Oct. 2, 1945. C. A. BARNETT 2,385,962

METHOD OF AND APPARATUS FOR CONDITIONING MOLDS AND THE LIKE

Filed Aug. 23, 1941 4 Sheets-Sheet 1

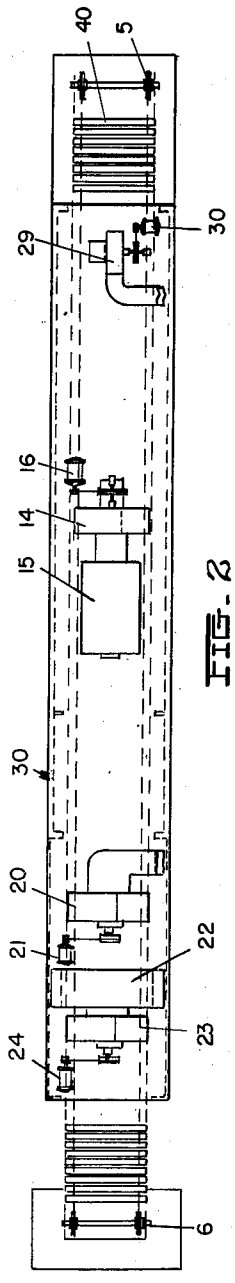


FIG. 2

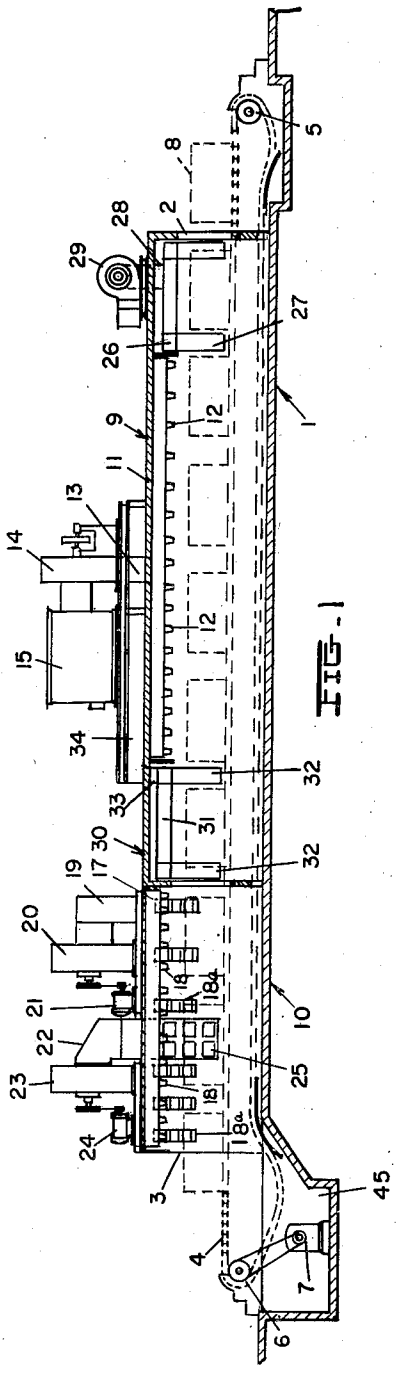


FIG. 1

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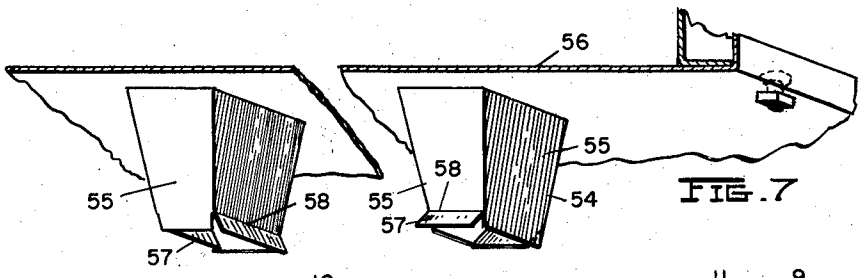


