Feb. 4, 1941. J. F. FINNEGAN 2,230,425

PORTABLE PNEUMATIC GRAIN ELEVATOR

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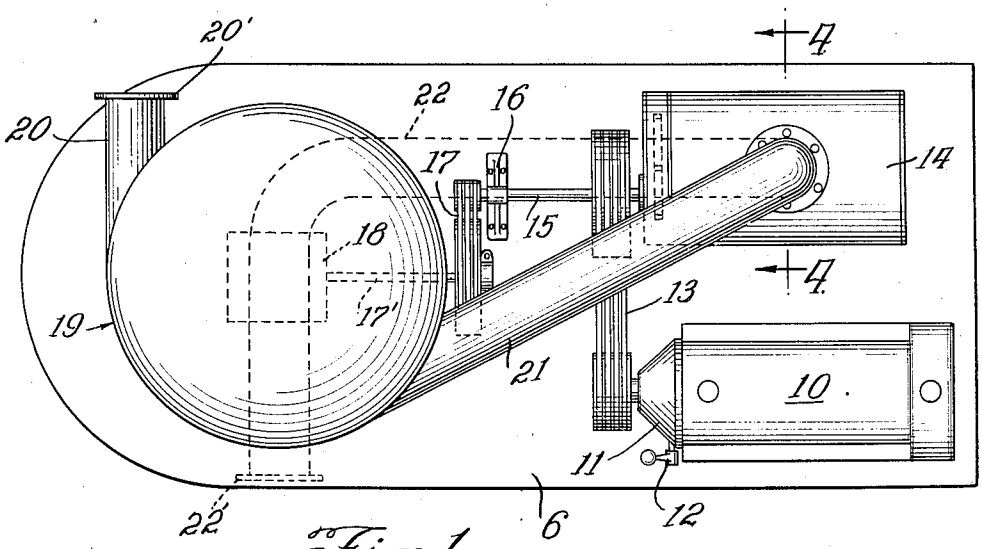
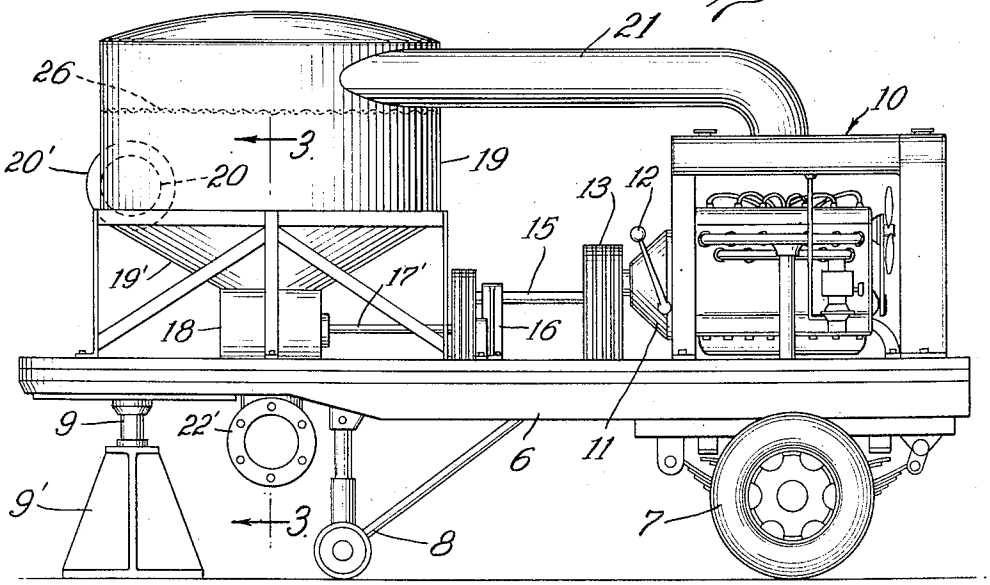


Fig. 1.

Fig. 2.



Inventor:
James F. Finnegan
By: Tefft & Tefft
Attys.

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Fig. 3.

