

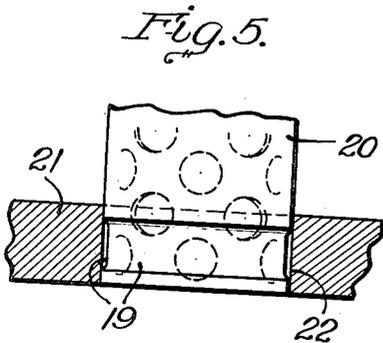
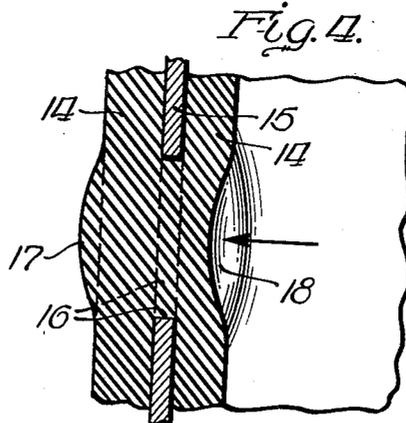
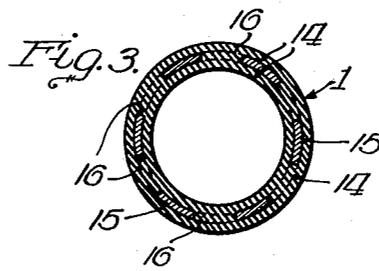
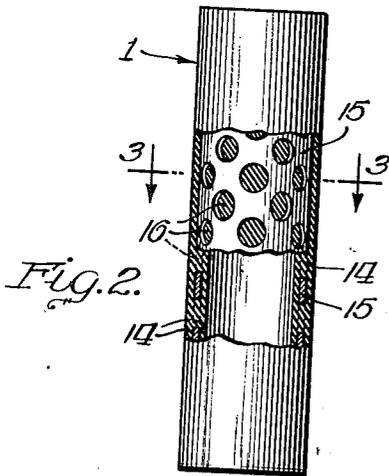
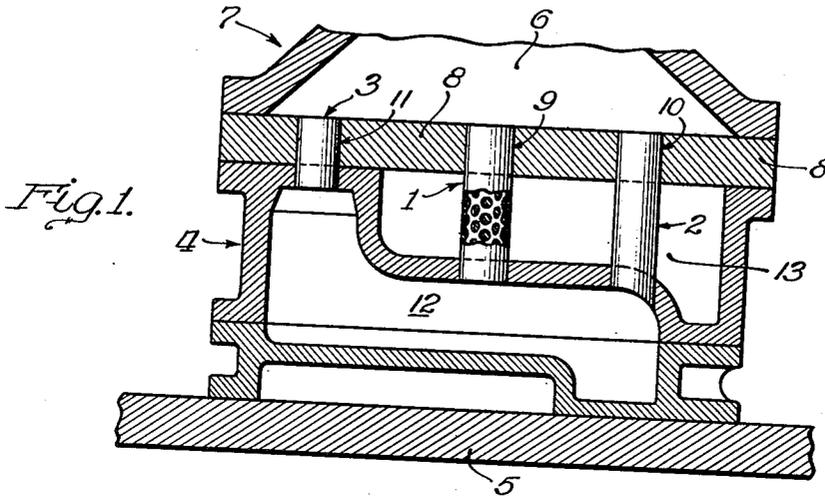
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BLOW TUBE FOR CORE BOXES

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2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 6.

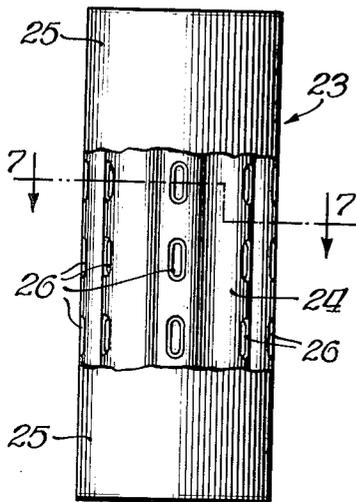


Fig. 7.