FIG. 7

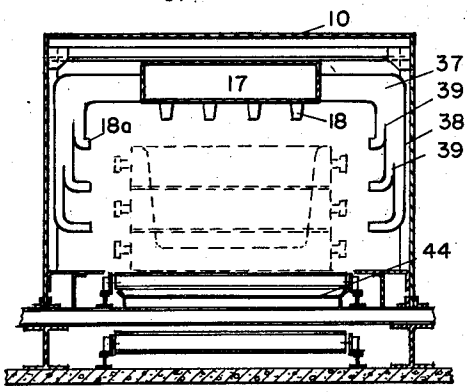


FIG. 3

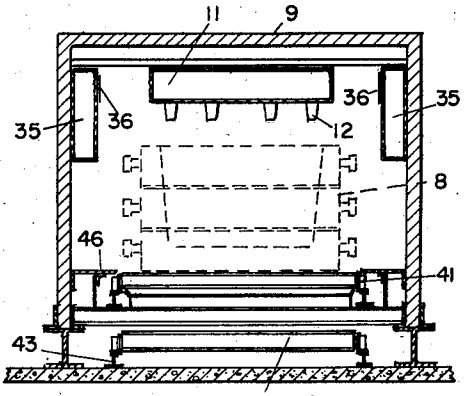


FIG. 4

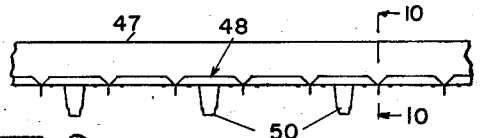


FIG. 9

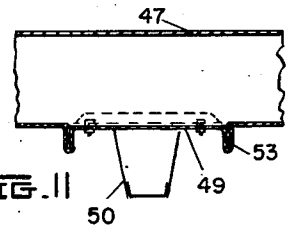


FIG. 11

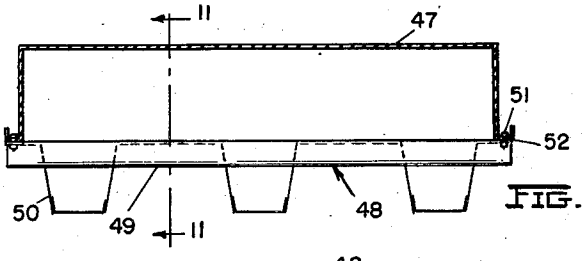


FIG. 10

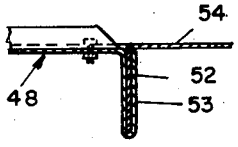


FIG. 12

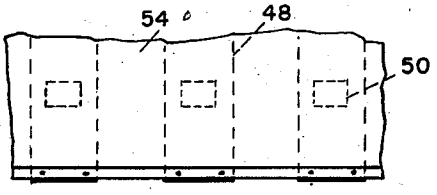


FIG. 13

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METHOD OF AND APPARATUS FOR CONDITIONING MOLDS AND THE LIKE

Filed Aug. 23, 1941 4 Sheets-Sheet 3

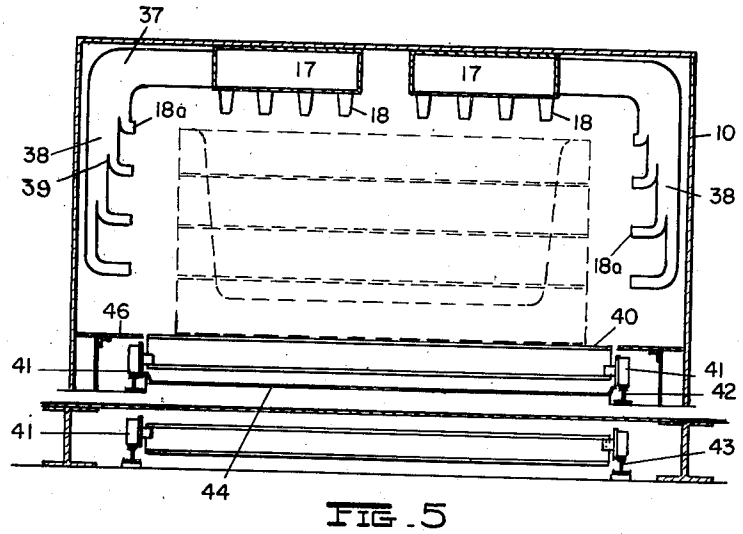


FIG. 5

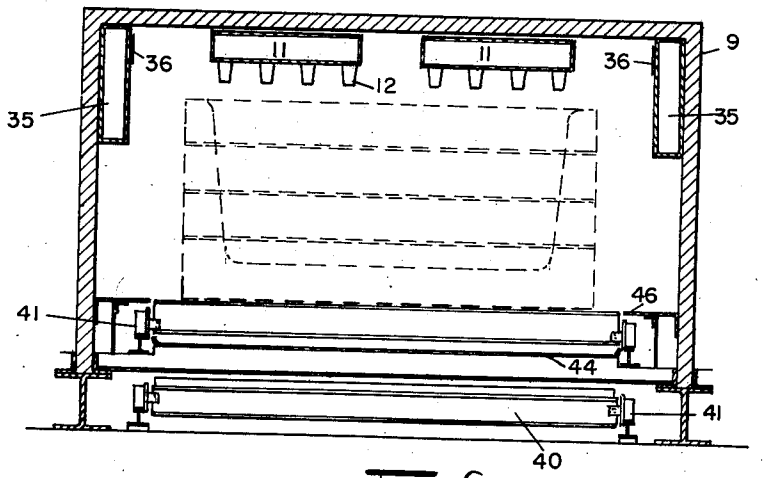


FIG. 6.

