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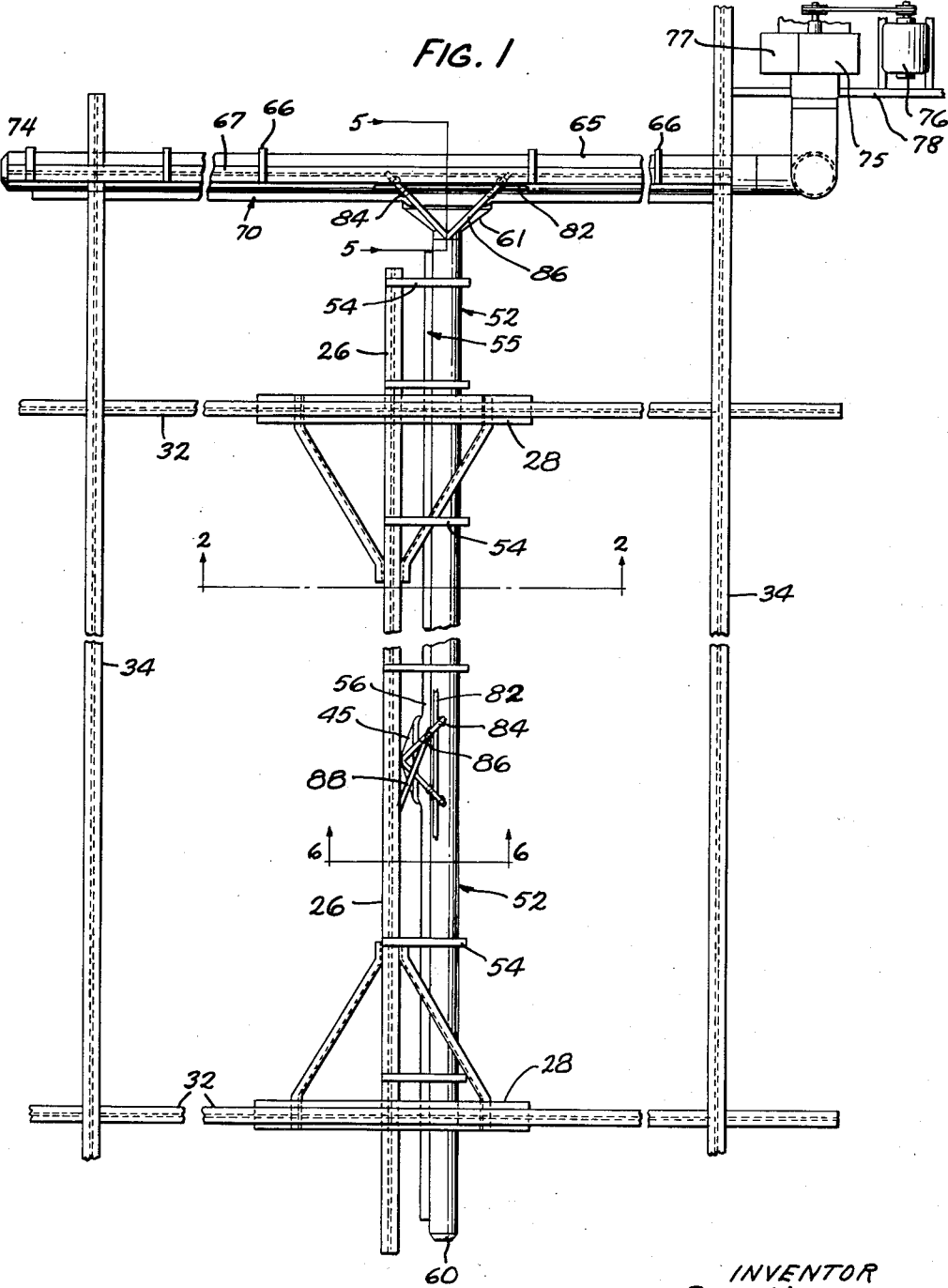
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EXHAUST SYSTEM FOR LADLES