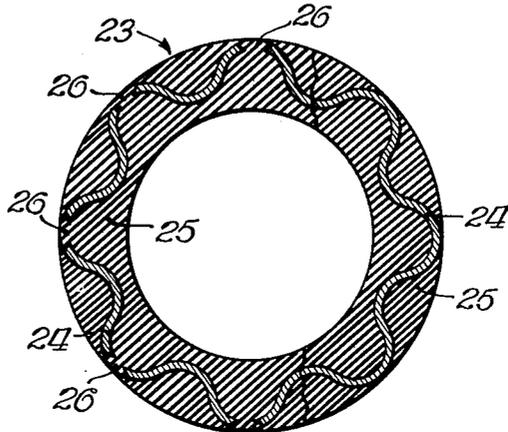


Fig. 9.

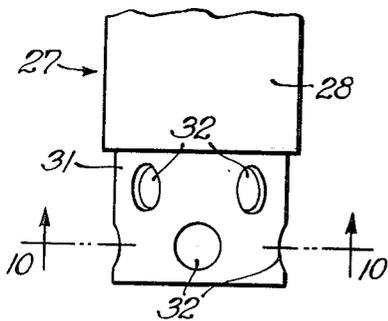


Fig. 8.

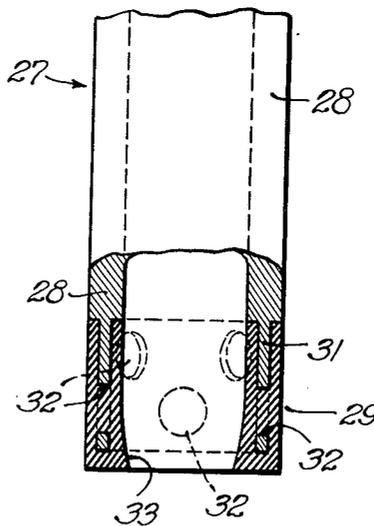
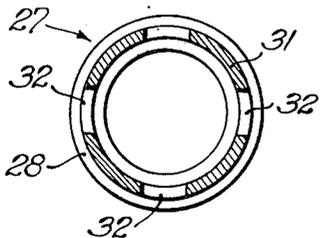


Fig. 10.



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BLOW TUBE FOR CORE BOXES

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4 Claims. (Cl. 22-10)

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This invention relates to sand conducting tubes of the type used between a sand supply box of a core blowing machine and a core box adapted for producing a core of sand after it is filled by sand directed into the box from the sand box through such tubes.

It has been difficult to obtain substantial, efficient and long lasting tubes for this purpose. Metal tubes require close tolerances to fit same into openings in the blow plate of a sand box and in the core box. And such metal tubes have a relatively short life due to the abrasive action of the air actuated sand while in use making such tubes relatively costly and causing delays for replacements.

Tubes of resilient material do resist the abrasive action of the airborne sand for a long time and for comparison, approximately ten times as long as a metal tube. But such tubes are also unsatisfactory since they must be made with a very thick wall increasing the cost of such a tube and requiring large diameter holes in the blow plate and core box that are not practical for holding the tube ends under the pressures used in a sand system adapted for making sand cores. Any attempt to thin out a resilient tube will cause such a tube to shorten while in operation thus directly tending to draw the ends of such a tube free from within the opening holding same leading to looseness and unsatisfactory cores.

The tube of the present invention has been designed to overcome these unsatisfactory characteristics of the metal and resilient tubes by providing a combination tube incorporating the desirable features of each kind of tube. As a main object of this invention, therefore, the sand conducting blow tube is made with a hollow resilient body containing a metal reinforcement sleeve as a stiffener, the latter being completely embedded within the resilient body to protect the metal from the abrasive action of the sand. The metal provides the stiffness for the tube to permit the use of a thin walled resilient tube.

Another object of this invention is to produce a composite tube of resilient and hard materials which can be bonded together as an integral unitary structure. Another feature is to use a perforated or otherwise openwork metal framework or sleeve for the spine of the rubber tube whereby the molded rubber of the resilient tube portion joins the adjacent portions of the tube through such openings.

