) the element 51 passes, at the end of travel of the tube 48, to the vertical position shown in FIG. 2 and, in dot-dash line, in FIG. 3, due to the action of the transverse ram 64 supplied at this moment with fluid under pressure by the action of an end-of-travel abutment (not shown) actuating a fluid distributor or valve controlling the fluid supply to the ram 64. Upon the rapid return of the ram 18 which drives the tube 48 out of the furnace through the medium of the thrust head 19, the ejecting element 51 quickly drives the billet 5 located in its path outwardly without allowing the billet time enough to assume an oblique position under the simultaneous effect of the rotary motion of the hearth 3, and projects it into the discharging trough 70. An end-of-travel abutment (not shown) then acts on a distributor or valve which reverses the fluid supply of the ram 64 and the latter turns the tube 48 in the direction corresponding to a raised ejecting element 51.

The charging and ejecting travels described hereinbefore, which can be produced separately by a manual action on the distributor feeding the ram 18, are rendered automatically consecutive by the pressurized fluid distributing device shown diagrammatically in FIG. 9. In this diagram, there are shown the main charging and ejecting ram 18 and the transverse ram 64 which turns the tube 48 and its ejecting element 51. The moving part of the ram 18 is designated by the reference character 18*a* and that of the ram 64 by the reference character 64*a*. A main distributor or valve 81 is connected by piping 82 to a pressurized fluid supply inlet 83, and two outlets 81*a* and 81*b* of the distributor 81 are respectively connected to the opposite ends of the ram 18. Another inlet aperture 81*d* of the distributor 81 is connected by a pipe 84 to a pipe 85 which connects an outlet aperture 86*a* of an end-of-travel distributor or valve 86, provided with a pressurized fluid supply inlet 87, to an inlet 88*a* of a distibutor which supplies the ram 64 at the opposite ends of which these outlet apertures 88*d* and 88*c* are respectively interconnected by pipes 90 and 91. The end of the distributor 88 opposed to that to which the pipe 85 is connected by piping 92 to another end-of-travel distributor or valve 93 provided with a pressurized fluid inlet 93*a*. The two end-of-travel distributors 86 and 93 comprise rollers 94 and 95 which respectively cooperate with cams 96 and 97 which move in accordance with the travel of the ram 18 and are tiltable in one direction in opposition to the action of a spring or counterweight, the direction of tilt of one being opposite to that of the other.

This device acts in the following manner:

In the diagram, the automatic stop position of the machine is shown to be that in which the ram 18 is at the end of its charging travel and the ejecting element 51 has been brought to, and is held in, its ejecting position by the ram 64. In this position, the pressurized fluid supplied through the piping 83 acts in the left part of the ram 18 through the medium of the distributor 81 and the pipe on the downstream side of the aperture 81*b* and maintains the moving part 18*a* in the illustrated position; it also acts, through the medium of the distributor 88 and the pipe 91, in the ram 64 so as to maintain the moving part thereof 64*a* in the illustrated position and thereby, and through the medium of the links 60, the tube 48 in the angular position in which the ejecting element 51 is in the ejecting position. The two other compartments of the rams 18 and 64 are connected to the exhaust through the medium of, in respect of the first-mentioned rams, the aperture 81*a* of the distributor 81, the pipes 84 and 85 and the distributor 86, and, for the other ram, the pipe 90, the aperture 88*b*, the distributor 88, the piping 92 and the distributor 93. If the electrovalve 98 is then actuated by momentarily sending pressurized fluid to the end of the distributor slide, the latter moves so that the pressurized fluid supplied through the pipe 82 issues from the aperture 81*a* and flows into the ram 18; simultaneously the distributor puts the aperture 81*a* in communication with the pipe 84, that is, with the exhaust. The ram 18 thereupon effects its rapid ejecting travel; the cam 97 tilts upon passage of the roller 95 without actuating the distributor 93; at the end of travel, the cam 96 encounters the roller 94 of the distributor 86 and actuates the latter so that the pressurized fluid supplied through the aperture 87 is temporarily directed by the piping 85 and the branch connection 84 to the end of the slide of the distributor 81 and simultaneously to the end of the slide of the distributor 88; the latter slide then puts in communication the two apertures 88*a* and 88*b* and, moreover, the aperture 88*c* with the pipe 92, that is, with the discharge. The piston of the ram 64 moves back toward the pivoted end of the ram, that is, effects the travel causing retraction of the ejecting element 51. Simultaneously, the fluid under pressure flowing through the pipe 84 to the main distributor 81 actuates the slide of the latter so that the pipe 82 communicates with the aperture 81*b*; the ram 18 then effects its charging travel, the ejecting element 51 remaining retracted; the cam 96, which is a tiltable cam having a spring or counterweight, is pushed aside upon contact with the roller 94 without actuating the distributor 86; at the end of the charging travel, the cam 97, which is a cam tiltable in the opposite direction to the cam 96, encounters the roller 95 and, through the medium thereof, actuates the distributor 93 which temporarily sends pressurized fluid through the piping 92 to the distributor 88 so as to actuate the slide of the latter in such manner as to put the apertures 88*a* and 88*c* once more in communication with one another and the aperture 88*b* in communication with the pipe 92. The ram 64 then operates and brings the ejecting element 51 back to its ejecting position. The starting position is thus resumed and the assembly ceases to function until a further injection of pressurized fluid in the distributor 81 by the electrovalve 98 initiates a further operational sequence.

