Feb. 14, 1928. 1,659,088

R. L. DOWDALL ET AL

GRAIN CLEANER AND DUST REMOVER FOR ELEVATORS

Filed Feb. 15. 1926 3 Sheets-Sheet 2

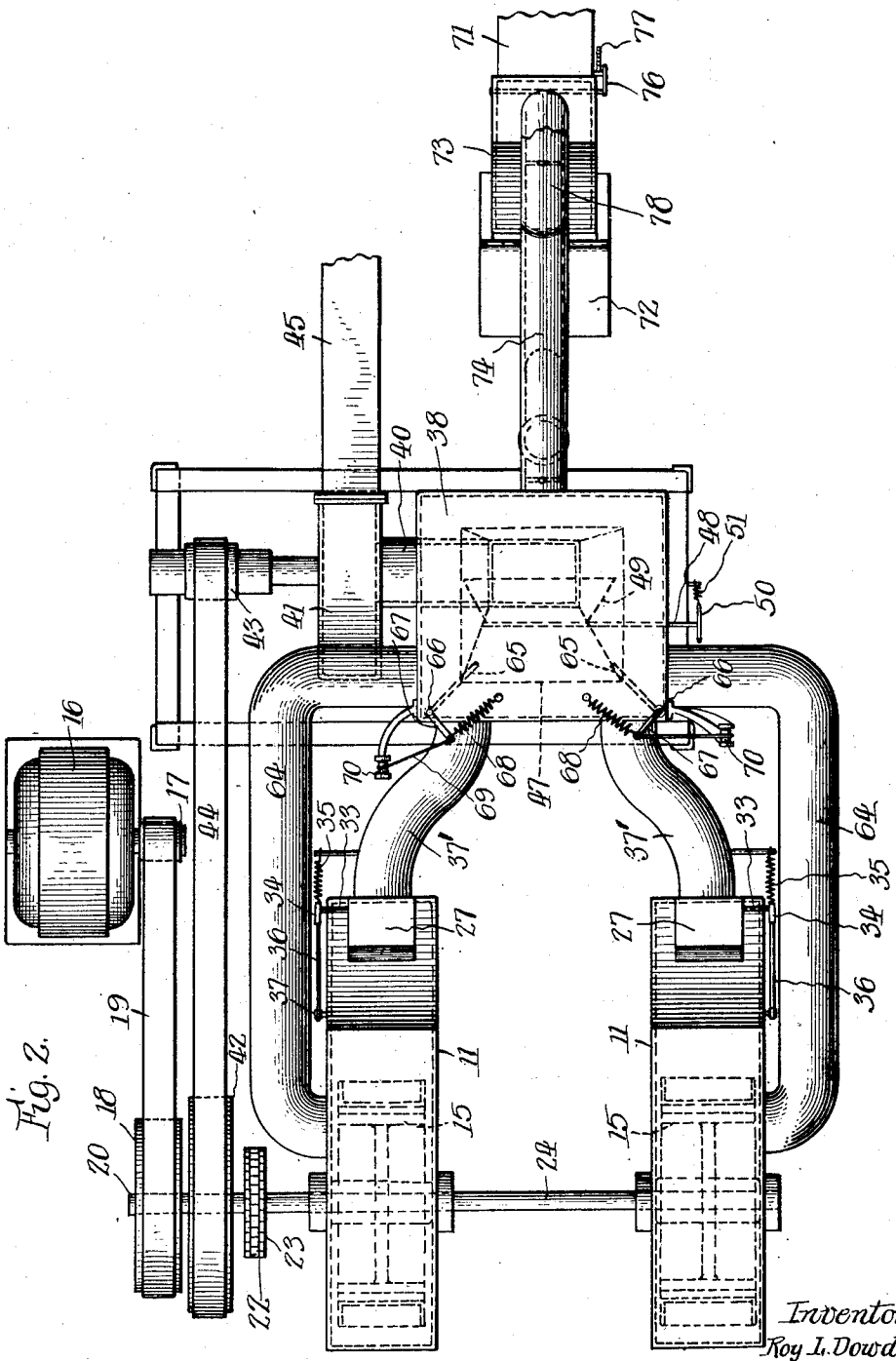


Fig. 2.