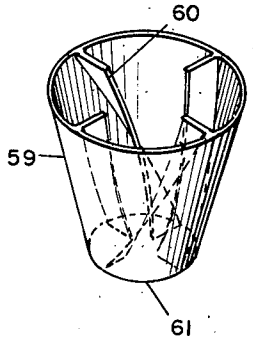


FIG. 8

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METHOD OF AND APPARATUS FOR CONDITIONING MOLDS AND THE LIKE

Filed Aug. 23, 1941 4 Sheets-Sheet 4

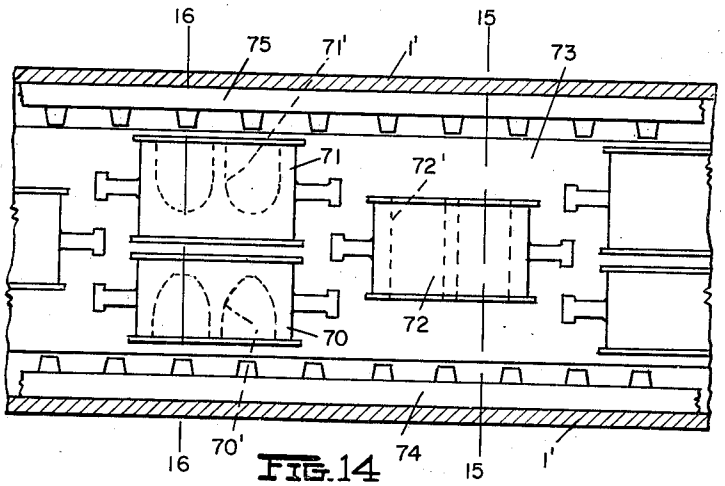


FIG. 14

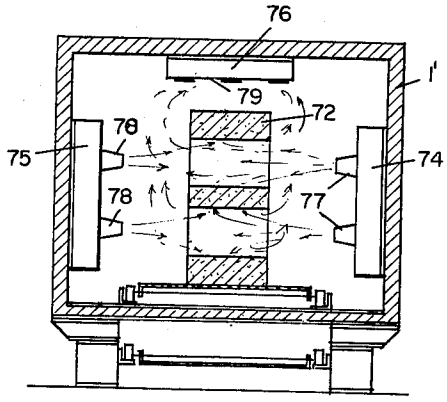


FIG. 15

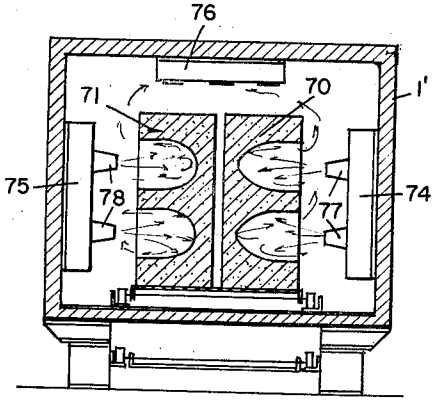


FIG. 16

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UNITED STATES PATENT OFFICE

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METHOD OF AND APPARATUS FOR CONDITIONING MOLDS AND THE LIKE

Charles A. Barnett, Shaker Heights, Ohio, assignor to The Foundry Equipment Company, Cleveland, Ohio, a corporation of Ohio

Application August 23, 1941, Serial No. 408,063

7 Claims. (Cl. 34—13)

This invention relates to a method of and apparatus for conditioning molds and the like.

Sand molds employed in the production of metal castings are generally one of three well known types. Such types are commonly known as green sand molds, skin dried molds, and dry sand molds.

Green sand molds are those which are made from damp sand and such molds are used wherever possible because they do not involve the expense of subsequent operations necessary to convert them into one of the other type molds. However, except in the production of molds for relatively small castings, green sand molds have a number of disadvantages. It is not always possible or feasible to produce molds with sand of uniform density throughout. Therefore, when the metal is poured into the mold, the resulting pressures may cause distortion of some of the surfaces, resulting in castings with corresponding irregularities. This condition may result in a variation in the weight of several castings made from the same pattern. In addition, the irregularities in the casting surface previously referred to, require additional labor for their removal. Furthermore, when the hot metal makes contact with the surface of the green sand mold, a fusion of the metal and the sand surface frequently takes place, causing a scabby casting surface which is difficult and costly to remove. If certain portions of the green sand mold have excess moisture, the metal may be chilled, resulting in excessive hardness; or, reducing the temperature of the metal so that it does not flow properly and results in an imperfect casting.