Filed Nov. 13, 1950

3 Sheets-Sheet 1



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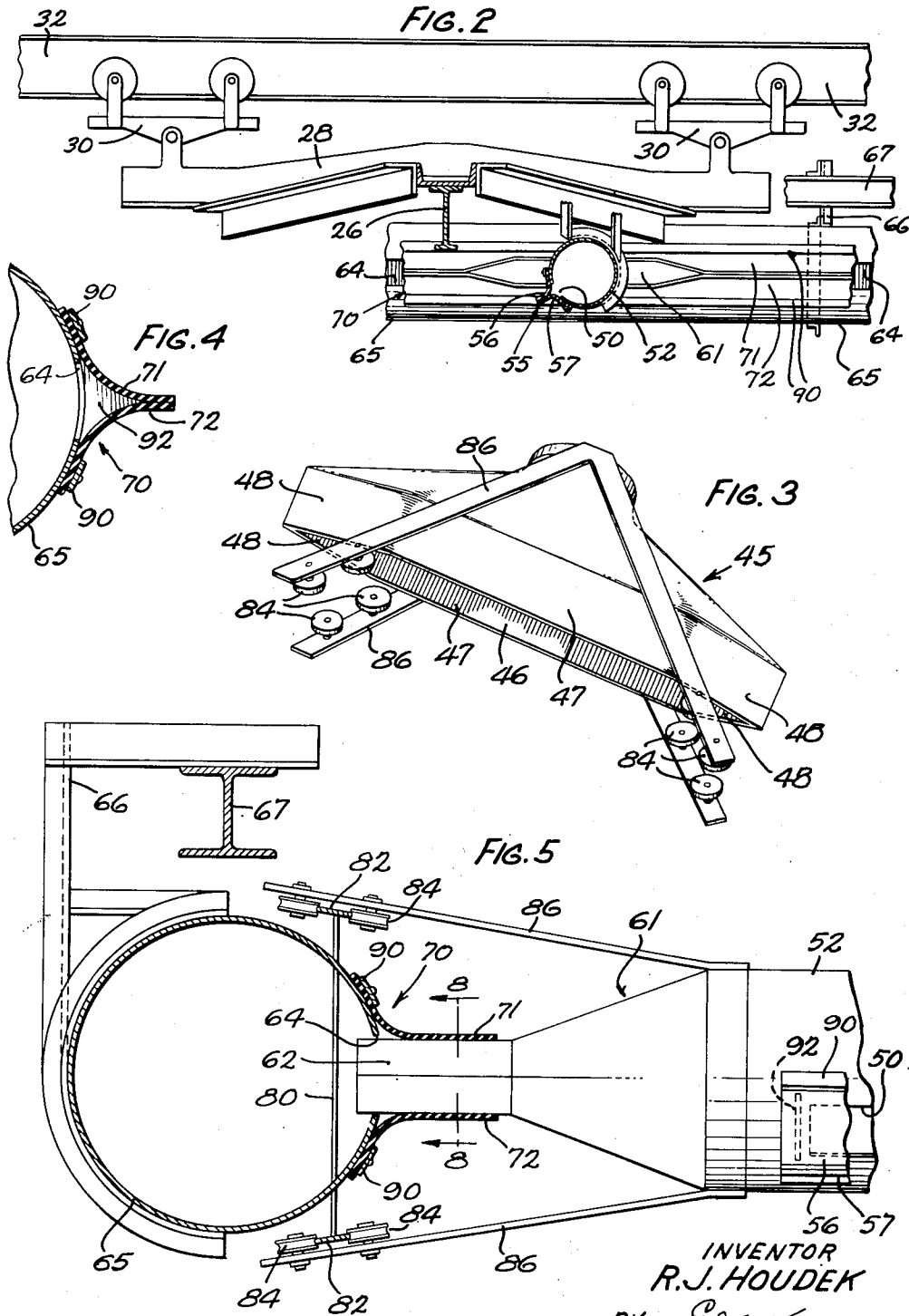
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3 Sheets-Sheet 2