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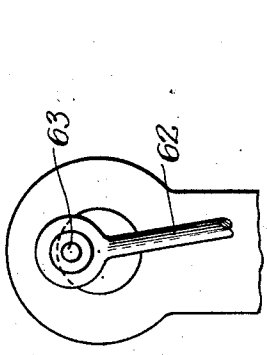


Fig. 6.

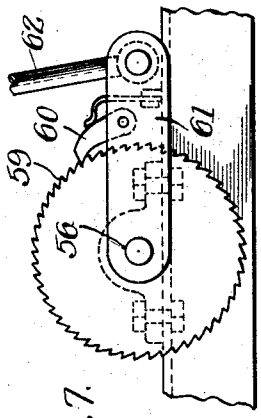


Fig. 7.

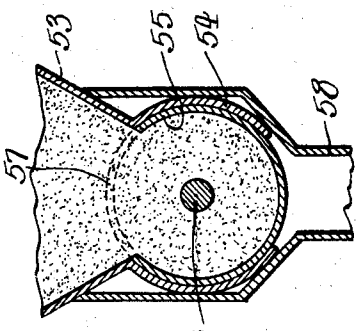


Fig. 5.

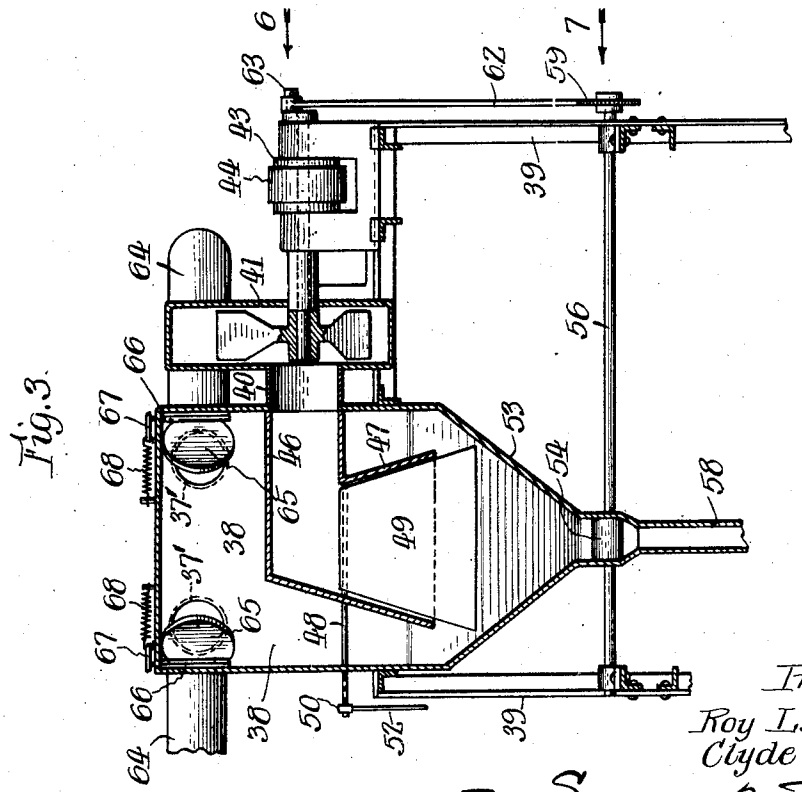


Fig. 3.

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Patented Feb. 14, 1928.

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UNITED STATES PATENT OFFICE.

ROY L. DOWDALL, OF SABETHA, AND CLYDE C. PALMER, OF CONCORDIA, KANSAS, ASSIGNORS OF TWO-THIRDS TO GEORGE BOWMAN, OF CONCORDIA, KANSAS, AND ONE-THIRD TO SAID PALMER.

GRAIN CLEANER AND DUST REMOVER FOR ELEVATORS.

Application filed February 15, 1926. Serial No. 88,179.