To overcome some of the above mentioned disadvantages of green sand molds, such molds may be surface dried to convert them into the so-called skin dried type or they may be baked to convert them into dry sand molds. Both of these treatments as commonly practiced result in disadvantages and increased cost of production which it is one of the objects of this invention to avoid.

As presently practiced, molds are surface or skin dried by several methods. One method is to move a gas or oil torch over the surface of the mold. Another method is to radiate heat to the surface of the mold from heat generated by gas burners, charcoal or coke. Another method is to deliver heated air to the surfaces of the mold from electrically heated or fuel fired heaters so as to transfer the heat from the heating unit to the surface of the mold by convection. All these methods as presently practiced are undesirable in that the heat is not uniformly transferred to the surfaces of the mold or is incapable of providing sufficiently rapid and economical heat penetration to a desired depth.

To make dry sand molds, the molds are generally placed in a drying oven at temperatures of from about 350° F. to about 900° F., and, according to the size of the mold, the binder employed and the casting to be produced, it generally requires from four to twenty-four hours to produce a satisfactorily dried mold. On extremely large work the drying period may even take several days. The drying oven in such case is much in the nature of a heat soaking operation as it is necessary to leave the mold in the oven for a long period of time in order that the heat will penetrate to the interior surfaces of the mold cavities. Even though convection is employed for transferring heat, the stacking of the molds in the oven causes parts of the mold to act as baffles, preventing the hot gases from contacting the interior surfaces of the mold cavities. Moreover, after the molds are removed from the oven time is usually lost by waiting for the molds to cool down to a temperature enabling the same to be handled.

I have discovered that the foregoing disadvantages and objections may be overcome by subjecting the green sand molds to a blast of heated air or gaseous medium, directed against the mold surfaces and the mold bodies at those particular areas or zones in which the heating and drying action is desired to be accomplished. Generally outlined, my invention comprises the method and apparatus for forcibly projecting streams of heated air through a plurality of jets or nozzles which are so positioned as to direct such streams against the mold surfaces in such a manner as to secure a uniform and efficient heating and drying of the green sand material.

One of the objects of this invention is to provide a method of and apparatus for conditioning green sand molds which will reduce the time required to treat such molds for the purpose of eliminating the disadvantages of green sand molds.

A further object is to provide a method and apparatus by which a mold having the characteristics of a skin dried or dry sand mold may be produced in less time than is required by conventional methods.

A further object is to provide a method of and apparatus for conditioning green sand molds which involves first subjecting the mold to a

rapid heating and drying action and then to a rapid cooling action.

A further object is to provide apparatus of the character referred to in which the molds are continuously carried through an oven wherein they are first subjected to a rapid heating and drying action and then to a rapid cooling action.

A further object is to provide an apparatus having an oven of the character referred to with a novel arrangement for separating the heating and cooling portions thereof, and more particularly, an arrangement wherein the cooling portion of the oven acts as a preheater for the heating portion.

Other objects and advantages of the invention will become apparent during the course of the following description.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims, the annexed drawings and the following description setting forth in detail certain means and one mode of carrying out the invention, such disclosed means and mode illustrating, however, but one of various ways in which the principle of the invention may be used.

In said annexed drawings:

Fig. 1 is a vertical sectional view of apparatus constructed in accordance with the principles of this invention;

Fig. 2 is a top plan view of the apparatus shown in Fig. 1;

Fig. 3 is a vertical sectional view taken through the cooling portion of the oven shown in Fig. 1, illustrating the arrangement of the cooling ducts and nozzles;

Fig. 4 is a vertical sectional view, similar to Fig. 3, showing the arrangement of the heating ducts and nozzles;

Figs. 5 and 6 respectively are views similar to Figs. 3 and 4, showing a modified construction;

Fig. 7 is a perspective view illustrating a construction of the air nozzles by which the direction of the stream of air being projected therefrom may be varied;

Fig. 8 is a perspective view illustrating the construction of a nozzle by which a cyclonic effect may be imparted to the air or gas passing therethrough;

Fig. 9 is a side elevational view of an air duct provided with removable panels having a plurality of nozzles;

Fig. 10 is a sectional view taken substantially on the line 10—10 of Fig. 9;

Fig. 11 is a sectional view taken substantially on the line 11—11 of Fig. 10;

Fig. 12 is an enlarged view of a part shown in Fig. 11;

Fig. 13 is a broken-away top plan view of the construction shown in Fig. 9;

Fig. 14 is a horizontal sectional view taken through a modified form of construction of my oven apparatus, and illustrating in particular the arrangement of the molds and the drying treatment thereof by means of streams of heated air projected from the vertical sides of the oven and in a substantially horizontal direction;

Fig. 15 is a vertical sectional view taken substantially along the line 15—15 of Fig. 14; and

Fig. 16 is another vertical sectional view taken substantially along the line 16—16 of Fig. 14.