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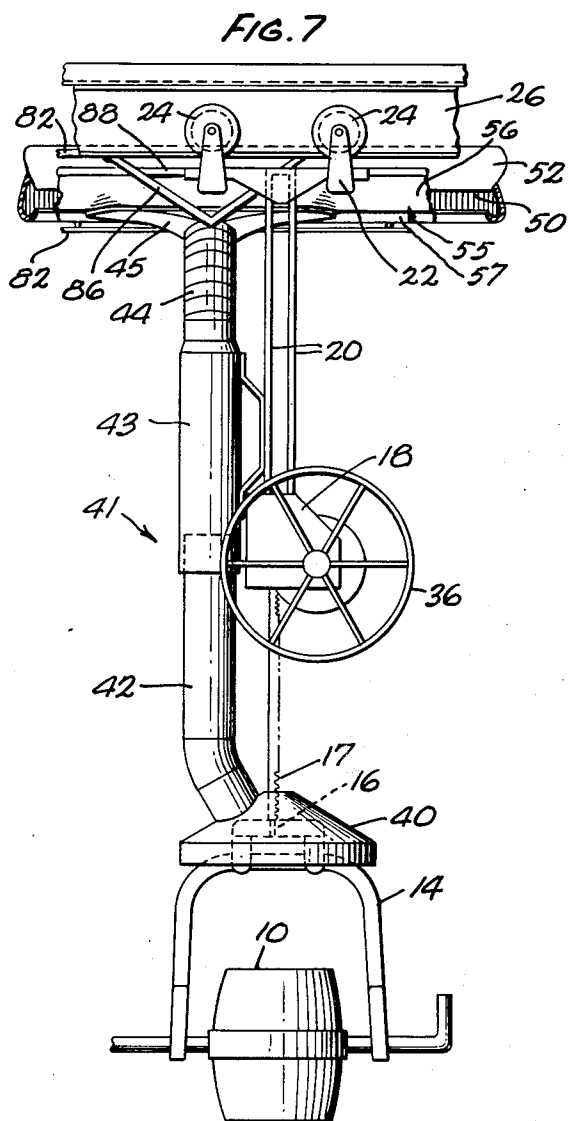
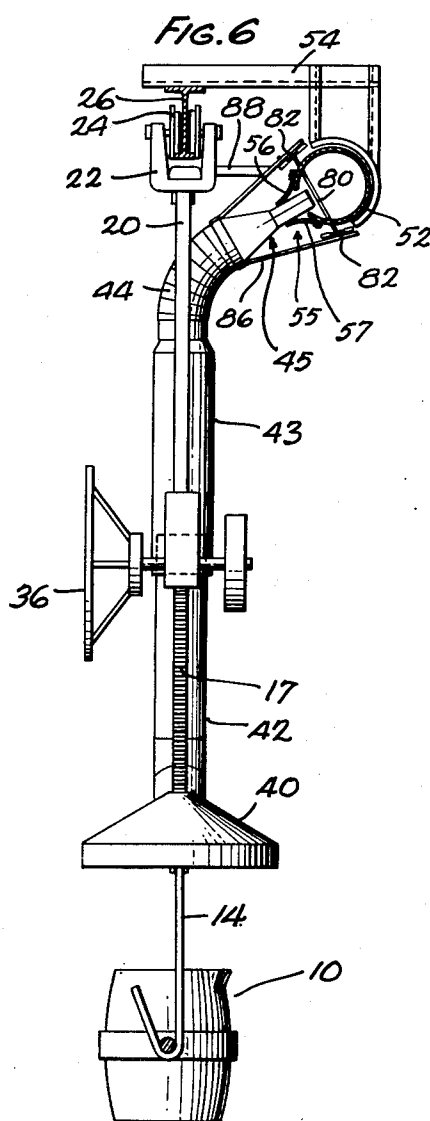
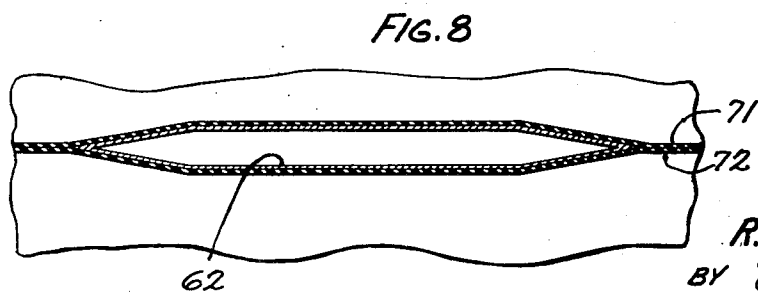
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EXHAUST SYSTEM FOR LADLES

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3 Sheets-Sheet 3



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2,693,749

EXHAUST SYSTEM FOR LADLES

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7 Claims. (Cl. 98—115)

This invention relates to exhaust systems and more particularly to a foundry exhaust system having an exhaust hood movable with the pouring ladle.

In foundry work, especially brass molding, disagreeable and obnoxious fumes are associated with the pouring of the molten metal, and it is desirable to confine these fumes and exhaust them from the foundry.

