

July 7, 1931.

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1,813,625

TRANSPORTATION SYSTEM

Filed June 12, 1930

3 Sheets-Sheet 1

Fig. 1.

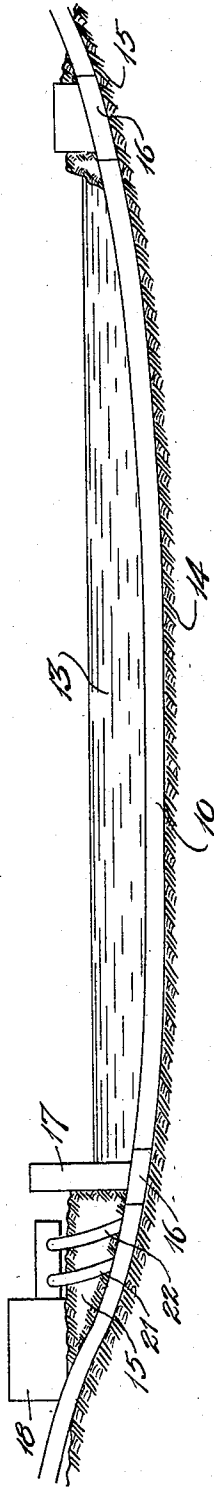
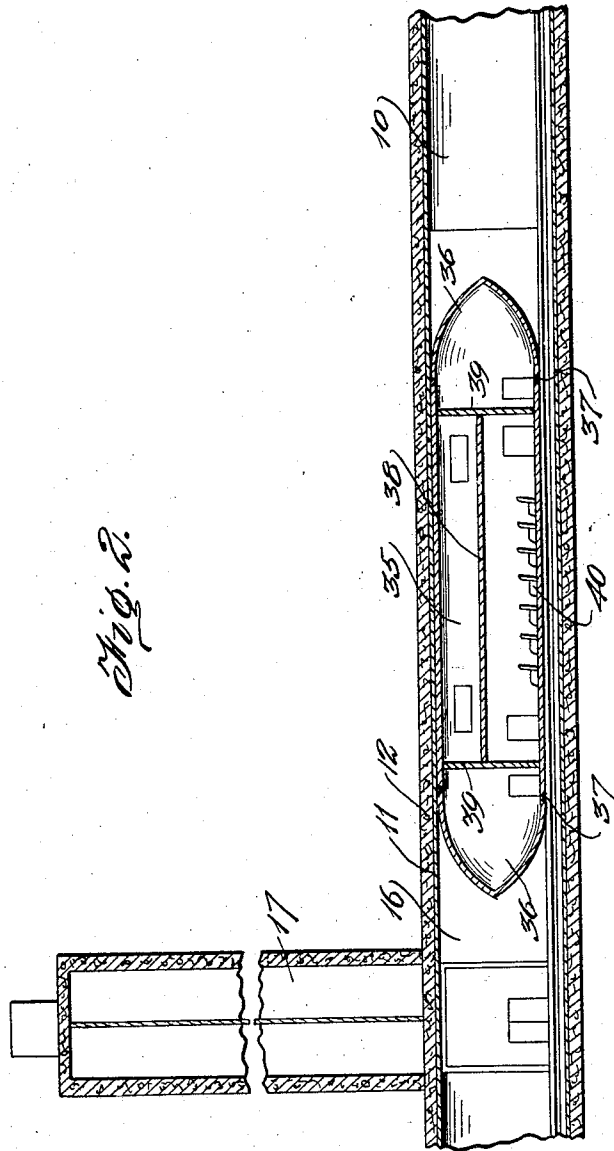


Fig. 2.