Referring to Fig. 1 of the drawings, the numeral 1 indicates as a whole, that which is in substance an elongated, heat insulated housing, or more briefly termed "oven," having an entrance opening 2 and an exit opening 3. A continuous chain conveyor 4 is trained around sprockets 5 and 6 and is driven from a suitable power device 7 for carrying molds 8 through the entrance opening 2 and out the exit opening 3. The oven 1 is provided with a heating portion, indicated as a whole by the numeral 9, adjacent the entrance opening 2, and a cooling part, indicated as a whole by the numeral 10, adjacent the exit opening 3.

The heating portion 9 is provided with an air duct 11 and nozzles 12 respectively adapted to deliver a plurality of streams of air to the surfaces of the molds 8 being conveyed through the oven. Hot air is supplied to the duct 11 through a supply duct 13 by a fan 14 which draws the hot air from a suitable heating unit 15. The fan 14 is driven by a suitable power device 16. The heating unit 15 is preferably an electric heating unit, although any other suitable type of heating unit may be employed. Accordingly, where the term "hot air" is used it will be understood that such term is meant to cover air with or without products of combustion as would be had where the air is drawn through a heater such as a gas-fired heater. In addition, the heating unit 15 will be selected so as to be capable of delivering air at any desired temperature ranging from about 350° F. to about 900° F.

Thus, a plurality of forcibly projected heated air streams, or "hot air blasts" are delivered from the nozzles 12 directly against the surfaces of the green sand molds, which are desired to be heated and dried. A uniform and efficient heat penetration effect, eliminating heat waste and substantially decreasing the time of operation, thereby results.

The cooling portion of the oven 10 is provided with an air duct 17 and a plurality of nozzles 18, of a character to be referred to, respectively adapted to deliver a stream of air to the surfaces of the molds 8 being carried through the cooling portion 10. The duct 17 is supplied with air from a feed duct 19 fed by a fan 20 which draws its air supply from the atmosphere. The fan 20 is operated by a suitable power device 21. Air is exhausted from the cooling portion 10 of the oven 1 at a point centrally of the air duct 17 by a duct 22 and a fan 23 driven from a suitable power device 24. The duct 22 is connected with the interior of the oven by suitable vents 25.

Air is also withdrawn from the oven adjacent the entrance opening 2 by an air duct 26 having vents 27 connecting the same with the interior of the oven. The duct 26 is connected by a duct 28 to a fan 29 driven by a suitable power device 30.

The entrance and exit openings 2 and 3 are open at all times and the parts thus far described cooperate with an intermediate portion 30 of the oven 1 in controlling the flow of air within the oven and through the openings 2 and 3. The central part 30 of the oven is provided with an air duct 31 and vents 32 connecting the duct 31 with the interior of the oven. The duct 31 is connected by a duct 33 and a duct 34 to the heater unit 15. The low pressure end of the fan 14 is in this manner connected through the heating unit 15 and parts 31 through 34 with the interior of the oven and is thus operable to draw the air supply for the heater unit 15 from the central part 30 of the oven. This arrangement provides

a recirculating arrangement operable in a manner to be described, but it will be understood that the duct 31 may be provided with a suitable exhaust fan separate from the heater unit 15 and fan 14 for withdrawing air from the duct 31 without departing from the principles of this invention.

The duct 11 supplies heated air to the interior of the oven under pressure. The duct 17 likewise supplies air to the interior of the oven under pressure. The duct 31, by withdrawing air at a point intermediate the ducts 11 and 17, prevents air from oven part 10 from entering the oven part 9, and vice versa. The duct 31 withdraws all intermingled hot and cold air from the oven 1 in the portion 30 thereof. The air withdrawn by the duct 31 from the part 10 serves as make-up air to compensate for the air withdrawn by the exhaust duct 26 adjacent the entrance opening 2. By withdrawing air from opposite ends of the oven part 9 the hot air or gas is distributed uniformly throughout the duct 11 and the duct 11 is thereby made operable to deliver streams of air through all the nozzles 12.

The capacity of the fan 20 is preferably made equal to the capacity of the fan 23 in order that the duct 17 will distribute air uniformly to all parts of the portion 10. Such capacities being equal, the air entering the opening 3 will be controlled by the amount of air exhausted from the oven part 10 by the duct 31. This air entering the opening 3 is the make-up air for the heating unit 15 and will therefore be equal to the amount of hot air which escapes from the oven portion 9 and thus controls the flow of air within the oven portion 9. That is, the pressures are balanced within the oven 1 so that the fan 29 will withdraw hot air equal to the air entering the opening 3.