It is an object of the present invention to provide a simple system for effectively exhausting the gases from a movable container.

In accordance with one embodiment of the invention as applied to a crane supported ladle movable in one direction on a crane rail and transversely to said one direction with the crane, a hood is mounted above the ladle for movement therewith and has a nozzle extending into a longitudinal slot of a duct supported on the crane and extending parallel to the crane rail for transverse movement therewith. A nozzle on one end of the movable duct extends into a longitudinally extending slot in a stationary duct extending parallel to the path of movement of the movable duct, and having one end thereof connected to a fan for exhausting the gases from the interior of the ducts and hood. Each of the slots in the ducts is closed by a pair of flexible strips fixed along one edge portion to the ducts on opposite sides of the slot and having their other edge portions extending outwardly from the ducts into engagement with each other to form a seal which fits around the nozzle and permits longitudinal movement thereof.

Other objects and advantages of the invention will become apparent by reference to the following detailed description and the accompanying drawings illustrating a preferred embodiment thereof in which,

Fig. 1 is a plan view of the exhaust system applied to the superstructure and overhead crane of a foundry;

Fig. 2 is a fragmentary vertical sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a detailed perspective view of one of the nozzles of the exhaust system;

Fig. 4 is a detailed vertical sectional view through one of the ducts showing the flexible closure means for the slot therein;

Fig. 5 is a vertical sectional view through the stationary and movable ducts of the exhaust system taken on the line 5—5 of Fig. 1;

Fig. 6 is a vertical sectional view taken on a line 6—6 of Fig. 1 showing the ladle and a portion of the exhaust system associated therewith;

Fig. 7 is a side elevational view of the mechanism shown in Fig. 6 and,

Fig. 8 is a detailed sectional view through the nozzle and the flexible strips forming a seal between the nozzle and the ducts communicating therewith.

The exhaust system constituting the present invention is shown applied to a foundry having a ladle 10 (Figs. 6 and 7) supported by an overhead crane 12 for conveying the ladle horizontally and longitudinally above a plurality of molds arranged in rows, and for moving the ladle laterally from one row of molds to another of the rows of molds disposed in spaced relation to each other. The ladle 10, is supported for rocking movement in a hanger 14 which is swivelled at 16 to a rack bar 17 adjustably supported in a housing 18 which in turn is secured to the lower end of supporting members 20 suspended from a carrier 22. The carrier 22 has a plurality of rollers 24 which are supported by and ride on the lower flanges of a crane rail or bridge 26. Secured to the crane rail in

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spaced relation to each other are cross frames or heads 28 each of which is connected by carriers 30 to tracks 32 forming a runway for lateral movement of the crane. The rails 32 in turn are supported by overhead structural iron frame members 34 supported by suitable pillars or wall members of the foundry (not shown). The ladle 10 thus may be moved horizontally, longitudinally along the rows by manually moving the carrier 22 on the track 26, and may be moved laterally from one row to another by moving the crane 12 along the runway 32. In addition, the ladle 10 may be moved a limited distance vertically by means of a hand wheel 36 which is connected through a shaft and gear drive to the rack 17 for elevating or lowering the ladle.

The exhaust system for removing the fumes rising from the ladle 10 when filled with molten brass or other metal comprises a hood 40 fixed to the rack bar 17 in a position directly above the ladle 10. An upwardly extending conduit 41 communicating with the hood 40 is mounted on the carrier 22 for movement therewith and comprises a tubular member 42, a tubular member 43 fixed to the supports 20 and telescopically engaging the member 42, a flexible connection 44 and a nozzle 45. The nozzle 45 preferably made of sheet metal has a mouth 46 defined by a pair of flat wall members 47—47 spaced apart in parallel relation to each other and diverging walls 48—48 at each end thereof forming wedge-shaped surfaces at opposite sides of the mouth 46. The mouth 46 of the nozzle 45 fits into a longitudinally extending slot 50 of a cylindrical or tubular duct 52 extending parallel to the crane rail 26 and supported in fixed relation thereto for movement therewith by a plurality of supporting brackets 54. The conduit 52 and the crane rail 26 extend parallel and beyond the ends to the rows of molds to be filled (not shown), and the slot 50 in the duct extends substantially the full length of the conduit to permit movement of the carrier 22 and exhaust conduit 41 throughout the entire length of the rows of molds. A self-sealing closure 55 comprising a pair of flexible strips or flaps 56 and 57 (Figs. 4 and 5) are secured to the conduit to surround the mouth 46 of the nozzle 45 and seal the slot 50 in the interior of the conduit 52 from the entrance of atmosphere thereinto except through the nozzle.