A tube constructed with a rubber body for the resilient material introduces another feature that

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makes the newly designed perforated metal tube an ideal structure for the purpose for which the tube is used. Under operative pressure, the resilient tube dimples radially outwardly at the metal tube perforations so that the body of sand moving through the tube is grasped by the rubber areas adjacent the perforations the moment pressure is released in the tube and sand system. This release of pressure thus causes the tube to hold the sand column in the tube by means of the interior tube areas at the perforations resuming their normal positions acting radially inwardly against the sand. This action of the tube of this invention prevents the objectionable formation of stems on sand cores.

Other objects of this invention reside in the use of metal reinforcement tubes of different configurations, one example being a tube having vertically disposed corrugations. A still further variation of the same principle is to apply a partial rubber and metal tube combination upon a given length of a metal tube.

Other objects and advantages relating to a core sand blow tube of the above indicated composite design shall hereinafter be referred to in the following detailed description having reference to the drawings forming a part of this specification.

In the drawings:

Fig. 1 is a vertical cross sectional view of fragmentary portion of a core making machine illustrating the use of the blow tubes of this invention as conduits for directing sand from a sand box into a machine supported core box;

Fig. 2 is an enlarged side elevational view of a tube partially broken away and in section to show the detail structure thereof;

Fig. 3 is a transverse cross sectional view of the tube as seen substantially along the line 3-3 in Fig. 2;

Fig. 4 is an enlarged fragmentary sectional view of a portion of the tube wall to show the gripping action that is possible in a tube using a perforated sleeve as a structural insert;

Fig. 5 shows a tube end designed to bring the sand grasping feature substantially to the outlet end of the tube;

Fig. 6 is a side elevational view of a tube of modified construction;

Fig. 7 is a transverse cross sectional view of the tube in Fig. 6 as seen along the plane of the line 7-7 in Fig. 6;

Fig. 8 is a fragmentary cross sectional view of a tube end to show a modified tube that uses only a partial rubber and metal section;

Fig. 9 is a side elevational view of the metal

portion of the Fig. 8 construction; while Fig. 10 is a transverse cross sectional view of the reduced and perforated metal end of the Fig. 8 tube substantially as seen along the plane of the line 10—10 in Fig. 9.

Referring to Fig. 1, a number of blow tubes 1, 2 and 3 are shown in use in a typical core making setup, tubes 1 and 3 being of different lengths with tube 2 illustrating an out of square end contour at the core box 4. The core box 4 is supported on a table 5 of a conventional core making machine and the tubes 1, 2 and 3 are arranged to provide communication between the interior 6 of a sand supply box 7 by their connections with a blow plate 8 in suitable bores 9, 10 and 11, respectively, and the interior 12 of the core box 4.

In operation, air under pressure is admitted into the sand box 7 to force the sand through the tubes 1, 2 and 3 for completely filling the core box 4, and as seen in Fig. 1, tubes 1 and 2 conduct sand across the gap 13 between the blow plate 8 and the top of the core box 4, the tube 3 in this arrangement having a complete metal seat within the contiguous bore portions in which the tube is located.

Tubes 1, 2 and 3 are constructed according to the principles of the present invention, and for purposes of description tube 1 has been shown in greater detail in Figs. 2 and 3. This tube is made as a composite unit having a resilient body with a hard interior spine to stabilize the body, while the latter is particularly adapted for resisting the abrasive action of the sand forced through the tubes during operation in the practice of core making or under any other conditions requiring conduction of sand through conduits.

More specifically, tube 1 has a hollow body 14 made of molded rubber with a metal sleeve 15 embedded therein. A tube of this nature may be fabricated in predetermined short lengths or it may be made as a continuous tube to be later cut to given lengths as per requirements. And as shown in Figs. 2 and 3, tube 1 is a molded product with the sleeve 15 bonded to the body 14 thereof.

To enhance the union of the rubber body 14 and the sleeve 15, the latter is perforated to provide numerous staggered holes 16 through which the rubber of the body extends to join the interior and exterior surface portions of the body which are separated by the sleeve or metal stiffening shell 15.