As shown in Fig. 4, the hot air duct 11 is rectangular in shape although it may be round, square, etc., and is centrally aligned over the conveyor which carries the molds 8 thereunder. The nozzles 12 are spaced transversely of the duct 11 and are operable to direct a plurality of streams of air downwardly toward the surfaces of the molds passing therebeneath. Recirculating ducts 35 positioned at each side of the duct 11 and extending longitudinally of the oven 9 are connected with the exhaust duct 31 and are provided with openings or louvers 36 through which hot air may be returned to the heater 15 for reheating. The air which is projected from the nozzles 12 flows over the mold surfaces and is then drawn into the recirculating ducts 35.

The cold air duct in the cooling portion 10 of the oven is shaped and arranged similarly to the hot air duct 11. The nozzles 18 are likewise arranged similarly to the nozzles 12. In addition, branched passages 37 are connected to the duct 17 and are provided with vertically extending portions 38 from which the lateral nozzles 18a extend. The nozzles 18a are aligned vertically and have connections with the vertical portion 38 at laterally spaced points. In this manner fin-like members 39 are provided which divert a portion of the air flow in the vertical member 38 to the nozzles 18a and substantially equal amounts of air are delivered to each of the nozzles 18a. The nozzles 18a are operable to deliver air directly to the lateral surfaces of the molds being conveyed through the oven.

The constructions illustrated in Figs. 5 and 6 are respectively similar to the constructions illustrated in Figs. 3 and 4 but show a modified arrangement for an oven of greater width employing a plurality of air delivery ducts. The oven part 9 shown in Fig. 6 is shown as having two hot air ducts 11 and the part 10 is shown as having two cold air ducts 17. The ducts 17, and likewise the ducts 11, are respectively provided with separate connections, not shown, to the cold air delivery duct 19 and the hot air delivery duct 13. As best shown in Figs. 5 and 6, the chain 4 is provided with transversely extending carrier members 40 having rollers 41 secured to the outer ends thereof. While carrying the mold through the oven the rollers 41 ride on tracks 42 and after delivering a mold through the exit opening 3 are returned through the oven on tracks 43. The transversely extending carrier members 40 cooperate with a plate 44 positioned therebeneath to effect a removal of sand from the oven. The sand which falls from the molds as they are carried through the oven falls onto the plate 44 and as the sand builds up in the plate 44 the carrier members 40 will scrape and sweep such sand along the plate 44 and out the discharge opening 3 into the pit 45 from which the same may be removed.

The plate 44, in addition to serving as a sand removal means, also operates as a baffle to retain the air within the oven. Baffle members 46 extend longitudinally of the oven and are positioned over the rollers 41. The baffles 46 operate to prevent the air entering the oven from contacting the rollers and causing damage to such rollers and their bearings.

In Figs. 9 through 13 there is shown a duct 47 having a plurality of removable panel units indicated as a whole by the numeral 48 by which the duct 47 may be provided with as many nozzles as is desired. Each of the panel units 48 comprises a transversely extending portion 49 having spaced nozzle members 50. The transversely extended portion 49 is connected at opposite ends by bolts 51 to a flange 52 forming a part of the duct 47. As best shown in Fig. 12, the transversely extending edges of the members 49 are provided with a depending U-shaped member 53 providing a recess within which a depending flange 52, carried by an adjacent section 54 forming a part of the bottom of the duct 47, is receivable. The arrangement of the parts 52 and 53 act as a seal for the removable panel unit 48 with the part 54 constituting a part of the duct 47. In this construction if it is desired to reduce the number of nozzle openings, it is merely necessary to remove one of the units 48 and replace the same with another unit not provided with nozzle openings. The duct 47 may be employed either as a hot air duct 11 or as a cold air duct 17.

In Fig. 7 there is shown a nozzle construction 54 by which the direction of the stream of air issuing therefrom may be varied. The nozzle construction 54 comprises side wall portions 55 secured at their upper edges to the periphery of an opening formed in a plate 56 constituting a part of one of the air ducts. The connected side walls 55 are provided with flexible parts 57 at their bottom edges which may be adjusted along lines 58 with respect to the body of the side walls 55. By bending the parts 57 along the lines 58 the direction of the stream of air issuing from the nozzle 54 may be varied. Although adjustment of the lower edges 57 with respect to the side wall portions 55 is had by bending along the lines 58 in the construction illustrated in Fig. 7, it will

be understood that hinges may be provided for connecting the parts 57 to the parts 55 in order to permit of such adjustment.

In place of making the nozzles rectangular in shape as shown in the constructions thus far described, it is contemplated that such nozzles may be given any desirable shape. In Fig. 8 there is shown a nozzle 59 frusto-conical in shape. The nozzle 59 is provided with helically shaped vanes 60 secured to the inner surface thereof. The vanes 60 will be found to impart a cyclonic or vortex action to the stream of air issuing from the nozzle opening 61 and will increase the effectiveness of the stream of air issuing therefrom. Such a cyclonic, twisting stream of air is particularly suitable for the treatment of molds which have recessed portions or pockets which are relatively deeper than other portions, since the stream of air tends literally to bore its way into such mold portions.