The conduit is closed at 60 and at its other end is provided with a nozzle 61 substantially identical in structure with the nozzle 45. The mouth 62 of the nozzle 61 (Figs. 1 and 5) extends into a longitudinally extending slot 64 of a conduit 65 stationarily mounted parallel to the path of transverse movement of the nozzle 61. The conduit 65 is supported by a plurality of brackets 66 from an overhead structural frame member 67 suitably supported from the frame supporting members 34. A self-sealing closure 70 identical in construction to the closure 55 and comprising a pair of flexible strips 71 and 72 mounted on the duct 65 adjacent to the slot 64 and surrounding the mouth 62 of the nozzle 61 serves to seal the opening 65 in the interior of the duct from the passing of the atmosphere thereinto. Closed at one end 74, the duct 65 at its other end is connected to an exhaust fan 75 driven by a motor 76 and having an exhaust duct 77 extending upwardly through the roof of the foundry (not shown) to exhaust the fumes into the atmosphere. The fan 75 and motor 76 are suitably mounted on a platform 78 fixed to the structural frame members 34.

The ducts 52 and 65 adjacent the slots 50 and 64, respectively, are provided with a plurality of reinforcing rods 80 which pass through apertures in the ducts and are welded thereto for supporting the edges of the ducts adjacent the slots. To the projecting ends of the reinforcing rods 80 are welded guide tracks 82—82 which extend parallel to the ducts and are engaged on opposite edges by pairs of rollers 84 rotatably mounted on bracket arms 86. The bracket arms 86 are arranged in diverging pairs and are welded to the nozzles 45 and 61 on opposite sides thereof as indicated in Figs. 3 and 5 and serve in cooperation with the rollers 84 and the tracks 82 to guide the nozzles parallel to the ducts and to maintain the mouths of the nozzles within the slots of the ducts. An arm or bracket 88 secured to the carrier 86 on the

nozzle 45 (Figs. 1 and 6) serves to connect the nozzle 45 to the carrier 22 for movement therewith along the duct 52.

The flaps 56, 57, 71 and 72 of the closures 55 and 70 are made from flat flexible strips of material, such as rubber, which are clamped along each edge portion thereof between the duct and a clamping strip of metal 96 which is riveted or otherwise secured to the duct. The flaps or strips are flexed outwardly as indicated in Fig. 4 with the inner faces of the free edge portions of the strips engaging each other to form a seal for preventing the passage of atmosphere into the duct through the slot 50 except through the nozzles. The diverging surfaces 48-48 of the end portion of the nozzle 45 are adapted to separate the closure strips 56 and 57 at one side of the nozzle and to guide the strips into engagement with each other at the other side of the nozzle as it is moved along the duct. The closure strips 56 and 57 and 71, 72 engage and conform to the outline of the mouth portion of the nozzles as indicated in Fig. 8 and provide an effective seal between the nozzles and the ducts while the nozzles are moving or at rest. To seal the ends of the strips 56, 57 and 71, 72 plates 92 (Figs. 4 and 5) are provided which are fixed to and extend outwardly from the ducts 52 and 65 at positions located beyond the ends of the slots therein and have curved edges which conform to and engage the inner faces of sealing strips. The mouth of end portions of the nozzles with their relatively narrow opening formed by the parallel walls 46 and 47, and the two opposing pairs of sloping surfaces formed by the diverging walls 48 meeting in lines disposed at the meeting planes of the sealing strips of the ducts, cooperate with the strips so that the strips will engage the outer surface of the forward position of the nozzle throughout its entire width, forming an effective seal for excluding the entrance of air into the slot of the duct except through the nozzle.