This invention relates to a device for removing the dust from grain elevators, terminals and mills, and has for its main object to provide an improved apparatus for collecting the light and broken particles of grain and any other grain that may be abstracted from the main body of grain and separating the same from the dust, thus cleaning the main body of the grain as it is elevated, discharging the dust and chaff, and collecting and saving the light and broken particles of grain which are valuable as chicken and stock feed. Another object is to provide a device of the character specified that will effectively remove the dust from the pit, head, leg, belt conveyor discharge, or any other place in the elevator or mill where dust has accumulated. A further object is to provide a device that shall work entirely by suction and may be readily attached to the elevator head, and from which conduits may be extended to various sources of dust accumulation. Other more specific objects are to provide a means for regulating the strength of the suction at different points, to provide improved means whereby the light and defective grain salvaged from the main body of grain may be continuously discharged without impairing the suction, to provide an improved grain cleaning and dust removing hood located within the head of the elevator leg which shall be adjustable as to length so as to fit different lengths of head, and is preferably equipped with a hood regulator or valve to increase or decrease the suction at the mouth of the hood; and to provide a generally similar hood located within a collecting and separating chamber, in which the dust and chaff are separated from the light particles of grain, which hood is preferably equipped with a suction regulating valve which may be set, according to the kind and condition of grain undergoing treatment, to create the proper suction for drawing off the dust and chaff without taking the defective grain with it.

Still other objects and attendant advantages of the invention will be apparent to persons skilled in the art as the same becomes better understood by reference to the accompanying drawings, wherein we have illustrated a practical and approved embodiment of the invention as applied to a double leg elevator, and in which—

Fig. 1 is a side elevation, partly broken away and in section, of the complete apparatus;

Fig. 2 is a top plan view of the same, as adapted for a double leg elevator;

Fig. 3 is a vertical section through the collecting chamber on the line 3—3 of Fig. 1;

Fig. 4 is a vertical central section through the grain cleaning and dust removing hood located in the head, opposite the discharge of the grain elevating buckets;

Fig. 5 is an enlarged sectional view through the discharge valve of the collecting chamber;

Fig. 6 is an enlarged side elevation of a part of the operating mechanism of the discharge valve shown in Fig. 5, viewed in the direction of the arrow 6 of Fig. 3; and

Fig. 7 is a view of part of the operating mechanism of the discharge valve shown in Fig. 5 viewed in the direction of the arrow 7 of Fig. 3.

Referring to the drawings, 10 designates as an entirety the vertical elevator leg, 11 the head thereof, and 12 and 13 the rear and front vertical passageways of the leg, in which travel respectively the ascending and descending limbs of the usual bucket conveyor 14 running over a sprocket 15 journaled in the head 11, by which conveyor the grain is elevated from the pit to the head and discharged into the latter. In a double leg elevator, such as is illustrated in the plan view, Fig. 2, the above described parts are in duplicate located side by side. Figs. 1 and 2 also illustrate a typical drive for the bucket conveyors, the same comprising an electric motor 16 connected by pulleys 17, 18, and a belt 19 to a shaft 20 extending transversely through both elevator legs. The shaft 20 is connected by sprockets 21, 22 and a chain 23 (Fig. 1) to an upper shaft 24 likewise extending through the two heads, and having fast thereon the conveyor drive sprockets 15.

On that side of each head which is opposite the grain discharge from the bucket conveyor is located the usual distributor hopper 25 and tube 26; and directly above the hopper 25 and for the most part located within the head 11 is a grain cleaning and

ed to an eccentric wrist pin 63 on the projecting end of the fan shaft. At each complete rotation of the fan shaft, the valve shaft 56 is turned the extent of one tooth of the ratchet 60.