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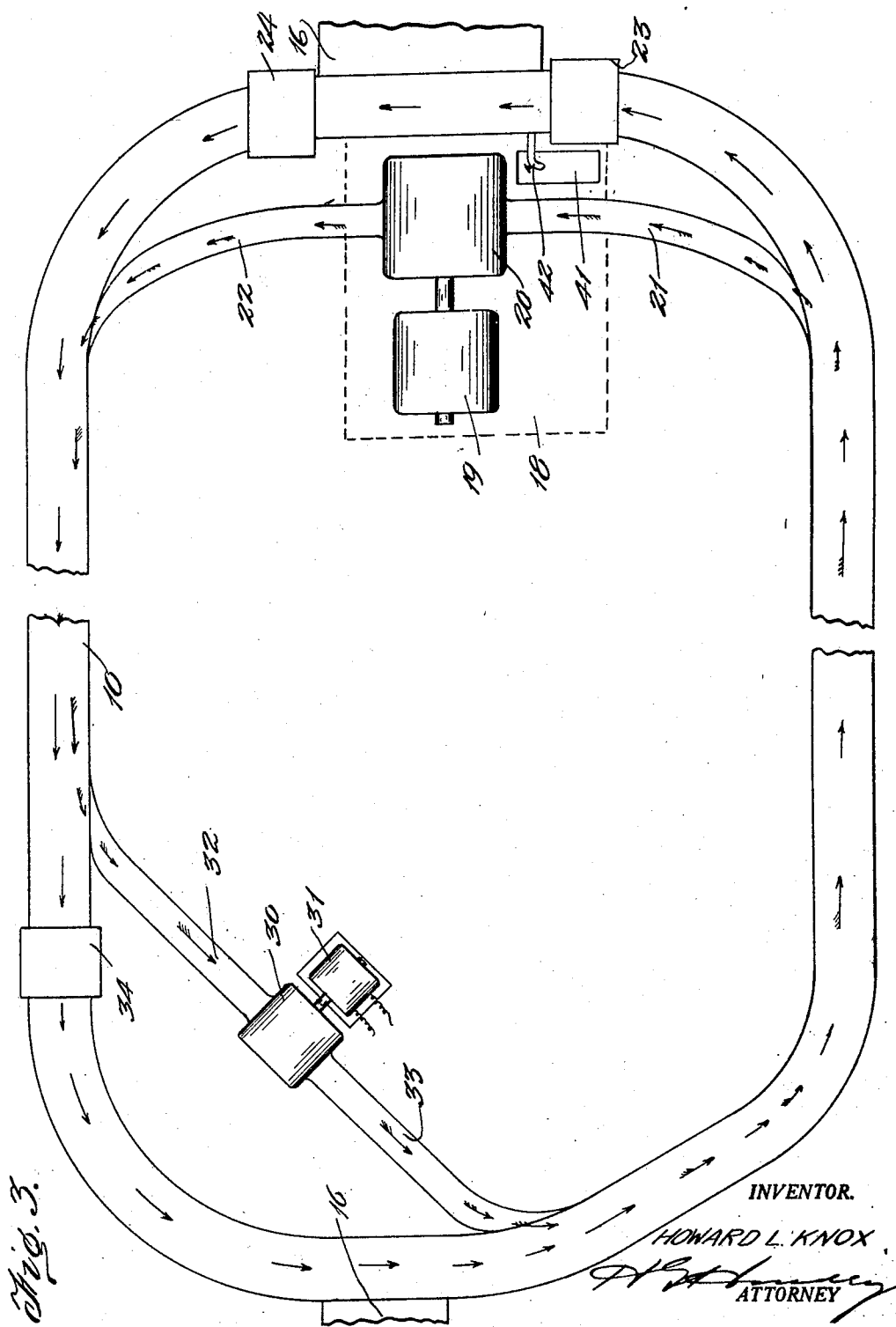
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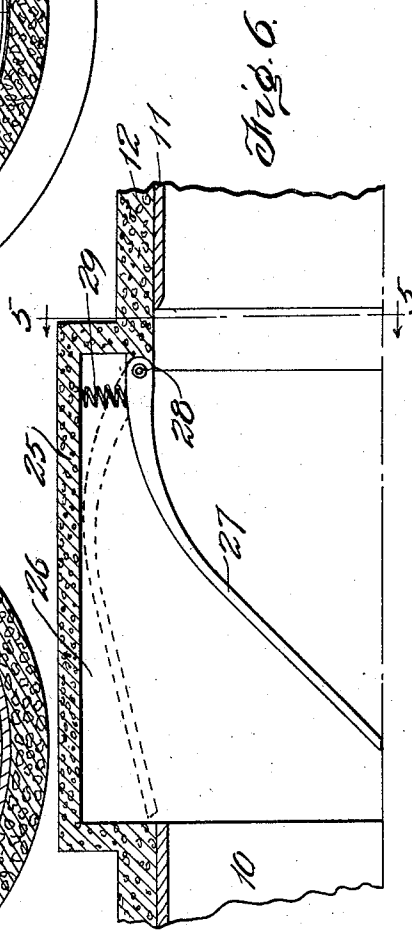
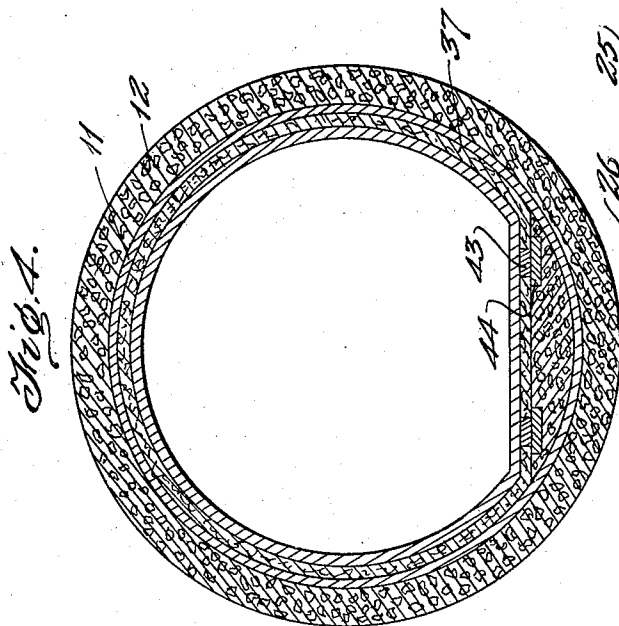
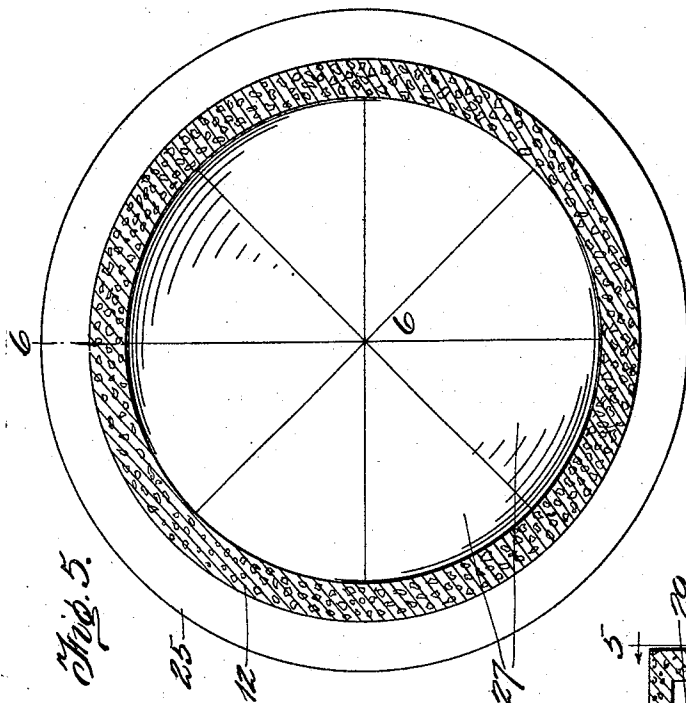
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TRANSPORTATION SYSTEM