The modified form of apparatus illustrated in Figs. 14, 15 and 16 is best suited for the conditioning of molds in which the mold cavity extends entirely through the supporting body, for example that particular type of mold in which a cheek is employed. Thus, in Fig. 14, a complete mold comprising the three separate parts of the drag 70, the cope 71 and the cheek 72 are placed on the surface of the conveyor 73 in a position 90° rotated from their normal assembled position. In other words, the mold parts are placed on their sides on the conveyor, with the mold cavities facing outwardly; i. e. the mold cavities 70' of the drag 70 face outwardly toward one side of the conveyor 73, the cavities 71' of the cope 71 face toward the other side of the conveyor 73, and the through cavities 72' of the cheek face toward both sides of the conveyor.

Air ducts 74 and 75 are mounted on the interior of each of the vertical side walls of the oven 1'. A recirculating or return duct 76 is mounted in the top horizontal or ceiling wall of the oven 1'. Air stream directing nozzles 77 and 78 are mounted in the opposed walls of the ducts 74 and 75. Receiving openings, such as generally indicated at 79, are provided in the bottom wall of the return duct 76.

Thus, as best shown in Figs. 15 and 16, the forcibly projected streams of heated (or cooled, as the case may be) air travels from the nozzles 77 and 78 into and out of the interior of the mold cavities 70', 71' and 72', effecting a uniform contact with the mold cavity surfaces, and speedily effecting the desired mold conditioning treatment, without any baffling action which would otherwise result in an over-drying or an under-drying of particular surface zones.

It is believed that the operation of the apparatus will be apparent from the foregoing and it will be sufficient to point out that as the molds are carried through the housing or oven portions 9 and 10 the mold surfaces will be subjected progressively to the action of a plurality of forcibly projected streams of air issuing from the nozzles located in such oven portions. The molds, while in the oven part 9, will be subjected to the drying action of a plurality of streams of air delivered in a blast from the nozzles 12 to the surfaces of the molds. Thereafter, such surfaces will be subjected to the cooling action of a plurality of streams of air delivered in a blast from the nozzles 18 and the mold flasks subjected to cooling air streams from the nozzles 18a.

When drying the sand in a sand mold, the problem is presented of first getting the drying heat to the place where it is most desired, viz., the surface of the mold cavity, and secondly of getting the heat out of the sand, as well as out of the metallic mold flasks where some of it is bound to have penetrated, so that the mold bodies, after discharge from the drying oven, are in a condition that workmen can get near them and handle them as promptly as possible.

In the present process, it is especially to be noted that this problem is solved by first of all directing the drying heat against the sand mold surfaces only, and then directing the cooling air against both the sand mold surfaces and the mold flasks, so that when the mold, as a whole, or the mold body is discharged from the conditioning oven, it is immediately ready to be handled.

As previously indicated the present improved method and apparatus is adapted to the conditioning of molds and the like. Accordingly, the term mold as used herein will be understood equally to include cores and the term flask equally to include flask parts such as copes and drags as well as boxes such as are ordinarily employed in forming cores.

In the annexed drawings and in the foregoing description of the apparatus, it will be noted that I have shown the oven 1 as being constructed in the form of substantially one integral, continuous unit, but it will be equally well apparent to those skilled in the art, that the individual conditioning or treatment zones may be separated or divided from each other, as a matter of lay-out design and engineering convenience, without violating the spirit of my invention.

The delivery of the air in streams which impinge on the mold surfaces is particularly desirable and effective in securing the desired results in that all of the mold surfaces are subjected uniformly to the action of the air. By causing the air to be delivered to the mold surface in a plurality of streams, parts of the mold do not act as baffles in preventing the air from contacting other parts of the mold. By treating the molds in the manner described above, it is possible to get a mold in which substantially all the disadvantages of green sand molds have been eliminated. Moreover, the resultant mold will be found to be as effective and desirable as a dried sand mold, and the apparatus used enables such mold to be produced with less expense than to produce a skin dried mold as conventionally practiced. The particular action provided by this invention gives a mold which is in the nature of a skin dried mold, but which by reason of the uniform condition of the mold surfaces and great depth of penetration of the drying action, eliminates the disadvantages of skin dried molds as heretofore produced. This invention thus enables the production of a mold by surface treatment which heretofore had to rely on a slow baking process for its production.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the means and the steps herein disclosed, provided those stated by any of the following claims or their equivalents be employed.