In addition to the main suction pipe or conduit 37′ connecting the collecting and separating chamber 38 with the elevator head and leg, we may also employ an auxiliary suction pipe 64, one end of which communicates with one side of the head 11, preferably opposite the descending leg of the conveyor, and the other end of which enters the corresponding side of the collector and separator 38, preferably at a point on the same level with the pipe 37′. As shown in Fig. 2, the suction pipes 37′ and 64 enter the separator casing 38 through ports at right angles to each other and adjacent to a corner of the separator. This makes it possible to control the relative suctions exerted through the pipes 37′ and 64 by means of a single valve which, in the instance shown, consists of a vertically disposed valve disc 65 (see Fig. 3) mounted on a vertical tangential hinge rod 66 that extends through the top wall of the casing 38 just within a corner of the latter and is equipped on its upper end with a horizontal operating arm 67 adapted to be swung to a position closing the pipe 64 by a pull spring 68, and to a position closing the pipe 37′ by a pull cord 69 connected to the end of the arm 67 and extending over a guide pulley 70 and thence downwardly to the work floor of the elevator. Manifestly, by means of adjustment of the pull cord, the valve 65 may be set at any intermediate position so as to permit equal or unequal suctions through the pipes 37′ and 64. In situations where the body of grain carries but little dust and chaff, the auxiliary pipe 64 may be wholly or nearly closed; while with grain carrying a relatively large amount of dust and chaff, the valve 65 will be so manipulated as to permit suction through the pipe 64 in addition to the main suction through the pipe 37′.

In practice, the dockage valve 49 will be so set, depending upon the kind and character of the grain treated, that dust, chaff and husks only will be drawn off through the dockage hood and fan, while the grain particles will be collected in and intermittently discharged from the hopper 53. The fan discharge pipe 45 communicates freely with the atmosphere, so that there is no back pressure on the fan, thereby reducing the power required to drive the same as compared with known devices wherein the fan discharge pipe leads into a dust collecting or settling chamber.

The dust collecting chamber 38, in addition to the uses and functions already described, may be additionally employed for the collection of dust from other parts of the elevator or mill, and in Fig. 1 we have illustrated some of such additional uses. For instance, 71 indicates a belt conveyor used to convey and discharge grain into the hopper 72 of an automatic scale, bin or sheller; and 73 designates a hood located directly over the discharge end of the conveyor 71 and the flow passage into the hopper 72, the hood 73 being connected with the vacuum chamber 38 by a pipe 74. The lower end of the pipe 74 is equipped with a hinged valve 75 which may be open more or less to control the strength of the suction, and retained in position by a valve handle 76 and co-operating locking segment 77, or other valve controlling means. 78 indicates a branch pipe on the pipe 74 that may lead to any point where dust accumulates in the mill or elevator, said pipe being equipped with a shut-off valve 79 to place the same out of commission when not required.

At 80 we have also shown an additional suction pipe communicating with the vacuum chamber 38 and equipped with a shut-off valve 81, to which pipe 80 may be connected a hose 82 equipped at its lower end with a suction mouth 83 to serve as a vacuum sweeper. It will thus be seen that our improved cleaning device is adapted to remove the dust not only from the pit, leg, head and belt conveyor discharge, but also from any other place where dust may accumulate in the elevator or mill, since it operates entirely by suction, and suitable conduits may readily be run from the separating or vacuum chamber 38 to various places of dust accumulation, and there may be as many of these conduits as required, providing the blower has sufficient power to create the necessary vacuum in the collecting or separating chamber.

The attachment is so constructed that it may readily be taken apart and introduced through the cupola window of the elevator and occupies unused space in the cupola.

In its practical operation, the apparatus dries and ventilates heated, damp or musty grain as it is elevated, thus making a better grain and raising the test.

The suction at the mouth of the hood 27 serves mainly to clean the grain itself, carrying over the dust, chaff and light and defective particles of grain, while the auxiliary suction through the pipe 64, when employed, serves mainly to create an up-draft of air through the leg and thus clean the pit, leg and head of dust. As stated, where the grain is damp, or for other reasons carries very little dust, the auxiliary suction through pipe 64 may readily be cut out, and the full force of the suction applied to the cleaning of the grain itself.

The strength of the initial suction on the grain at the mouth of the hood 27 may be nicely regulated by a proper setting of the

valve 32, by which suction may be applied in any strength desired under any kind of grain as it is discharged from the buckets. Heavier grain will, of course, permit the employment of a stronger suction than lighter grain without danger of drawing off sound grain. Moreover, suction alone being employed in the collecting and separating chamber 38, there is no possibility of dust being blown out of the same into the elevator, as might readily occur where pressure, instead of a vacuum, is employed in the collecting and separating chamber.

