

July 26, 1960

F. A. BAUREGGER
SAND BOOSTER

2,946,628

Filed Jan. 9, 1958

2 Sheets-Sheet 1

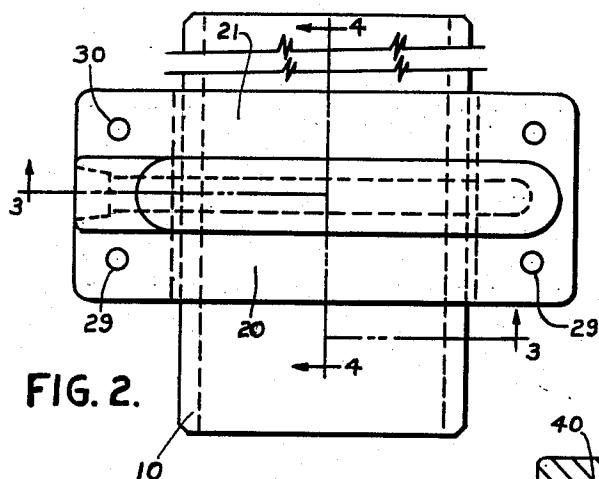


FIG. 2.

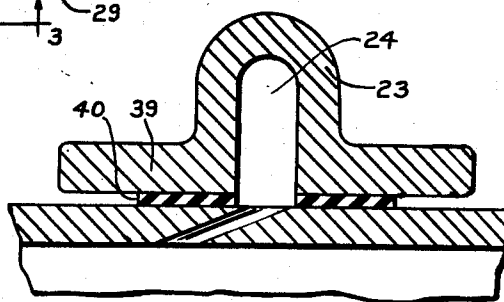


FIG. 4.

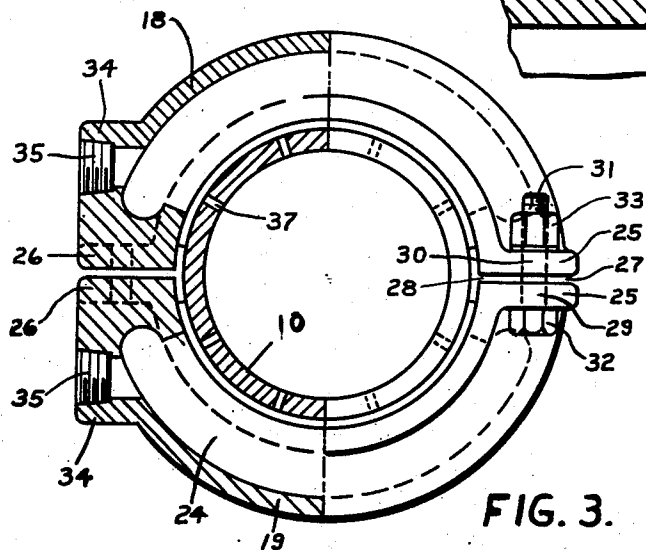


FIG. 3.

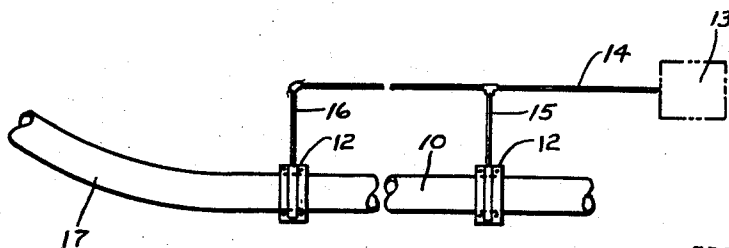


FIG. 1

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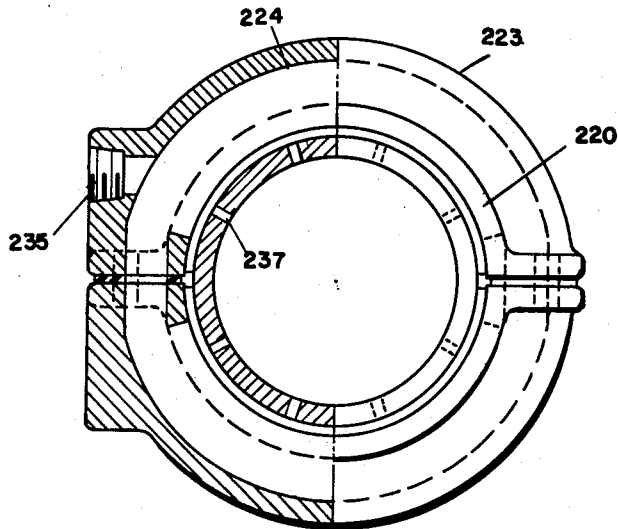