I therefore particularly point out and distinctly claim as my invention:

1. The method of conditioning sand molds having mold flasks and mold forming surfaces which comprises conveying the molds through an oven, and while so conveyed, first subjecting the mold forming surfaces only to the action of a plurality of jets respectively adapted to deliver

a forcibly projected stream of heating and drying medium against such surfaces, and then subjecting both the mold forming surfaces and the mold flasks to the action of a plurality of jets respectively adapted to deliver a forcibly projected stream of cooling medium against such surfaces and against the mold flasks.

2. The method of conditioning sand molds having mold flasks and mold forming surfaces which comprises conveying the molds through an oven, and during the initial travel of the molds through the oven, subjecting the mold forming surfaces only to the heating and drying action of forcibly projected streams of hot air forcibly projected against such surfaces, and during the final travel through the oven, subjecting both the mold forming surfaces and the mold flasks to the cooling action of forcibly projected streams of relatively cold air impinging thereagainst, while exhausting air from the oven at a point intermediate those portions of initial and final travel to prevent air from one of such portions from traveling directly into the other of such portions.

3. The method of conditioning sand molds having mold flasks and mold cavities, which comprises conveying the molds through an oven, and during the initial travel of the molds through the oven, subjecting the mold cavities to the action of a plurality of jets respectively adapted to deliver a stream of hot air into and against the interior surfaces of said mold cavities, and during the final travel of the molds through the oven, subjecting both the mold cavities and the mold flasks to the action of a plurality of jets respectively adapted to deliver streams of relatively cold air into and against the surfaces of said mold cavities and against the outer surfaces of said mold flasks, while exhausting air from the oven at a point intermediate said hot and cold jets to prevent said different jets from interfering with the action of each other.

4. In mold conditioning apparatus, the combination of an oven having a continuous conveyor extending therethrough for conveying molds through said oven, an air delivery duct and an air recirculating duct both extending beside each other along a portion of said oven, means for delivering heated air to said delivery duct, said recirculating duct being connected to the inlet of said heated air delivery means, a plurality of nozzles spaced along said delivery duct longitudinally of said oven respectively operable to deliver a stream of heated air from said duct to the mold surfaces as the molds are carried thereby by said conveyor, said recirculating duct having openings for receiving the air from said nozzles after contact with said mold surfaces, a second air delivery duct extending along a second portion of said oven, a plurality of nozzles spaced along said second delivery duct longitudinally of said oven respectively operable to deliver a stream of cooling air from said second duct to the mold surfaces as the molds are carried thereby by said conveyor, and means for exhausting air from said oven at a point in said oven longitudinally intermediate said delivery ducts to prevent the air being delivered from one of said delivery ducts from interfering with the action of the air being delivered from the other of said delivery ducts.

5. In a mold conditioning apparatus, the combination with an oven having entrance and exit openings, and a continuous conveyor extending therethrough for carrying molds through said oven, of an air delivery duct extending longitudinally along said oven and terminating adjacent said entrance opening, heating means for delivering heated air to said delivery duct, a plurality of nozzles along the extent of said delivery duct for delivering streams of air from said duct to the mold surfaces, an air recirculating duct extending alongside said delivery duct and connected to the inlet of said heating means, said recirculating duct having openings for receiving the air from said nozzles after contact with said mold surfaces, cooling means adjacent said exit opening for delivering a stream of cold air to the mold surfaces prior to being carried out of said oven, and exhaust means connected to said oven at a zone intermediate said delivery duct and said cooling means for withdrawing both cold and hot air from said oven.

6. In a mold conditioning apparatus, the combination with an oven having entrance and exit openings, and a continuous conveyor extending therethrough for carrying molds through said oven, of an air delivery duct extending longitudinally along said oven and terminating adjacent said entrance opening, heating means for delivering heated air to said delivery duct, a plurality of nozzles along the extent of said delivery duct for delivering streams of air from said delivery duct to the mold surfaces, an air recirculating duct extending alongside said delivery duct and connected to the inlet of said heating means, said recirculating duct having openings for receiving the air from said nozzles after contact with said mold surfaces, a second air delivery duct extending along said oven and terminating adjacent said exit opening, a plurality of downwardly and horizontally directed nozzles located along said second delivery duct for delivering streams of cold air to the mold surfaces prior to being carried out of said oven, exhaust means connected to said oven at a zone intermediate said first and second delivery ducts for withdrawing both cold and hot air from said oven, and a duct for delivering such withdrawn air from said exhaust means to said heating means for reheating and recirculation through said oven.

7. The method of conditioning sand molds and the like having mold flasks and mold forming surfaces, which comprises first subjecting such surfaces only of the mold to a forcibly projected stream of heating and drying medium impinging against such surfaces, and then subjecting both such surfaces and the mold flask to a forcibly projected stream of cooling medium impinging against such surfaces and against the mold flasks.

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