The cyclic repetition of the operational sequences is advantageously obtained by a timing device 101 which controls the electrovalve 98. It will be understood that this timing device is so set that the total duration of the cycle exceeds that of one automatic operational sequence. In this way, there is provided a period of rest in the cycle, the duration of this period varying with the setting of the timing device, which setting depends on the rotational speed of the hearth, itself depending on the weight of the billets to be charged.

FIG. 10 shows an installation combining the drive and operational control united with a rotating hearth furnace and charging and discharging means according to the invention. This installation comprises two electric circuits selectively connectible through the medium of a selector 105. One of these circuits, designated by the reference character 106, is provided for controlling a discontinuous operation of the furnace and the charging and discharging means. It comprises two branches one of which includes a manually operated push-button 107 and the motor-variator-speed reducer unit 108 driving the rotating hearth of the furnace, whereas the other branch includes a manually-operated push-button 109 and the electrovalve 98. The other circuit 110 comprises, starting from the selector 105, a safety contact 111 controlled by a shearable safety pin inserted in the drive of the hearth, so that this contact automatically opens, in the event of rupture of this pin, and stops rotation of the hearth. The circuit 110 further comprises: a contact 112*a* of a time relay 112 whose timed or delayed cut-out is so set that the delay exceeds the duration of the operational cycle of the charging ma-

chine; thereafter, five branch conductors 114*a*, 114*b*, 114*c*, 114*d*, 114*e* in parallel in which are inserted respectively an automatic relay 115 with a manually-operated control push-button 116 and connected in parallel with the latter, the contact 115*a* maintaining the relay 115 closed, the motor-variator-speed reducer unit 103 driving the hearth, which is also part of the circuit 106, and a contact 115*b* actuated by the relay 115, the safety time or delay relay 112 and a contact 115*c* actuated by the relay 115, the time device 101 controlling the cyclic operation of the machine and a contact 115*d* actuated by the relay 115, the electrovalve 93, which is also part of the circuit 106, a contact 103*a* actuated by the motor-variator unit so as to be closed when the latter rotates and a contact 101*a* (which operates the time device 101) and push-button 119 connected in parallel with one another.

With the circuit 110 closed by the selector 105, when the push-button 116 is depressed, the automatic relay 115 is switched into circuit and all the contacts 115*a*, *b*, *c*, *d*, *e* are closed, the hearth driven by the motor-variator unit 103 starts to rotate and the contact 103*a* closes. The time devices 101 and 112 are in circuit and the device 101 temporarily closes the contact 101*a* and transmits an electric pulse to the electrovalve 93 and thereby initiates the first automatic operational cycle which is followed by the periodic temporary closure of the contact 101*a* by the time device 101.