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3 Sheets-Sheet 3



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TRANSPORTATION SYSTEM

Application filed June 12, 1930. Serial No. 460,776.

This invention relates to transportation and has special reference to a pneumatic tube system of transportation for passengers and baggage and other freight.

One important object of the invention is to improve the general construction of such systems.

A second important object of the invention is to provide an improved combined vacuum and pressure system of this character.

A third important object of the invention is to provide an improved arrangement of pneumatic tube having means spaced therealong and communicating therewith for reinforcing or "boosting" the vacuum and pressure conditions.

A fourth important object of the invention is to provide an improved valve arrangement for the tubes of such system.

A fifth important object of the invention is to provide an improved arrangement of car and track for such a system.

With the above and other objects in view, as will be presently understood, the invention consists in general of certain novel features of construction and combinations of parts hereinafter fully described, illustrated in the accompanying drawings and specifically claimed.

In the accompanying drawings like characters of reference indicate like parts in the several views, and:

Figure 1 is an elevation, partly in section, showing a system constructed in accordance with this invention and running under a river on the bottom thereof.

Figure 2 is a vertical section through a portion of the tube of this system and showing a station elevator and car.

Figure 3 is a plan view in diagrammatic form showing a tube system in accordance with this invention.

Figure 4 is an enlarged cross section through a tube and car constructed in accordance with this invention.

Figure 5 is a cross section through the valve portion of such a tube.

Figure 6 is a section on the line 6-6 of Figure 5.

The tube 10 forming the transportation tube of this invention may be made of any preferred material as one example of such construction may have an inner portion or lining 11 (see Fig. 4) and an outer portion or casing 12, the lining 11 being of steel and the casing being of concrete. Naturally the lining will be formed in sections suitably joined and each section may be built up of joined plates. Obviously, this method of forming metal tubes is old and well known as are various methods of joining tube plates and sections to provide a smooth interior. I have not, therefore, deemed it necessary to show such details of construction as I am at liberty to use any and all of these old and well known details.