From the above it may be seen that an efficient and effective exhaust system is provided for exhausting the fumes from the pouring ladle, the structure having a minimum number of parts so arranged as to permit the exhaust hood mounted above the pouring ladle to follow the movements of the ladle during the pouring operation. Vertical movement of the hood is permitted by the telescoping arrangement of the conduit sections 42 and 43, and the flexible connection 44 between the nozzle 45 and the conduit section 43 permits a limited rocking movement transversely about the crane rail. As the carrier and ladle are moved longitudinally along the crane rail, the nozzle 45 moves relative to the duct 52 and the sloping outer surfaces of the nozzle serves to separate the strips at the forward end of the nozzle and permit the strips to close into engagement with each other at the rearward portion of the nozzle while maintaining an effective seal therearound. During the transverse movement of the ladle and the crane supporting the ladle, the movable duct 52 moves with the crane and the nozzle 61 thereon moves relative to the stationary duct 65, and the outer surfaces of the mouth portion of the nozzle with its streamlined contour cooperates with the sealing strips 71 and 72 to effectively seal the nozzle to the duct 65 while permitting relative longitudinal movement therebetween. Thus in any position of the pouring ladle 10 communication between the exhaust hood 40 and the exhaust fan 75 and outlet 77 is established to exhaust the fumes from the ladle.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. An exhaust apparatus for use in foundries having an overhead rail and a carrier mounted on said rail for supporting a pouring ladle for movement along said rail comprising a tubular duct mounted parallel to said rail and having a longitudinally extending slot therein, a conduit supported on said carrier for movement therewith having a hood at one end positioned above said pouring ladle and having a nozzle extending into the slot of said duct, and means for sealing said slot around the nozzle comprising a pair of flexible strips mounted on said duct on opposite sides of said slot and having portions thereof flexed outwardly from the duct to cause the marginal portion of one face of each of the pair of

strips to be urged into engagement with each other and the nozzle, and means for exhausting the atmosphere from said duct.

2. An exhaust system for use in foundries having an overhead track and a carrier suspended from said track for supporting a pouring ladle for movement parallel to said track, the combination therewith of conduit means supported by said carrier forming a hood above said pouring ladle for receiving the gases therefrom and a nozzle for discharging said gases, a tubular duct mounted parallel to said track and having a longitudinal slot therein parallel to the track for receiving the end of the nozzle, means for sealing said slot around said nozzle and permitting longitudinal movement thereof comprising a pair of normally flat flexible strips disposed on opposite sides of the slots and secured along one longitudinal edge of each strip to said duct with the strips flexed outwardly from the ducts to cause the marginal portions of one face of each of the pair of strips to be urged into engagement with each other along a meeting plane and in engagement with said nozzle on opposite sides thereof, said nozzle having cooperating sealing surfaces engageable with said strips including two opposed pairs of sloping surfaces meeting at edges in the meeting plane of said flexible strips for separating said strips as the nozzle is moved in said slot, and means for exhausting the atmosphere in said duct.

3. In an apparatus of the class described the combination of a crane, a runway for supporting said crane for movement in one direction, a carrier for supporting a pouring ladle, a rail on said crane for supporting said carrier for movement transversely to the movement of said crane, a hood supported by said carrier above said pouring ladle, a conduit extending upwardly from said hood having a nozzle at its upper end, a duct mounted on said crane parallel to said crane rail for movement therewith, said duct having a longitudinally extending slot for receiving said conduit nozzle therein, means for closing said slot around said nozzle and permitting movement of said nozzle longitudinally of said duct, said duct having a discharge nozzle, a stationary duct having a longitudinally extending slot therein for receiving the nozzle on said movable duct, means mounting said stationary duct parallel to the direction of movement of said crane and said nozzle on said movable duct, means for closing the slot on said stationary duct around the nozzle communicating with said slot and permitting longitudinal movement of said nozzle relative to said duct, and means for exhausting the atmosphere from said stationary duct.

4. An exhaust apparatus for a movable container carried by a support which is guided for reciprocal movement in a first direction by a first means which in turn is guided for reciprocal movement in a second direction transversely to said first direction by a second means, said exhaust apparatus comprising a movable duct mounted on said first means parallel to movement of said container in said first direction, said movable duct having a longitudinally extending slot therein parallel to the movement of said container in said first direction, a conduit carried by said support for movement with said container for receiving the gases therefrom and having a discharge nozzle extending into the slot in said movable duct, means for closing said slot around said nozzle including a pair of flexible strips on said duct on opposite sides of said slot having portions thereof extending outwardly from said duct into engagement with each other and the outer surfaces of the nozzle, said movable duct having one end thereof closed and a nozzle on the other end thereof, a stationary duct mounted parallel to the movement of said first means and said movable duct in said second direction, said stationary duct having a longitudinally extending slot therein extending parallel to said movement of said movable duct in said second direction for receiving the nozzle on said movable duct, means for closing the slot in said stationary duct about the nozzle on said movable duct comprising a pair of flexible strips on said stationary duct on opposite sides of said slot having portions extending outwardly from said duct into engagement with each other and with the exterior surfaces of the nozzle on said movable duct, and means for exhausting the atmosphere from said stationary duct.