If the hearth ceases to rotate owing to stoppage of the motor-variator unit 103, the contact 103*a* opens and the circuit 114*e* of the magnetic valve is opened and causes stoppage of the automatic operation.

In the event of the charging machine not operating, the time relay 112 opens the contact 112*a* a given period of time exceeding that of one cycle after the start of this non-operational period, which opens the entire automatic operation circuit 110 and the automatic relay 115 is rendered inoperative and all its contacts are opened.

Further, there are, in the general circuit between the main switch 120 and the selector 105 two other branch conductors 121 and 122, one of which includes a magnetic valve 123 controlling the machine cooling fluid circuit whereas the other includes an alarm hooter 124 and a contact 125 which is normally maintained open by a pressostat or pressure control device under the effect of the pressure of said cooling fluid. If this pressure drops, the contact 125 closes and the hooter 124 operates. A contact 127, which closes a pressostat under the effect of the pressure of the cooling fluid, is furthermore inserted in a branch conductor 128 leading to the means controlling the furnace burners; this branch conductor is therefore automatically opened should the cooling fluid pressure drop.

It must be understood that the invention is in no way limited to the features of the embodiment illustrated and described which have been given merely by way of example. Thus, the retraction of the ejecting element can be dispensed with on condition that the charging is effected at such rate that there is between two successive billets deposited on the furnace hearth space enough to allow the ejecting element to pass therebetween during the charging travel, it being of course understood that the automatic operational sequence commences with the ejecting travel and terminates with the charging travel so that the charging arm is in its position corresponding to maximum insertion in the furnace during the dwell or inoperative part of the cycle, or that the ejection is effected by an ejecting arm which is not driven by the movement of the charging head and has its own means of propulsion. The assembly could also be arranged, if an ejecting arm is related to the movement of the charging head and has a retractable ejecting element, in such manner that the operational sequence starts with the charging travel and terminates with the ejecting travel, the ejecting arm thus remaining in its position of maximum retraction from the furnace during the inoperative part of the cycle. It is also possible to effect the charging and discharging at two remote points of the hearth. There can also be provided means ensuing the automatic retraction of the entire machine and its removal from the furnace in the event of the cooling fluid ceasing to circulate, the attachment of the machine on its cradle 74 being in this case obtained by fixing means easy to release, for example rams or jacks or electromagnets, whereas driving means, such as rams or jacks, ensure that the machine travels along its cradle, these various means being manually controlled as concerns moving the charging machine toward the furnace and its attachment to the cradle, and automatically controlled, for example through the medium of a pressostat and a contact which closes in the event of a drop in the circulating fluid pressure, as concerns stopping the action of the fixing means and the removal or separation of the charging machine from the furnace.

The invention is moreover not limited to the shape of the cross-section of the billets to be charged, which shape can be any other than circular, such as for example polygonal.

Further, it is advantageous to recover the heat carried away by the fluid cooling the charging tube of the ejecting arm by connecting the circuit of this cooling fluid to a circuit supplying or utilizing hot fluid in the factory in which the charging machine is installed.

What I claim is:

1. In an apparatus for charging and discharging billets into and out of a rotary hearth furnace having a rotary hearth and a furnace wall surrounding the hearth with there being an aperture in the furnace wall, means for charging billets into said furnace and positioning the billets radially on said rotary hearth, a guiding abutment radially disposed in said furnace above said rotary hearth in the path of the billets positioned on said hearth, said guiding abutment being positioned radially inwardly of said aperture and being rearwardly of said charging means with respect to the direction of hearth rotation, means extending into said furnace through said aperture for discharging billets outwardly of said furnace from said rotary hearth through said aperture, said discharging means having an ejecting element movable radially of said rotary hearth and parallel to said guiding abutment, said abutment radially repositioning any billets on said rotary hearth displaced from their radial position as such billets are moved into registration with said aperture so that said ejecting element can engage said billets to eject the same outwardly of said furnace through said aperture.

2. In an apparatus as claimed in claim 1, wherein said guiding abutment comprises a hollow wall member having an inlet and an outlet therein for circulation of a cooling fluid therethrough.

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