As compared with former devices for cleaning grain, the present invention represents a considerable economy of construction, since less piping and a lesser number of elbows are required; it represents an economy in initial cost on account of its simplicity, and it represents an economy in power, mainly due to the fact that there is no back pressure on the fan or blower, and the several regulating valves may be set at any position without throttling the flow of air. By means of the described discharge valve, the suction in the collecting and separating chamber is always maintained unimpaired while the collected grain is being drawn off.

Still other mechanical advantages of the apparatus, not necessary to here particularize, will be apparent to persons familiar with the uses and functions of grain cleaners of this general type; and it will also be manifest that the structural details may be considerably varied without destroying the principle of action, or lessening the uses and advantages of the device. Hence, we do not limit the invention to the details of structure and arrangement herein presented for purposes of illustration, but reserve all such variations and modifications as fall within the spirit and purview of the appended claims.

We claim—

1. In an apparatus of the character described, the combination with the leg and head of a grain elevator, of a dockage collecting and separating chamber, a one-way suction conduit connecting said head and chamber, a fan located externally of said chamber, and a second suction conduit, independent of said first-named suction conduit, connecting said chamber with the section side of said fan.

2. In an apparatus of the character described, the combination with the leg and head of a grain elevator, of a hood in said head formed with an open lower end across which the grain discharged in said head flows, a fan communicating on its suction side with the upper portion of said hood, and a valve in said hood regulating the suction area of said lower open end.

3. In an apparatus of the character described, the combination with the leg and head of a grain elevator, of a hood in said head formed with an open lower end and an inclined side onto which the grain discharged in said head is thrown, a fan communicating on its suction side with the upper portion of said hood, and a plate mounted on said inclined side and adjustable lengthwise of the latter, whereby to adapt said inclined side to varying points of grain discharge in different heads.

4. In an apparatus of the character described, the combination with the leg and head of a grain elevator, of a hood in said head formed with an open lower end, a valve in said hood regulating the effective suction area of said lower open end, a dockage collecting and separating chamber, a pipe connecting the upper portion of said hood with the upper portion of said chamber, and a fan communicating on its suction side with said chamber.

5. In an apparatus of the character described, the combination with the leg and head of a grain elevator, of a hood in said head formed with an open lower end, a valve regulating the effective suction area of said lower open end, a dockage collecting and separating chamber, a pipe connecting the upper portion of said hood with the upper portion of said chamber, a dockage hood in said chamber formed with an open lower end, a fan communicating on its suction side with said dockage hood, and grain discharging means in said chamber operative to continuously seal the latter against the atmosphere.

6. In combination with the subject-matter of claim 5, a dockage control valve on said hood operative to regulate the effective suction area of the mouth of said hood.

7. In combination with the subject-matter of claim 5, a dockage control valve consisting of a plate hinged at its upper end to and parallel with a side wall of said hood with its lower end adapted to swing across the mouth of said hood and thereby regulate the effective suction area of the latter.

8. In an apparatus of the character described, the combination with a dockage collecting and separating chamber formed with a hopper bottom terminating in a valve seat, of a dockage hood mounted in said chamber, a fan communicating on its suction side with the upper end of said hood, a valve in said valve seat operating to deliver successive charges of dockage grain collected in said hopper and seal the latter against the atmosphere, and mechanism for actuating said discharge valve from the shaft of said fan.

9. In an apparatus of the character described, the combination with the leg and head of a grain elevator, of a dockage collecting and separating chamber, a fan connected on its suction side with said chamber, independent suction conduits connecting dif-

ferent points on said head directly with the upper portion of said chamber, and a valve for controlling the relative suctions exerted through said conduits.

10. In an apparatus of the character described, the combination with the leg and head of a grain elevator, of a dockage collecting and separating chamber, a fan connected on its suction side with said chamber, a hood in said head, a pipe connecting the upper portion of said hood directly with the upper portion of said chamber, a second pipe connecting a side of said head directly with the upper portion of said chamber, a suction regulating valve in said hood, and a valve in said chamber for controlling the relative suctions exerted through said pipes.

