

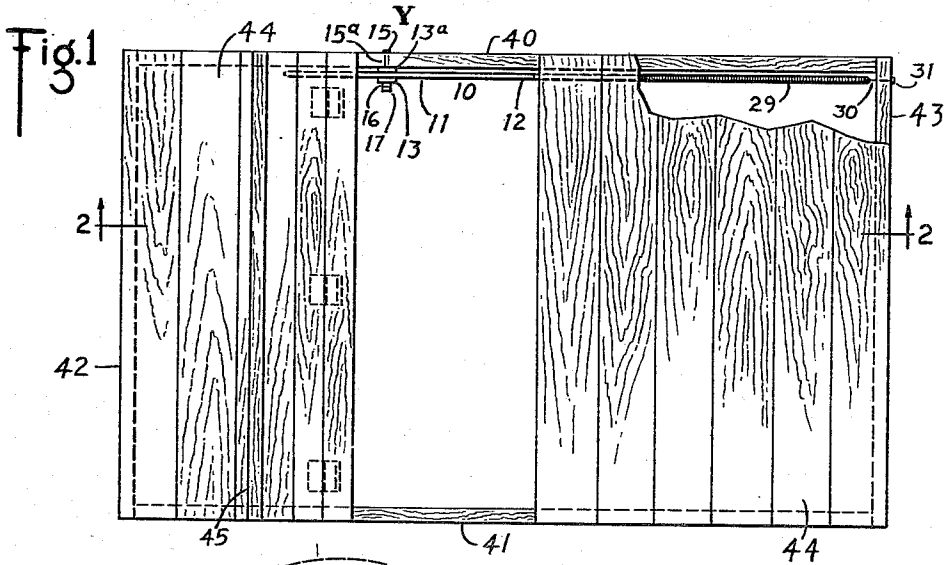
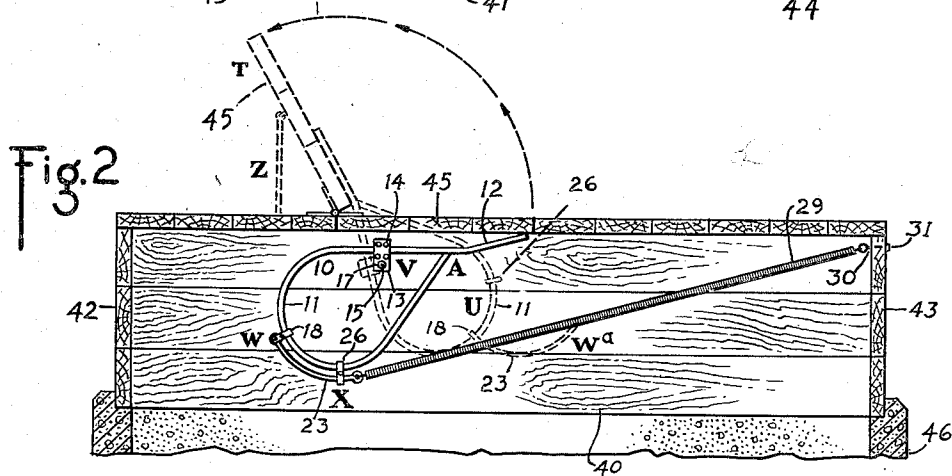
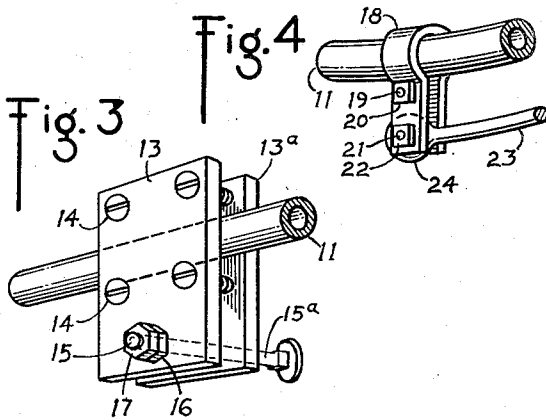
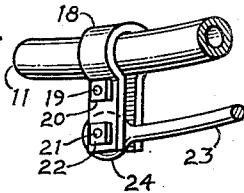
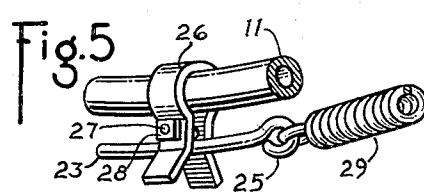
Aug. 21, 1951