Likewise, the tube has here been shown as circular in cross section but I may use any cross section I may find best adapted to the particular case.

As here shown the tube 10 extends beneath a river 13 and rests on the bottom 14 thereof with its ends extending up through the banks 15. The tube as thus shown is subaqueous centrally and sub-terranean terminally. However, for land transportation the tube may be entirely below the surface, entirely above the surface, or partly below and partly above the surface. It may be carried on bridges and trestles where desired and may be anchored by any suitable means at any desired distance below the surface of a body of water, the particular location of the tube being immaterial so far as concerns the principles of the invention.

The foregoing facts are mentioned to show a wide adaptability of the invention in location, form and construction and those features which deal immediately with this invention will now be considered.

The main tube 10 is, as shown in Figure 3, preferably made in the form of a closed loop having spaced stations 16 and while but two stations are here shown as many may be employed as the exigencies of the case require. If desired, where the stations are below ground, an elevator 17 may be employed to convey passengers to and from the station. A power house at 18 is preferably

located adjacent one of these stations and contains a suitable motor 19 to drive a main fan or blower 20 of any well known type. A suction pipe 21 leads from the tube 10 to the intake of the fan 20 and from the outlet of this fan a pressure pipe 22 leads to the tube 10, the suction pipe opening into the tube on one side of the station and the pressure pipe opening into said tube on the other side of the station, the first side being the side from which the cars enter and the second side being that from which they depart. A suitable valve 23 is located at the incoming side of the station closer to the station the opening of the pipe 21 and this valve opens toward the station. Similarly, a valve 24 is located at the outgoing side of the station between the station and the opening of the tube 24 and opens away from the station. Each of these valves is of like construction as in Figs. 5 and 6 and consists of a casing 25 interposed between two sections of the tube 10, this casing being of greater diameter than the body of the tube. Thus an annular channel 26 is formed within the tube 10 at this point. A series of orange peel valve leaves 27 are hinged in this channel as at 28 and are urged together by springs 29 to close the valve. The valve is thus of conoidal form. The leaves, when the valve is open are housed in the channel so as not to interfere with the passage of the car past the valve, the open position of a leaf being shown in dotted lines in Fig. 6.

At one or more suitable points in the length of the tube 10 is a booster fan 30 driven by a motor 31 and having its suction and pressure sides connected at spaced points with the tube 10 by a suction pipe 32 and pressure pipe 33. A single valve 34 is interposed in the tube 10 between the junction points of pipes 32 and 33 and is of the same construction as the other valves.

The car consists of a cylindrical body 35 having conoidal ends 36 and is provided adjacent each end with a packing ring 37 of asbestos or other suitable material fitting closely in the tube 10 to prevent air passing the car. Preferably the car may be divided into compartments by a deck 38 and partitions 39 and one of these compartments may be provided with seats 40 for passengers, the other compartments being used for freight, mail and the like.

It should be mentioned that adjacent the valve 23 is a compressed air tank 41 supplied with compressed air communicating with the incoming end of the station section of the tube 10 through a valved pipe 42.

The car may run on wheels or the like but I preferably support skids 43 running on well lubricated flat rails 44.

In operation, the car is forced through the tube between stations by air pressure from behind, a partial vacuum being pro-

duced in front of the car to aid this air pressure. On arriving at a station the inertia of the car will carry it through the valve 23 and suitable braking means (not shown) may cause it to stop opposite the station platform. There will now be no tendency for the car to move from the station as the air in the body of the tube 10 will be by-passed through the fan 20. When it is desired to again start the car the valve in the pipe 42 is opened which will admit compressed air between the car and valve 23 and force the car out through the valve 24 until it moves past the opening of the pipe 22 into the tube 10 whereupon it will again travel under the influence of the fan 20. The booster fan 30 is used to make up for the losses which arise from the transmission of compressed air through long tubes and the valve 34 prevents the air from the booster fan blowing back from the pipe 33 to the pipe 32 through the short length of tube 10 between these pipes. However, the springs of this valve are so adjusted that the motion of the car is not appreciably retarded as it passes this valve.

There has thus been provided a simple and efficient device of the kind described and for the purpose specified.

It is obvious that minor changes may be made in the form and construction of the invention without departing from the material spirit thereof. It is not, therefore, desired to confine the invention to the exact form herein shown and described, but it is desired to include all such as properly come within the scope claimed.