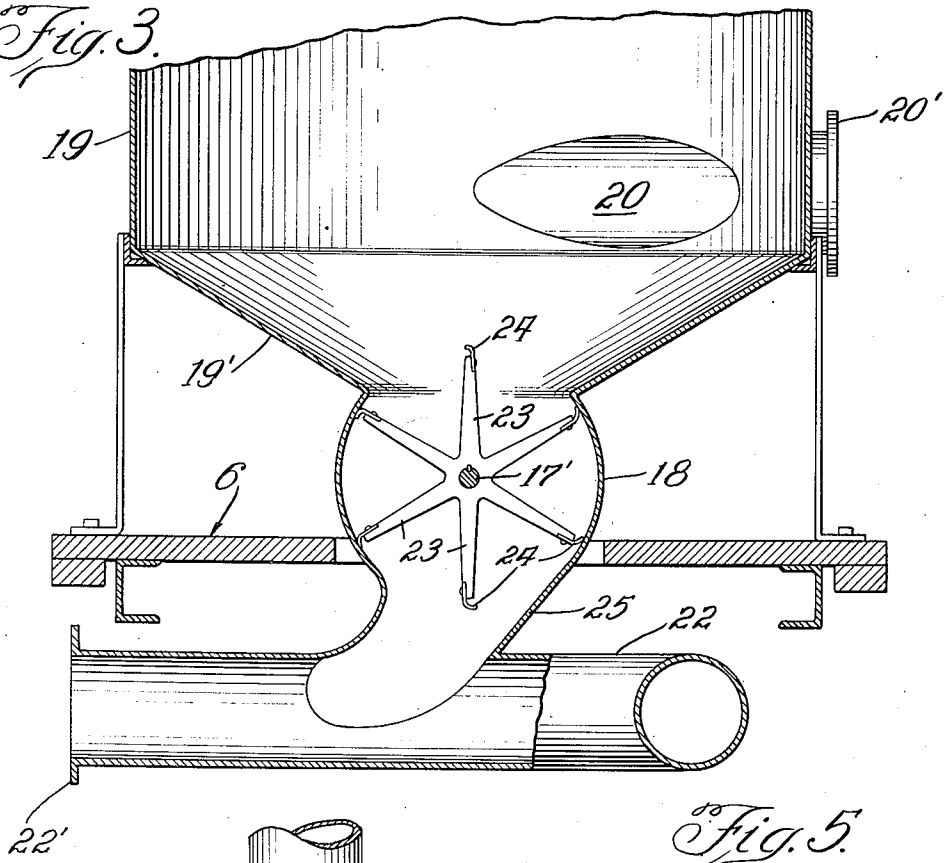


Fig. 4.

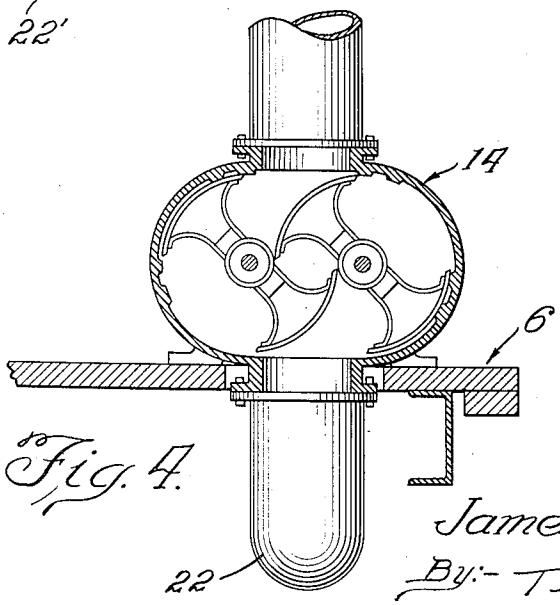
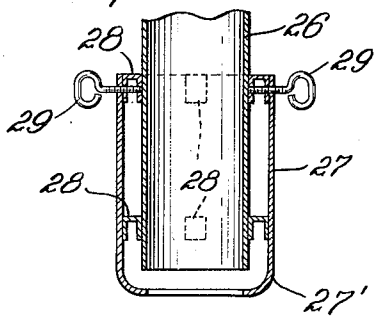


Fig. 5.



