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INDEPENDENT ZONE PLAN FOR CONTINUOUS FOUNDRY OPERATIONS.

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1,421,305.

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Fig. 1.

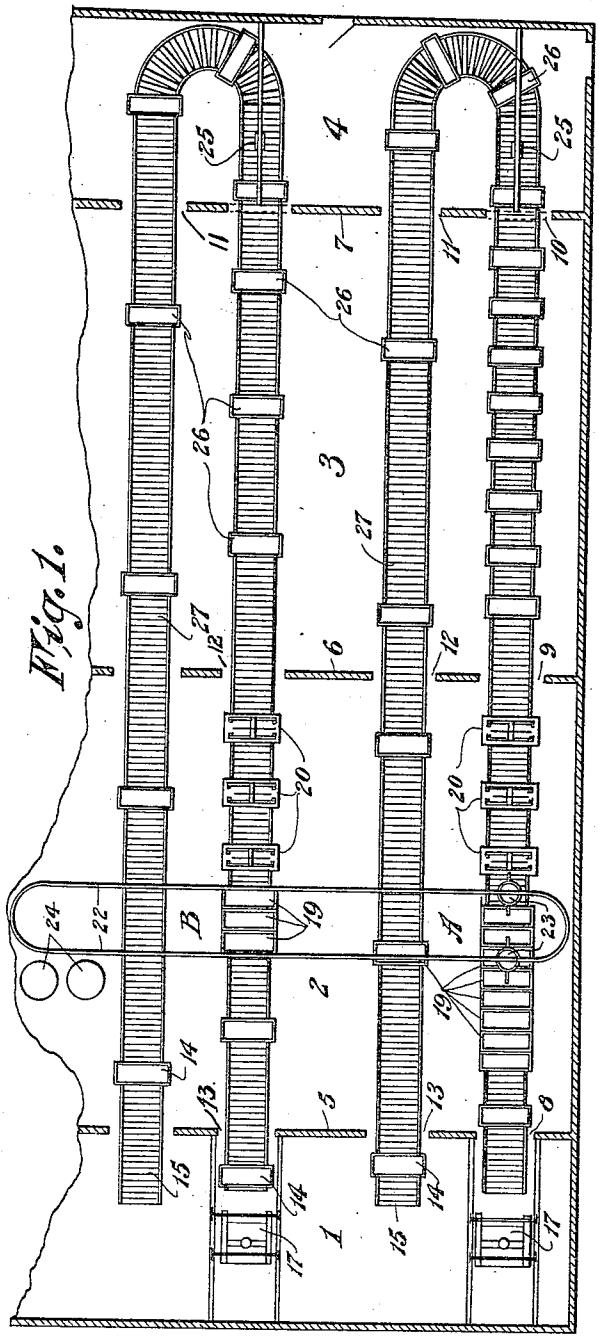
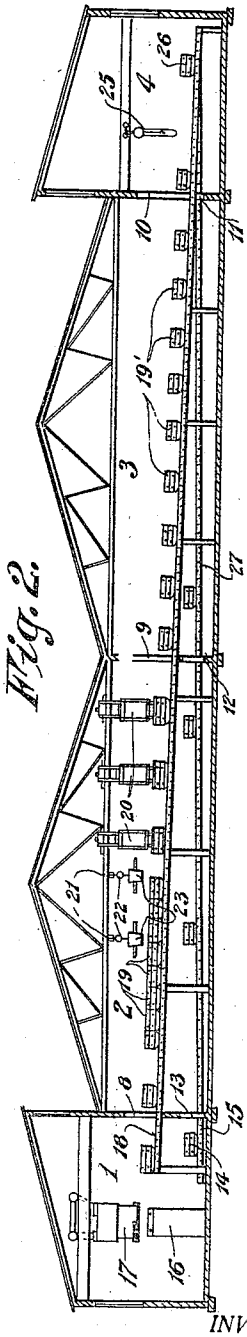


Fig. 2.



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To all whom it may concern:

Be it known that I, CLARENCE K. PRINCE, a citizen of the United States of America, residing at Westfield, in the county of Hampden and Commonwealth of Massachusetts, have invented certain new and useful Improvements in an Independent Zone Plan for Continuous Foundry Operations, of which the following is a specification.