With the rubber surrounding the sleeve 15, and united through the openings 16 of the sleeve, this form of a blow tube functions to grasp and hold sand filling the tube when the air pressure in the sand system is released after filling the core box. This is illustrated on an enlarged scale in Fig. 4 showing the rubber body 14 as distorted outwardly at the area of a hole 16 while internal pressure exists within such a tube producing a limited outward dimple 17 with a corresponding depression 18 within tube 1. With this action prevailing at all of the tube hole areas, and with the sand filling the entire tube and all of the collective depressed areas 18, release of air pressure will permit the resilient tube to resume its normal cylindrical contour to produce radially inwardly directed forces adjacent all the metal shell holes 16 to grasp and retain the slug of sand confined within the tube 1. This automatically prevents the formation of stems on the finished sand core in the core box.

This dimple action will be retarded in the bores receiving the ends of the tubes but the tube is

capable of producing the reverse effect by forcing the same into a bore in the core box of a given diameter which will bring about an internal dimpling adjacent the core outlet end of the tube to provide a number of limited internal choking areas to aid in holding the sand. The external dimpling action may be carried into a tube bore by molding or grinding an external circumferential recess 19 about the tube end 20 shown in Fig. 5. A shallow recess will suffice having a width that is less than the thickness of the core box wall 21 carrying the tube bore 22.

Tube 1, therefore comprises a composite unit made of a resilient body highly resistant to sand abrasion, but containing a spine or embedded core of hard material which acts to retard the expansion of the tube with the further purpose of stiffening a fairly thin walled flexible body and aiding in the handling of the same during assembly with the blow plate or core box. And the perforations in the spine allow limited expansion regions in the tube which provide the sand holding means as fully described hereinbefore.

Tube 1 uses a hard cylindrical sleeve concentrically molded within a resilient cylindrical body. In Figs. 6 and 7, a modified tube 23 contemplates using a metal sleeve 24 buried in a rubber body 25, the sleeve 24 here being of relatively light weight stock and also cylindrically corrugated to provide flutes extending longitudinally of the body 25. A sleeve of this kind may be of light weight stock due to the added strength of the lengthwise flutes of the corrugations and the apices of the flutes are easily perforated as at 26 by rotary grinding or slotting equipment.

Then too, a sleeve such as 24, if molded in short lengths into the rubber body, provides its own centering means in the mold cavity inasmuch as the radially outward ridges of the corrugations all terminate in a cylindrical plane which may be considered as analogous to the internal cylindrical surface contour of the mold cavity or bore.

It is further possible to construct sleeves 24 from softer metals such as aluminum or soft brass, etc., when fabricated with the corrugations above described.

The openings 26 will give a better bond to the body rubber 25 and the dimpling action will also prevail in a tube of this construction.

In some cases it may be desirable to provide a tube with a longer metal shank having only a section thereof made with a composite structure of the kind above described. Such a tube is shown at 27 in Figs. 8, 9 and 10 and comprises a tubular metal shank 28 terminating in a composite end having a rubber body 29 as a contiguous part of the metal shank 28. The body 29 is molded to a thinned out sleeve 31 formed integrally with the shank 28 and also being perforated at 32 to function in the same capacity as the tubes of Figs. 2 and 6. Although a tight fitting bore receiving the end of the tube 27 would cause radially inward dimpling as hereinbefore explained, the rubber body 29 is here further formed to include an internal circular restriction 33 at the exit end thereof to produce a sand choke at the discharge end of the tube 27.

Having described the specific illustrations disclosed in the drawings in great detail, it is to be understood that certain changes and modifications are contemplated in sand blowing tubes of this nature and function. All permissible variations in structure shall, however, be governed by the breadth and scope of the language of the

appended claims defining the invention in its more general aspects.