Inventor:
James F. Finnegan
By:- Tefft & Tefft
Attys.

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PORTABLE PNEUMATIC GRAIN ELEVATOR

James F. Finnegan, Morris, Ill., assignor to Loretta W. Macaulay, Chicago, Ill.

Application May 17, 1939, Serial No. 274,161

1 Claim. (Cl. 302—17)

This invention relates to grain elevators or transfer devices of the air blower or fan operated type.

Pneumatic elevators of this type as heretofore used have not been completely satisfactory for several reasons. Chief among these reasons is that such fan operated elevators have cracked or otherwise damaged the grain with a resultant lowering of the grade of the grain and a reduction in its market value. Another object has been the operating costs of such elevators,—air actuated devices of this kind being more expensive to operate than the more direct mechanical transfer methods.

In the development of this invention effective means have been devised to protect the grain against damage. The means to accomplish the above results has had the corollary effect of reducing the power and operating costs.

One of the principal objectives in developing the present invention was to provide effective elevator means for loading and unloading grain from barges. Although it is cheaper to ship grain by water, there is a dearth of effective grain transfer devices for barges which present unusually difficult conditions, and shippers, particularly on inland waterways, have been handicapped in their use of this cheaper transportation. The superior flexibility and adaptability of blower elevators makes their use for barges more adaptable than the mechanical type of elevator and offsets their slightly increased cost of operation.

On the other hand, the nature of inland waterway traffic is such that to be most effective the blower transfer apparatus cannot be stationary but must be quickly portable from one location to another as the need arises.

The principal object of the invention is to provide a portable pneumatic grain transfer device wherein the grain is handled smoothly in order not to crack or otherwise injure the grain.

Other objects and benefits will be disclosed in the following descriptions and drawings in which:

Fig. 1 is a plan view of my portable pneumatic grain elevator showing the arrangement of the engine, blower, and separator as mounted on a truck trailer;

Fig. 2 is a side elevation view of the elevator as shown in Fig. 1;

Fig. 3 is an enlarged broken cross-sectional view of the separator wheel grain valve and discharge pipe as it would appear on the section line 3—3 of Fig. 2;

Fig. 4 is an enlarged cross-sectional view of the suction blower as used in a preferred embodiment of my invention; and

Fig. 5 is an enlarged cross-sectional view of an adjustable inlet nozzle later to be described.

Now referring to Figs. 1 and 2, I show a conventional form of truck trailer 6 having a pair of pneumatic trailer wheels 7, retractable auxiliary support wheels 8, and a pivotal hitch 9. Such truck trailers are more or less conventional and their use being fully understood, the trailer will not be described in further detail except to say that such trailers may be quickly attached to the truck for transportation and detached from the truck and supported on the auxiliary support mechanism 8. When placed in position for use an auxiliary support member 9' is placed under the trailer hitch 9.

On the platform of the trailer I mount a power unit 10 which in this preferred embodiment of my invention consists of a conventional gas engine unit having a selective gear transmission 11 controlled by a shift lever 12. This gas engine power unit 10 drives a suction blower unit 14 through a multiple V-belt drive 13. A shaft 15 is extended from the shaft of the blower 14 being supported by a journal bracket 16, and drives another V-belt transmission 17 to a jack shaft 17' connected to the wheel valve 18, which is shown in detail in Fig. 3 and which will later be more completely described. This wheel valve 18 is attached to the conical bottom 19' of the separator 19.

A suction pipe 20 is tangentially attached to the shell of the separator 19, it being one of the main objects of my invention to provide a grain handling device wherein the grain is handled smoothly and the tangential attachment of the inlet pipe 20 is an important feature of my invention, as will later be clearly explained. The inlet pipe 20 has a flange 20' to which may be attached conventional inlet piping which I prefer to make of flexible members in order to provide means whereby the pipe may be adapted to fit under the variable conditions that my portable elevator encounters in use. On the end of this flexible inlet pipe I provide an adjustable inlet nozzle, as shown in Fig. 5, which will later be described in detail.