Having thus described the invention, what is claimed as new, is:

1. In a pneumatic tube system, a continuous main tube having a station section, a casing fitting said tube, a fan having its intake connected to the tube at one side of the station section and its outlet connected to the tube at the opposite side of the station, and valves interposed between the fan connections and the station section and opening toward the connection of the fan outlet.

2. In a pneumatic tube system, a continuous main tube having a station section, a casing fitting said tube, a fan having its intake connected to the tube at one side of the station section and its outlet connected to the tube at the opposite side of the station, valves interposed between the fan connections and the station section and opening toward the connection of the fan outlet, a compressed air tank, and a valved connection between the compressed air tank and the end of the station section adjacent the intake connection of the fan.

3. In a pneumatic tube system, a continuous main tube having a station section, a casing fitting said tube, a fan having its intake connected to the tube at one side of the station section and its outlet connected to the

tube at the opposite side of the station, and valves interposed between the fan connections and the station section and opening toward the connection of the fan outlet, said tube being intentionally channelled at each valve and each valve consisting of orange peel leaves having their major ends pivoted in the channel and their edges and points meeting to form a conoidal structure when closed, said leaves being housed in the channel when open and having springs urging the leaves to closed position, said car having a conoidal end adapted to enter the closed valve and open it.

4. In a pneumatic tube system, a continuous main tube having a station section, a casing fitting said tube, a fan having its intake connected to the tube at one side of the station section and its outlet connected to the tube at the opposite side of the station, valves interposed between the fan connections and the station section and opening toward the connection of the fan outlet, said tube being intentionally channelled at each valve and each valve consisting of orange peel leaves having their major ends pivoted in the channel and their edges and points meeting to form a conoidal structure when closed, said leaves being housed in the channel when open and having springs urging the leaves to closed position, said car having a conoidal end adapted to enter the closed valve and open it, a compressed air tank, and a valved connection between the compressed air tank and the end of the station section adjacent the intake connection of the fan.

5. In a pneumatic tube system, a continuous main tube having a station section, a casing fitting said tube, a fan having its intake connected to the tube at one side of the station section and its outlet connected to the tube at the opposite side of the station, valves interposed between the fan connections and the station section and opening toward the connection of the fan outlet, a booster fan located remote from said station section and having its intake and exhaust connected to the tube at spaced points, and a valve in said tube between the connections of the booster fan and opening toward the connection from the outlet of said booster fan.

6. In a pneumatic tube system, a continuous main tube having a station section, a casing fitting said tube, a fan having its intake connected to the tube at one side of the station section and its outlet connected to the tube at the opposite side of the station, valves interposed between the fan connections and the station section and opening toward the connection of the fan outlet, a compressed air tank, a valved connection between the compressed air tank and the end of the station section adjacent the intake connection of the fan, a booster fan located remote from said station section and having its intake and ex-

haust connected to the tube at spaced points, and a valve in said tube between the connections of the booster fan and opening toward the connection from the outlet of said booster fan.

7. In a pneumatic tube system, a continuous main tube having a station section, a casing fitting said tube, a fan having its intake connected to the tube at one side of the station section and its outlet connected to the tube at the opposite side of the station, valves interposed between the fan connections and the station section and opening toward the connection of the fan outlet, a booster fan located remote from said station section and having its intake and exhaust connected to the tube at spaced points, and a valve in said tube between the connections of the booster fan and opening toward the connections from the outlet of said booster fan, said tube being intentionally channelled at each valve and each valve consisting of orange peel leaves having their major ends pivoted in the channel and their edges and points meeting to form a conoidal structure when closed, said leaves being housed in the channel when open and having springs urging the leaves to closed position, said car having a conoidal end adapted to enter the closed valve and open it.

8. In a pneumatic tube system, a continuous main tube having a station section, a casing fitting said tube, a fan having its intake connected to the tube at one side of the station section and its outlet connected to the tube at the opposite side of the station, valves interposed between the fan connections and the station section and opening toward the connection of the fan outlet, a compressed air tank, a valved connection between the compressed air tank and the end of the station section adjacent the intake connection of the fan, a booster fan located remote from said station section and having its intake and exhaust connected to the tube at spaced points, and a valve in said tube between the connections of the booster fan and opening toward the connection from the outlet of said booster fan, said tube being intentionally channelled at each valve and each valve consisting of orange peel leaves having their major ends pivoted in the channel and their edges and points meeting to form a conoidal structure when closed, said leaves being housed in the channel when open and having springs urging the leaves to closed position, said car having a conoidal end adapted to enter the closed valve and open it.

In testimony whereof he has affixed his signature.

HOWARD L. KNOX.