5. In an apparatus of the class described, the combination of a crane, a runway for supporting said crane for movement in one direction, a carrier for supporting a pouring ladle, a rail on said crane for supporting said

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carrier for movement therealong in a second direction transversely to said first direction, a conduit supported by said carrier for receiving the fumes from said ladle and having a discharged nozzle thereon, a movable duct mounted on said crane parallel to said crane rail for movement therewith in said first direction, said movable duct having a longitudinally extending slot therein parallel to said rail for receiving the conduit nozzle therein and having a discharged nozzle, a stationary duct having a longitudinal slot therein parallel to the movement of said crane and said movable duct for receiving the nozzle of said movable duct therein, means for exhausting the atmosphere from said stationary duct, and means on said ducts for closing said slots around said nozzles extending thereinto and permitting movement of said nozzles longitudinally of said ducts, said means comprising a pair of flexible strips on each of said ducts on opposite sides of said slots therein having portions extending outwardly from the ducts into engagement with each other and the outer surfaces of the nozzle associated therewith, said strips being flexed to a normal closed position in engagement with each other and being separable from each other by said nozzle when said nozzle is moved longitudinally of said duct, each of said nozzles having a contour engageable with said strips including two pairs of oppositely directed converging surfaces meeting at the meeting surfaces of said strips.

6. An exhaust apparatus for use in foundries and the like having a crane, a runway for supporting said crane for movement in one direction, a carrier for supporting a container, a rail on said crane for supporting said carrier for movement therealong in a second direction transversely to said one direction, the combination therewith of a conduit mounted on said carrier for receiving gases from said container and having a tubular portion mounted on said carrier, a discharged nozzle, and a flexible portion interconnecting said nozzle and said tubular portion, a movable duct mounted on said crane for movement in said second direction therewith and having a longitudinally extending slot therein parallel to said rail for receiving the conduit nozzle therein, a discharged nozzle on said movable duct, a pair of tracks mounted on said movable duct on opposite sides of said slot, guide means attached to said conduit nozzle and engageable with said rails for supporting said nozzle for movement longitudinally in said slot, means on said carrier connecting said guide means thereto for moving said nozzle therewith along said rail, a stationary duct having a longitudinally extending slot therein parallel to the movement of said crane and said movable duct in said one direction for receiving the discharged nozzle of said movable duct therein, means connected to said stationary duct for exhausting the atmosphere therefrom, and means on each of said ducts for closing the slot therein around the nozzles and permitting longitudinal movement of the nozzles therein, said closing means including a pair of flexible strips on each of said ducts on opposite sides of

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said slots having a portion thereof extending outwardly from the duct into engagement with each other and the outer surfaces of the nozzles associated therewith, each of said nozzles having a contour engageable with said strips including two pairs of oppositely directed converging surfaces meeting at the meeting surface of said sealing strips capable of effecting the separation and closing of said strips while maintaining a sealing engagement therewith as the nozzle is moved longitudinally of the ducts.

7. A gas conducting apparatus for a movable container carried by a support which is guided for reciprocal movement in a first direction by a first means which in turn is guided for reciprocal movement in a second direction transversely to said first direction by a second means, said apparatus comprising a movable duct mounted on said first means parallel to movement of said container in said first direction, said movable duct having a longitudinally extending slot therein parallel to the movement of said container in said first direction, a conduit movable with said container and having a discharge nozzle extending into the slot in said movable duct, means for closing said slot around said nozzle including a pair of flexible strips on said duct on opposite sides of said slot having portions thereof extending outwardly from said duct into engagement with each other and the outer surfaces of the nozzle, said movable duct having a nozzle, a stationary duct mounted parallel to the movement of said first means and said movable duct in said second direction, said stationary duct having a longitudinally extending slot therein extending parallel to the movement of said movable duct in said second direction for receiving the nozzle on said movable duct, means for closing the slot in said stationary duct about the nozzle on said movable duct comprising a pair of flexible strips on said stationary duct on opposite sides of said slot having portions extending outwardly from said duct into engagement with each other and with the exterior surfaces of the nozzle on said movable duct, and means for causing the flow of the atmosphere in said stationary duct.

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