FIG. 5

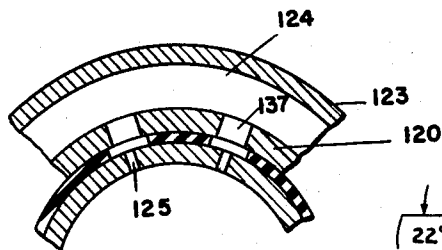


FIG. 6

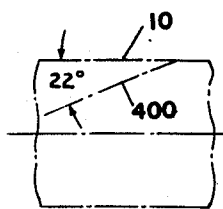


FIG. 7

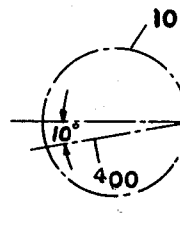


FIG. 8

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SAND BOOSTER

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1 Claim. (Cl. 302—24)

This invention relates to conveyors and, more particularly, to sand boosters for sand conveyors.

It is common practice in foundries to convey the sand from one point therein to another by means of pneumatic pipe conveyors wherein compressed air carries the sand through the pipes. In long lines or conveyors, the pressure drop of the sand and air in a long length of pipe is so great that the pressure drop is greater than allowable and boosters must be inserted periodically along the pipe line in order to maintain sufficient air pressure to carry the sand in a satisfactory manner. Various types of sand boosters have been provided and the most common are those which are inserted in the pipe itself by cutting out a section of pipe and welding the sand booster therein to replace the cut-out section. The erosion of the sand impinging on the inside of the booster, especially due to jets of air inserted into the booster, deteriorates the inside surfaces of the boosters fairly rapidly and it becomes necessary to replace the boosters occasionally. This replacement requires shutting down the entire assembly line for a period of time while the old booster is cut out and a new booster welded into the line in its stead.

The present invention contemplates the use of a booster which can be clamped on the outside of a line rapidly and within a very short interval of time without cutting out any length of pipe, therefore interrupting production only for a very short time. In initially installing the booster, it is only necessary to drill holes in the pipe at the proper attitude. This can be accomplished by means of a suitable drill jig by means of which the holes can be drilled expeditiously and promptly. With the present booster, the wear on the booster by sand is very low and if a section of pipe adjacent the booster does wear out, the section can be replaced equally as promptly and, therefore, the maintenance thereof is very low. Also, one operator can install the present booster whereas it takes at least two persons to install the conventional type of booster and the installation operation can be made without cutting the existing pipe with no extra flanges or couplings necessary in the pipe.

In one embodiment of the present invention, a twin air supply is provided to enable a different pressure to be used in one section than in the other.

It is, accordingly, an object of this invention to provide a sand booster for pneumatic sand conveyors which is simple in construction, economical to manufacture, and simple and efficient in operation.

Another object of the invention is to provide an improved sand booster which can be connected to a pneumatic pipe line without severing the line.

A further object of this invention is to provide an improved sand booster which clamps on the outside of a line.

A still further object of this invention is to provide an improved sand booster wherein holes are drilled in a pipe line and the booster clamped around the outside of the pipe superimposed over the holes.

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With the above and other objects in view, the present invention consists of the combination and arrangement of parts hereinafter more fully described, illustrated in the accompanying drawings and more particularly pointed out in the appended claim, it being understood that changes may be made in the form, size, proportions, and minor details of construction without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings:

Fig. 1 is a view of a sand booster connected in a sand conveying pipe;

Fig. 2 is a top view of one of the sand boosters according to the invention;

Fig. 3 is a partial sectional view taken on line 3—3 of Fig. 2;

Fig. 4 is a view taken on line 4—4 of Fig. 2;

Figs. 5 and 6 are cross sectional views corresponding to the view shown in Fig. 3 of other embodiments of the invention; and

Figs. 7 and 8 are schematic views indicating the angular disposition of the holes to be drilled in a pipe according to the invention.

Now with more specific reference to the drawings wherein corresponding numerals represent the same part in the various figures of drawings, a sand conveyor pipe line of the type commonly used in foundries is shown at 10. This type of conveyor system could be used for any granular material; for example, foundry sand, grain, or flour. The pipe line would be provided at its inlet end with a suitable device for feeding the material to be conveyed and, also, for applying an initial velocity thereto.

Air boosters 12 are spaced along the pipe line 10 at proper intervals, depending upon the nature of the material being conveyed, the inclination of the pipe, and other factors. Obviously, the boosters can be properly designed for a wide variety of sizes of pipes and one of the common applications of these boosters is to the four inch nominal size of pipe ordinarily used in foundries for conveying foundry sand from a storage location to the part of the foundry where it is used.