This invention relates to the method of and apparatus for carrying out foundry operations, in which one or more molding, weighting and pouring, cooling, and dumping units are installed in a building which is divided into separate zones, whereby each of the operations are designed to be carried out independently of the others.

The invention, broadly considered, relates to the employment or installation of the apparatus shown in my prior United States Letters Patent, entitled "Method of and apparatus for making and handling castings," dated July 27, 1920, No. 1,347,552, in which is fully described and claimed the complete apparatus for making and handling castings, which comprises or constitutes the molding operations, the weighting and pouring operations, the dumping of the finished castings, and the automatic means, comprising a gravity runway, for returning the empty flasks to the molding or starting station.

An object of the present invention is to permit the continuous carrying out of the above named operations and independently of each other by locating the apparatus for carrying out the different steps in the operations in different zones or stations in a building, whereby each group of the workmen employed in or located at each of these zones is enabled to perform its individual duties without being interfered with by any group employed at any of the other zones or stations.

In the present state of the art it is a common practice for the workmen performing the above mentioned operations, at certain times to operate in the same room, causing a confusion of effort and a resulting loss in efficiency and production. In the usual foundry organization the molder, for instance, is called upon to assist in the pouring and dumping, reducing his output as a molder. Also in the usual foundry, at pouring time, the room is filled with heated gases and dust which again result in lessened production because of the unfavorable conditions presented for productive effort. Frequently organizations have been attempted which permit a continuous effort of the several workmen employed in the different positions, but heretofore they have been handicapped in producing the efficiency desired because of the impossibility of properly separating each effort, and thereby securing a continuous effort of each group of workmen independently of the progress of other groups performing the different operations in the process.

The main objects of the present invention are to make each group of foundry workmen continuously perform its duties independently of any delay or confusion resulting from the efforts of other groups, consequently producing a higher efficiency, increased production, materially reduced costs, and a better organization. In the present invention also, each unit as installed is independent of the others and can be operated as a separate unit, in case of repairs or curtailment of production.

In the present invention, also, all operations while independent of each other are continuous and the plant as a whole can be operated continuously, by the introduction of different shifts of workmen, without being obliged to stop for a balancing effect of any group.

Also, the segregated groups working independently and continuously on the work for which they were hired and trained develops an efficiency not possible under the mixed efforts of former foundry organization. This new arrangement also, because of its ability to focus or concentrate each kind of effort in the process, eliminates a large part of the nonproductive common labor employed in foundries operating on the usual basis, resulting in a reduced cost for the same output.

In this plan each operation proceeds continuously, independently, and always in the same place. Mechanical aids to the various efforts can be readily designed and permanently installed; which was seldom possible under the older forms of foundry organization with their dispersed operations.

Referring to the drawings:

Fig. 1 is a plan view showing, in general, the arrangement of the foundry units of which two are shown, and the zones or stations of the building through which the

units pass and in which the different groups of workmen are stationed.

Fig. 2 is a side elevational view of Fig. 1 showing, in general, the molding, weighting and pouring, cooling, and dumping steps of each of the units, and the gravity return portion of the track for the empty flasks to automatically return to the molding room.

Referring to the drawings in detail: 1, 2, 3, and 4, designate the different zones or stations of a foundry building, in which the complete and independent units for carrying out the foundry operations are installed, two of the units being indicated at A and B; and 1 being the zone or room in which the molding operations are carried out; 2 the weighting and pouring room; 3 the cooling room; and 4 the dumping or discharging room. From this room the empty flasks are returned by means of the gravity runway to the molding room.

The different zones or stations in the building are separated by means of the partition walls indicated at 5, 6, and 7, and in these walls are formed openings 8, 9, 10, 11, 12, and 13, through which the different portions of the units A and B of the gravity runway apparatus extend and which also allow the molds on the runway to move thereon. By this distinct separation into zones, there is obtained an independence of effort of the several groups of workmen, each group being separate and distinct from the other; further, each group of workmen operate continuously for the full length of the working day, on the particular kind of work for which they are employed and trained, this latter feature, it is obvious resulting in greatly increased production. Another decided feature of this invention is that the gas burns off of the mold in the cooling room, said gas being practically confined within this room, or zone, the other zones being free of this disadvantage to the workmen. By the use of this invention, about fifty-five per cent of the common lifting labor heretofore employed whose services are inefficient, are dispensed with due to the balancing of the different processes of the several operations.