What I claim is:

1. In core making apparatus having a core sand supply box and a core box with openings in each for core sand passage from the interior of said supply box to the interior of said core box, the improvement consisting of a blow tube to conduct air actuated core sand from within said supply box into said core box comprising a resilient hollow body having its terminal ends firmly telescoped within said supply box and core box openings respectively, and a sleeve of hard material embedded within said resilient body, said body providing means to shield said sleeve from the abrasive action of the moving air and core sand mixture, and said sleeve providing means to impart a predetermined rigidity to said resilient body to counteract radial or longitudinal expansion and contraction of said resilient body over the length thereof and between said supply box and core box, and said sleeve of hard material having perforations formed therethrough to allow limited radial expansion and contraction of said resilient hollow body at the areas defined by the respective sleeve perforations whereby to effect greater sealing of the terminal ends of said blow tube during the sand blowing operation, and to further provide limited radial expansion of all of said resilient body portions at said perforations whereby said latter body portions move radially inwardly to grasp and retain the sand column within said tube upon interruption of the air-sand feed.

2. In an apparatus for transferring abrasive materials by means of fluid pressure, said apparatus having an abrasive material supply container and an abrasive material receiving container with openings in each container for the passage of said material from the interior of one container to the interior of the other container, and a conduit connecting said containers with the ends of said conduit firmly carried within the openings of each container respectively to conduct said fluid actuated abrasive material between said containers, the improvement which resides in said conduit which is provided with a wall structure comprising a resilient rubber inner tube section, a resilient rubber outer tube section, a metal tube separating said inner and outer rubber tube sections, said metal tube having apertures formed therethrough, and said inner and outer resilient tube sections having integrally formed joining portions extending through said metal tube apertures and between the resilient tube sections respectively to fix the relative positions of the composite elements of the wall structure of said conduit, said joining portions of said rubber tube sections being adapted for limited radially outward displacement through said apertured metal tube areas during the pressure feed cycle of said fluid actuated material whereby a greater seal is established between the conduit ends in said container openings through the radially outwardly urged tube section joining portions at said metal tube aperture regions, and whereby all of said tube section joining portions are displaced radially outwardly during the fluid pressure material actuating cycle with said joining portions automatically returning radially inwardly of said conduit to grasp and retain the column of sand remaining in said conduit after interruption of said fluid material feed cycle.

3. In a core making apparatus having a core

sand supply box and a core forming box, each with openings through the walls thereof for the passage of air actuated core sand from the interior of one box to the interior of the other box, the improvement which consists of a blow tube arranged with its terminal ends nested within the respective wall openings in said boxes and comprising means to conduct air actuated core sand under pressure between said boxes, said tube comprising a resilient body wall forming material, a stiffener embedded within said body and extending the length thereof, said stiffener being a rigid wall member having selected open areas arranged throughout the length thereof, said resilient body material comprising a deformable substance adapted for limited displacement radially outwardly with respect to the normal tube body wall contour and at the selected open areas through said stiffener under application of internal surface pressure established during the core sand blowing cycle through the air actuated sand, and said rigid wall member further comprising a plurality of corrugations arranged with the ridge portions thereof disposed coincident with the outer surface contour of said blow tube body and to collectively fit the peripheral portions of said openings in said box walls, said ridge portions of said stiffener thereby comprising orientation means to retain said deformable wall of said body material in a predetermined operable core sand conducting and dispensing relation with respect to said box openings and in relation to said stiffener under operative and inoperative conditions.

4. In a core making apparatus having a core sand supply box and a core forming box, each with openings in the walls thereof for the passage of core sand from the interior of one box to the interior of the other box, the improvement which consists of a blow tube having its ends carried within the wall openings respectively in said boxes and comprising a rubber body, and a stiffener embedded within said rubber body, said stiffener comprising a metal sleeve having circumferentially arranged corrugations formed therein with the radially outwardly positioned ridges of said corrugations coinciding with the outer surface contour of said rubber body, said stiffener adding stability to said rubber body throughout the length thereof, and said corrugation ridges being further arranged to collectively engage the peripheral surface portions of the box openings respectively to provide orientation means for said rubber body with respect to said box openings and to maintain said rubber body in a given operative core sand dispensing relation between said supply and core forming boxes.

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