A suction line pipe 21 from the blower 14 is also attached tangentially to the separator casing 19 which with the tangential attachment of the pipe 20 provides an arrangement which causes the air within the separator 19 to travel in a circular manner around the inside of the sepa-

rator casing, the purpose of which will later be explained. A discharge pipe 22 is attached to the lower side of the suction blower 14, as shown in Fig. 4, and from thence is led underneath the wheel valve 18 where it is attached to the casing by a tangential grain inlet casing 25. On the outer end of the pipe 22 is a flange 22' to which may be attached flexible discharge piping whereby the grain may be conducted to various discharge points at the will of the operator.

Now referring to Fig. 3, the wheel valve 18 has solid spokes 23 to which are attached flexible fingers 24 which normally contact the inside of the casing 18 as the wheel is revolved by the transmission members 17 and 17'. It will be understood that this wheel valve 18 will catch the grain as it falls in the conical bottom 19', and as the wheel is revolved the grain will be discharged into the discharge pipe 22 through the angular connector casing 25. The flexible fingers 24 being always in contact with the inside of the casing 18, provides means whereby the suction air pressure within the separator 19 and the discharge air pressure in the pipe 22 are effectively sealed while the grain is being transferred from the separator 19 to the discharge pipe 22.

Now referring to Fig. 5, on the end of the inlet pipe 26 I mount a larger nozzle 27 which is held in spaced relationship from the pipe 26 by U-clips 28. This adjustable nozzle 27 is held in adjusted position by the handle set screws 29 and by loosening these set screws the nozzle 27 may be adjusted in relation to the end of the pipe 26 whereby the curved end of the nozzle 27' is moved in its relationship to the end of the pipe 26 thereby providing an adjustable suction feed caused by the inrushing air introduced through the space between the members injectorwise to induce grain into the inlet pipe. Thus I provide means whereby the nozzle can be adjusted to various conditions as met in a portable grain elevator of this kind. The adjustment of this inlet nozzle is particularly important in order to provide means whereby the grain may be introduced smoothly within the inlet pipe 26 in order to prevent grain damage.

In explanation of my invention I desire to point out that pneumatic elevators of this type as heretofore used, have not been satisfactory because the grain was handled so roughly that it was cracked and otherwise damaged. It will be appreciated that by the tangential arrangement of the inlet pipes 20 and the suction pipe 21 a circular movement of the air within the separator chamber is provided. The grain introduced into the separator through the inlet pipe 20 is smoothly induced into contact with the separator shell 19 and smoothly slides downward inside of the shell and the conical bottom 19' into the wheel valve 18. A screen 26 effectively separates the upper section of the separator and the connection to the suction pipe 21 from the lower section of the separator and the suction pipe 20. It will be appreciated that air separators of this kind depend for their effective action on the enlarged cross section area of the separator and it has been observed that in separators as heretofore constructed, the grain rushing through the inlet pipe 20 is violently impinged and dropped on the inside of the separator wall and thereby most of the damage is incurred. It will further be observed that by angular tangential arrangement of the connector housing 25 between the wheel valve 18 and the discharge pipe 22 I provide means whereby the grain is smoothly inducted into the discharge pipe and thus further minimize the damage to the grain. This is another example of reducing damage to the grain where its velocity is either suddenly retarded or increased.

It will be observed that I provide a separator of rather large diameter although low in height. This enables me to accomplish the beneficial results of a separator of large capacity while at the same time keeping its dimensions within a range that is adaptable to portable mounting on a trailer truck.

Having thus described my invention, I claim:

In a pneumatic grain elevator, a suction blower, power means to drive said blower, an air-grain separator, said separator being proportionately large in diameter and low in height, a suction inlet pipe tangentially connected to the side of said separator near its top and to the suction side of said blower, a grain inlet pipe tangentially connected to the side of said separator near its bottom, screen means in said separator interposed between said tangential openings, a power driven rotary wheel grain valve in the bottom of said separator, and a blower discharge pipe connected to said grain valve, said power means, blower, transmission and piping being disposed and mounted below the height of the relatively low separator whereby the entire elevator may be mounted on a truck-trailer or the like to facilitate transportation.

JAMES F. FINNEGAN.