In the zone or station designated at 1 are placed or assembled the molders or workmen who build up the complete flask by removing the emptied returned flasks 14 from the lower end 15 of the gravity runway. These flasks are then placed on the molding platform 16 and when finished are conveyed by means similar to the overhead conveyor 17 onto the receiving end portions 18 of the different gravity runway units. The completed flasks are then conveyed or moved through the openings 8 into the room 2 where they are collected, as indicated at 19 ready to be weighted and poured. Located in this zone are the weighting devices indicated at 20, which are located over the gravity runway and are designed to travel on the track 21 which is arranged directly over this portion of the gravity runway units. By the term "weighting" it is generally understood in foundry practice that a flask is weighted when the two parts, the cope and nowel, are held together by means of a weight placed directly thereon, or they are held together by clamping the two parts in place, which is a very common practice.

As shown in the drawings, the track 22 is used only for distributing and conveying the filled ladles 23 to the flasks. They are then detached and placed on the ground. The workmen then lift them from the ground and the pouring is done after weighting, which is the usual practice. Extending transversely of the different units A and B is the continuous overhead conveyor track 22 on which travel the distributing ladles 23 that convey the molten metal from the cupolas indicated at 24. After the pouring operations, the filled flasks 19′ are moved through the openings 9 in partition 6 into zone 3 which may be termed the cooling shed, where the gases and fumes escape through the roof or sides of the building to the outside air. After the castings have sufficiently cooled, the poured flasks are then moved by the workmen in this zone to the zone or station 4 where the flasks are dumped by hand or appropriate mechanical devices, indicated as a whole at 25. The empty flasks 26 are then returned to the molding zone or station 1, along the gravity runway portions of the units A and B, indicated at 27.

It will therefore be seen from this description that the different units, indicated by the letters A and B pass through all of the different zones or stations of the foundry building. Between each zone it is to be understood that sufficient length of gravity runway conveyor track is provided to serve as a storage space for the surplus or unbalanced production due to temporary stoppage in any one or more of the zones, and that the workmen that are located in each of the different zones or stations can continuously perform their individual duties independently of the workmen located in the other zones and that the operations are continuous without any loss of time on the part of the workmen in any of the different zones or sections of the building.

It is also to be observed that should one of the units, as A, become disabled, the other units can be readily used or utilized to take its place, without materially halting any of the operations in any of the zones, thereby enabling the men to be employed constantly without loss of time or production.

What I claim is:

1. In an apparatus of the kind described, the combination with a suitable structure di-

vided into a plurality of separated and independent zones or stations, of a continuous gravity runway unit extending through all of said zones, the portions of each unit located in the various zones each receiving the casting apparatus for carrying out one of the different foundry operations, said operations being carried out continuously and independently of each other, each in a distinct zone.

2. In an apparatus of the class described, the combination of a structure having separated and independent zones for carrying out the different steps of foundry operations, one or more gravity runway units extending through said zones for receiving and conveying the flasks thereon through the zones, and an overhead trackway positioned in the weighting and pouring zone and extending transversely of the runway units for conveying the molten material to the flasks on this section of the runway.

3. An apparatus for carrying out the assembling and casting operations in a foundry, which includes a structure having a plurality of separated and independent zones for carrying out said operations, a gravity runway extending through said zones, said zones including a zone for assembling the molds on the gravity runway, a zone for weighting and pouring the assembled flasks on said runway, and a zone for discharging the contents of the flasks and for returning the same to the runway, said runway having a portion which serves to automatically return the empty flasks to the assembling zone, said apparatus serving to permit the several operations to be carried out independently of each other.

4. A system for carrying out foundry operations namely, forming the mold, weighting and pouring, cooling, and dumping, including a plurality of separated and independent zones, a gravity runway having two inclined runway portions extending in opposite directions, one of the portions passing through each of the zones whereby the different foundry operations may be carried out separately and independently as described, and the other portion of the runway serving to return the empty flasks to the molding zone.

CLARENCE K. PRINCE.