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2,565,202

DOOR LIFTING APPARATUS FOR GRAIN PITS AND THE LIKE

Filed July 26, 1947



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2,565,202

DOOR LIFTING APPARATUS FOR GRAIN
PITS AND THE LIKE

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Application July 26, 1947, Serial No. 763,960

1 Claim. (Cl. 16—1)

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My invention relates generally to improvements in apparatus by which relatively heavy trap doors may be lifted in a manner requiring a minimum of manual effort by the operator, and is particularly adapted to the lifting of such doors as are usually provided in the runway or platform covering the receiving pit of grain elevators.

It is well known that the usual trap door forming a portion of the platform over a grain receiving pit is necessarily of heavy construction, because the grain laden vehicles are driven over it to reach a position suitable for unloading grain into the pit. And it is also well known that as a result of the necessity for manually opening and closing doors of the usual type of receiving pit, severe operator fatigue is inevitable, which tends to slow down the unloading routine and requires added man power and subsequent increased operating expense.

Various methods of overcoming the aforesaid difficulties have been used, most of them comprising the arbitrary installation of costly motor equipment or else improvised and unstable apparatus not conducive to reliable and uninterrupted operation under heavy and constant service. In elevator operation I have found that the difficulties and defects in service incurred as a result of these last mentioned door lifting means may lead to serious confusion as well as expense due to work stoppage for repairs and adjustments.

My improved door opening apparatus contrives to overcome all of the aforesaid difficulties and disadvantages by the embodiment of economical, simple, and durable construction, high efficiency in use and such structural features as will insure its safe and convenient installation and operation, all of which is comprised in one of the more important objects of the present invention.

Another important object of the invention is to provide a door opening apparatus which is constructed and arranged to be fixedly though pivotally mounted on an inner side wall of a receiving pit, and adapted for yieldable connection to the trap door of a grain receiving pit for resiliently raising and opening said door and so as to be yieldable when acted upon by the force applied thereto in direction of the pivotal axis thereof. Its yieldable characteristics provide a cushioning means both for the door lifting action and for absorbing shocks and jolts caused by shocks thereagainst as, for example, in the act of lowering and closing the door, and especially in the event of accidental dropping of the door prior to its fully closed position. This cushion-

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ing is accomplished by means of a novel structure comprising the invention which is disclosed in the following description, together with the accompanying drawings referring to the preferred form of the invention and in which:

Fig. 1 is a top plan view showing the trap door in open position, and one corner of the platform broken away to indicate more clearly the spring member and the point of its attachment to one end wall of the pit.

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1, but showing the door in closed position and the arrows showing the course of the door when swinging open to the position indicated by the dotted lines at T, while the dotted lines at U indicate the position of the lifting apparatus when the door is swung to the position shown at T.

Fig. 3 is an enlarged perspective detail of the main pivotal plate assembly shown at V in Fig. 2.

Fig. 4 is an enlarged perspective detail of the pivotal clamp assembly shown at W in Fig. 2.

Fig. 5 is an enlarged detail perspective view of the cradle clamp assembly shown at X in Fig. 2.

For the purpose of this disclosure the invention is described herein as applied to a grain elevator pit, but it is to be distinctly understood that it is not my desire or intent that the invention be limited to this particular embodiment and illustrative use, and that modifications and changes in details of structure and arrangement of parts residing within the scope of the appended claim may be made without departing from the spirit thereof.

Referring to the drawings in detail, a spring actuated, pivotally operable frame member 10 is shown that comprises a circularly curved loop portion 11 extending forwardly so that its opposing ends converge to a pointed form as at A in Fig. 2 terminating thence in and as a lever member 12 for the purpose of slidably contacting the inner face of the trap door 45 in the act of raising the same, as shown particularly in Fig. 2.