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BOLSTER SPRING SUSPENSION MECHANISM

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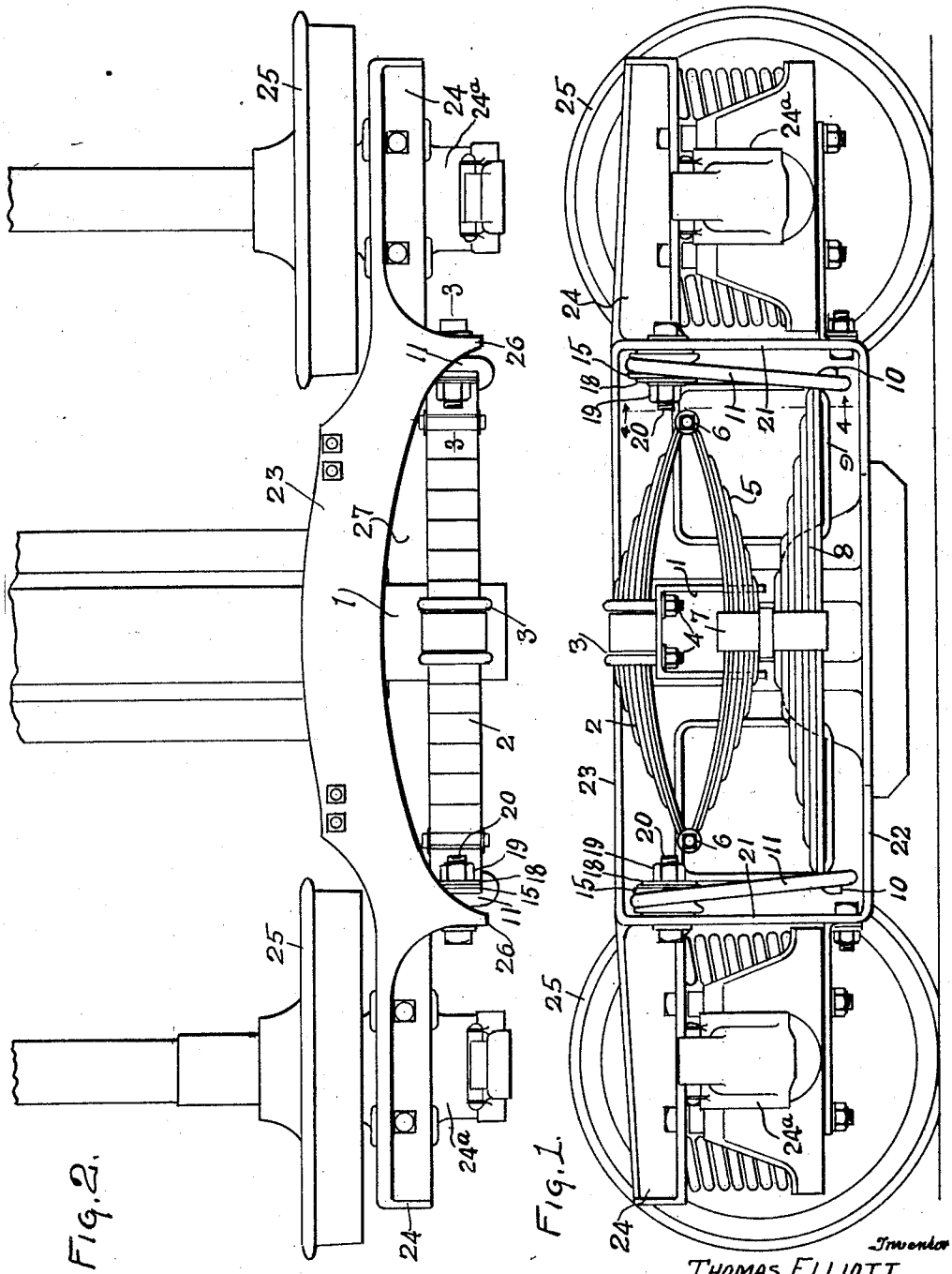


Fig. 2.

Fig. 1.

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