The boosters 12 are connected to the pipe 10 at spaced intervals as shown and they have an air supply 13 connected thereto by means of a branch pipe 14 connected to pipes 15 and 16. It is often desirable to have a booster directly following a curve or an elbow as the curved segment 17 in order to compensate for the pressure loss at the curve.

The boosters 12 themselves are shown as being made of two interchangeable crescent halves 18 and 19. Each half 18 and 19 has two circumferentially disposed, axially extending flanges 20 and 21 integrally connected by an intermediate arched web portion 23 which extends peripherally half way around the pipe 10 and defines an air receiving groove 24 on the inside thereof. The flanges 20 and 21 extend radially outwardly at 25 and 26 with machined facing surfaces 27 and 28 which are bored at 29 and 30 to receive studs 31 which have heads 32 and are threaded to receive nuts 33. Each laterally extending boss 34 is bored at 35 to receive a threaded fitting on the end of the pipe 14, 15, 16, or 17. The bores 35 communicate with the inside air receiving grooves 24. Pipes connected to the bores 35 supply compressed air into the groove 24.

The pipe 10 itself has radially extending bores 37 drilled therein and inclined in the direction of flow of the material through the pipe 10 as indicated in Fig. 4 so that the air impinging on the stream of granular material urges it in the direction of flow thereof.

When the sand boosters are mounted on the pipe 10 as shown with gaskets 40 which are cemented to the inner periphery of the flange at 39, forming a seal be-

tween the booster and the pipe, the air pressure from the pipes 14, 15, and 16 will be impressed in the groove 24 and will flow through the bores 37, impinging on the stream of sand therethrough and boosting it or urging it in its direction of flow.

The embodiment of the invention shown in Fig. 5 is similar to the embodiment shown in Fig. 3, the difference being that an air receiving groove 224 in each crescent communicates with the other and only one air inlet is necessary. Inner flanges 220 are connected to a web 223 and form the air receiving groove 224. A threaded bore 235 can be connected to a suitable pipe conducting air under pressure to the groove 224. Bores 237 are formed in the conveyor pipe and the groove 224 overlies the bores 237 to conduct air from the threaded bore 235 to the space within the conveyor pipe.

In the embodiment of the invention shown in Fig. 6, flanges 120 are integrally connected together by means of a peripherally extending web 123 having an inner peripheral air receiving groove 124 which extends around the booster. Bores similar to the threaded bores 235 in Fig. 5 are provided in the embodiment shown in Fig. 6. The pipe will be drilled in the manner of the drilled holes indicated at 137 and, in this case, holes 125 must be carefully aligned with the holes 137 in order to insure that the air will communicate from the groove 124 into the interior of the pipes.

Fig. 7 shows in phantom lines the pipe 10 with a center line 400 representing the center line of the bores 37 in Fig. 1. The bores 37 are inclined in the direction of flow of the sand at an angle of twenty-two degrees. While this angle can vary within tolerances of, for instance, ± 5 degrees, if it varies substantially more than this, the air will not penetrate the sand. If it varies substantially less, the air will not have the proper boosting effect.

Fig. 8 shows the radial disposition of the center line 400 of the bores in the three embodiments of the invention which are disposed at an angle of approximately ten degrees to the radius of the pipe. The bores in the three embodiments can best be bored by means of an improved drill jig which is the subject matter of another patent application.

The foregoing specification sets forth the invention in its preferred practical forms but the structure shown is

capable of modification within a range of equivalents without departing from the invention which is to be understood is broadly novel as is commensurate with the appended claim.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

A sand booster for use in a sand conveying system comprising a pipe conveyor for sand, said pipe conveyor adapted to have means to feed sand connected thereto and means to supply compressed air to said pipe conveyor connected thereto to carry said sand therethrough, spaced booster stations, said stations each comprising peripherally spaced holes bored through said pipe conveyor and communicating with the inside thereof, said holes being inclined at an angle of approximately ten degrees to the radius of said pipe conveyor and inclined toward the direction of flow of said sand at an angle of approximately twenty-two degrees to said pipe conveyor, a collar member comprising two crescent shaped half members, each said crescent shaped member having spaced flanges connected by a web, the inside surfaces of said flanges being shaped in the shape of the outside of said pipe conveyor and one said flange being disposed on each side of said spaced holes, means to form a seal between said flanges and the outside surface of said pipe conveyor, said web being spaced from said pipe conveyor forming a flow passage bounded by said flanges and said web, means to admit air into said flow passage, each said crescent shaped half member having an air passage therein, the engaging ends of each said crescent shaped half member having means thereon closing the ends of said air passages, and separate means connecting said supply of compressed air to said passages.

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