The pivotal plate members 13 and 13a are provided to clamp and hold firmly the frame member 10, thus comprising the means enabling the pivotal and subsequent door-lifting action of said frame member 10 as a whole, see Figs. 2 and 3.

The plate members 13 and 13a are held in securely clamped position as shown particularly in Fig. 3 by means of the screws 14 protruding through said plate member 13 to threadably engage said plate member 13a, and it is obvious that the king bolt 15 pivotally engages both the

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plates 13 and 13a. It is obvious, too, that the king bolt 15 is adapted to threadably engage at its threaded end a nut 16 and lock nut 17, and that the shank 15a of the bolt 15 is adapted for through engagement with one side of the grain pit as shown at Y in Fig. 1.

In actual use and to effect the pivotal and door opening action of the frame member 10 as just mentioned, the hereinafter described function and action of the other associated parts of the present invention will be observed. A pivotal clamp assembly is provided and adapted for clamped engagement with the loop portion 11 of said frame member 10 (see Figs. 2 and 4), comprising the clamp 18 held in fixed position on said loop portion 11 by the bolt 19 arranged for through engagement therewith, and the nut 20 threadably engaging said bolt 19. The outer ends of said clamp 18 being adapted to receive in through engagement therewith the bolt 21 threadably engaging the nut 22. Said bolt 21 is provided for the purpose of engaging the loop 24 at the rearward end of the curved arm member 23 which is formed to follow the shape of said loop portion 11 and which rests in the cradle clamp 26 held in fixed position on said loop portion 11 by the bolt 27 arranged for through engagement therewith, and the nut 28 threadably engaging said bolt 27. The outwardly flaring ends 26a of the clamp 26 are adapted to receive the outer swingable portion of the arm member 23 adapted to rest therebetween and against the bolt 27 as shown in Figs. 2 and 5. The loop 25 at the forward end of the arm member 23 engages the rearward end of the relatively long spring 29 which engages at its forward end the eye-bolt 30 held in through engagement with the end 43 of the receiving pit wall by threaded engagement with the nut 31.

It will appear obvious that the arm member 23 in its particular position shown on the loop portion 11 serves to maintain the pulling spring action required to produce the lifting action of the frame member 10. For example, were the rearward end of the spring 29 to be attached where the clamp 26 is now shown—and the arm member 23 omitted—then the frame member 10 would be deprived of a good portion of its lifting power by the time said frame member 10 was pivoted on the bolt 15 to the position shown at U in Fig. 2.

In the arrangement shown in Fig. 2, it will be readily evident that when the frame member 10 actually is in the position as indicated by U, the pull by the spring 29 is still exerted from a point adjacent the then bottom portion of the frame member 10 by means of the pivotal and subsequent unfolding action of the arm member 23 as

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to the position indicated by the dotted lines at W in Fig. 2.

While the dotted lines shown at Z in Fig. 2 indicate a stop member to hold the door against falling backward when it is open, it is pointed out that any suitable stop means may be provided for the purpose, and no claim is made to this particular feature.

The grain receiving pin in the present disclosure having the side walls 40 and 41, end walls 42 and 43, platform 44 and trap door 45 as well as the concrete foundation 46 are shown merely as one example of many well known types of grain receiving pits in which this invention may be installed and used, said pit and foundation not comprising any part on which claim is based.

It is obvious that any suitable latch means may be provided on the cover 45 for the purpose of latching it to the platform 44 of the pit and such latch means is deemed unnecessary to be shown.

I claim:

A trap door opener for a trap door having a horizontal hinge at one end and a door frame mounted thereunder, said trap door opener comprising a frame formed with an arcuate intermediate portion and convergent end portions, one of said end portions extending beyond the converging point forward to form a lifting member for sliding and shifting contact with a trap door, a swivel support for said frame mounted on the normal upper end portion thereof and adapted to be mounted on a door frame, a curved arm member swingably mounted on the arcuate portion of said frame, a spring secured at one end to the distal end of said curved arm, an eye bolt secured to the other end of said spring and adapted to be secured to a door frame, a cradle member fastened to said frame between the mounting of said curved arm member thereon and the distal end of the normal lower end portion thereof, said curved arm member arranged so that the end to which the spring is secured rests in said cradle member when said frame is in position as when the door is closed.

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