Oct. 10, 1950 L. DELIVUK 2,525,167

GRAIN ELEVATOR

Filed Feb. 13, 1948 3 Sheets-Sheet 1

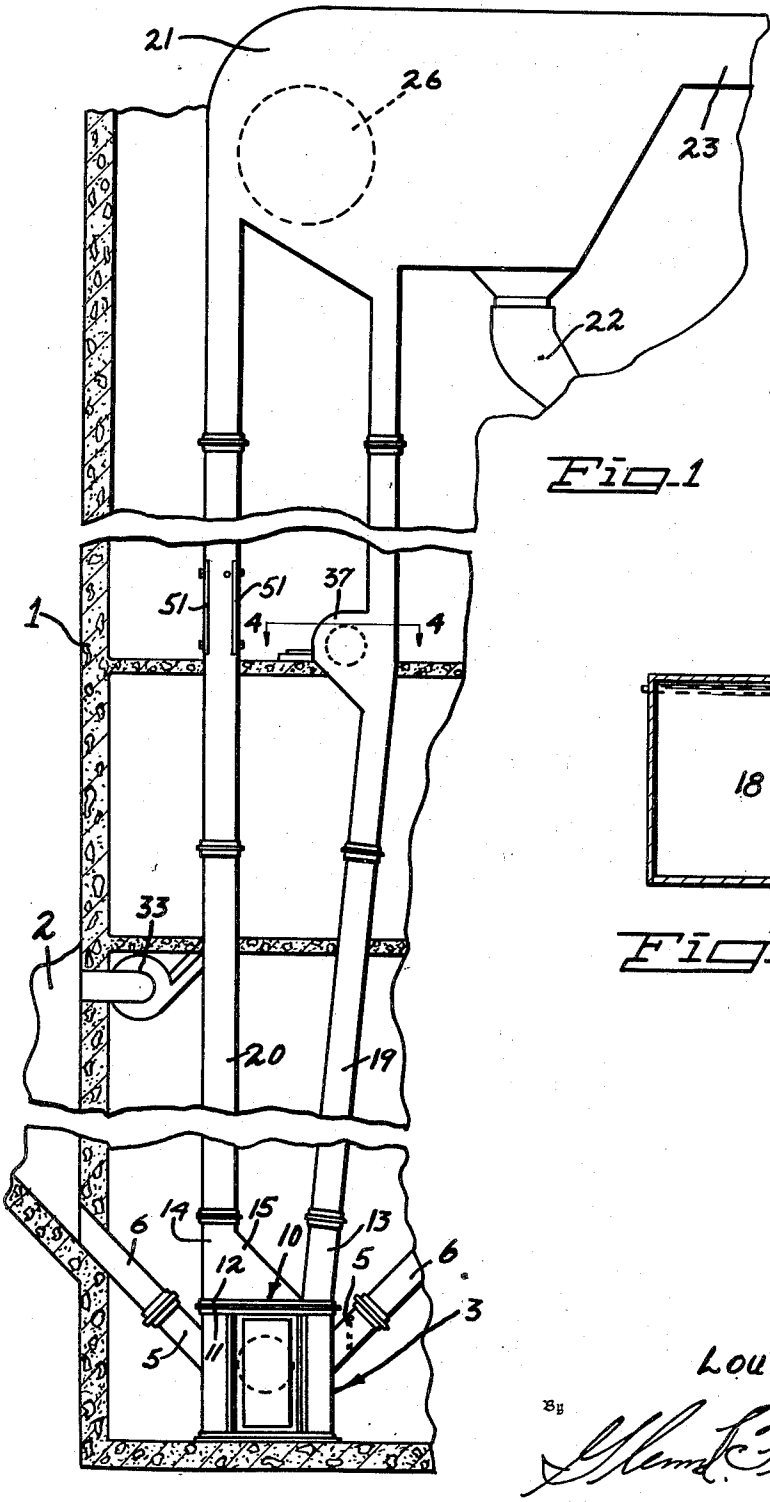


Fig. 1

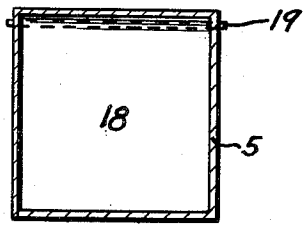


Fig. 8

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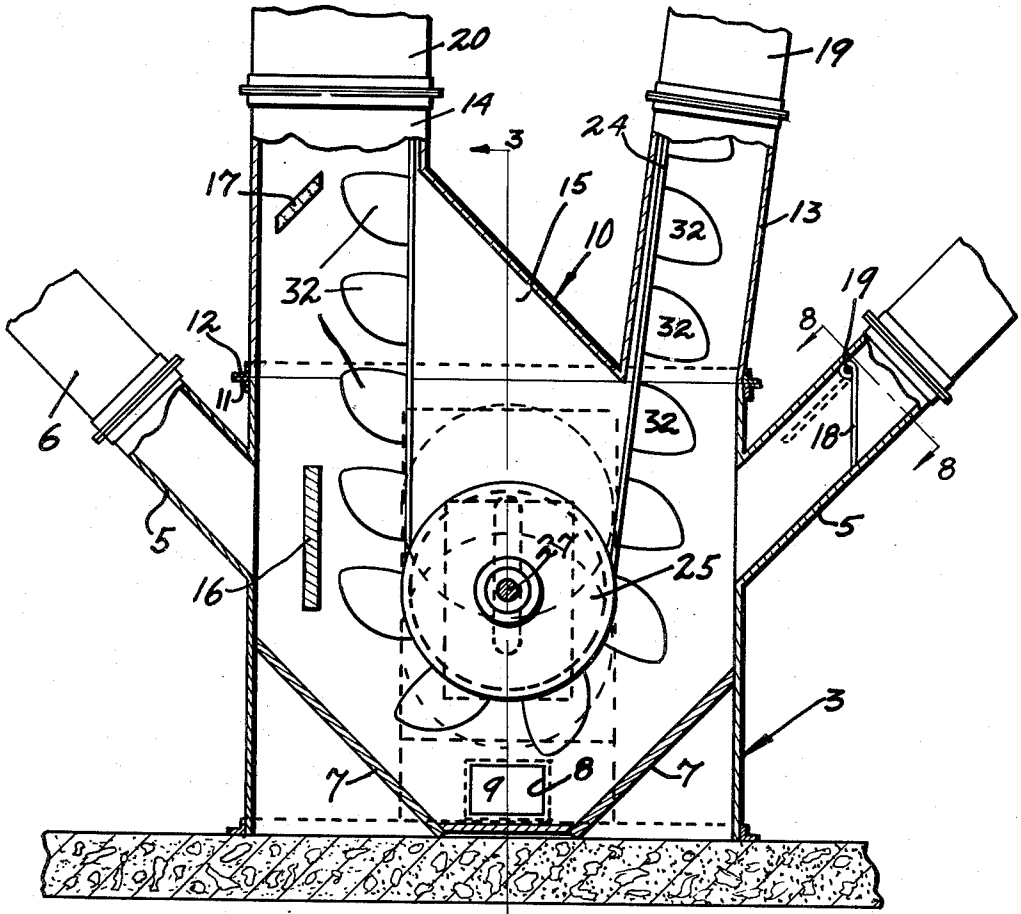


Fig. 2

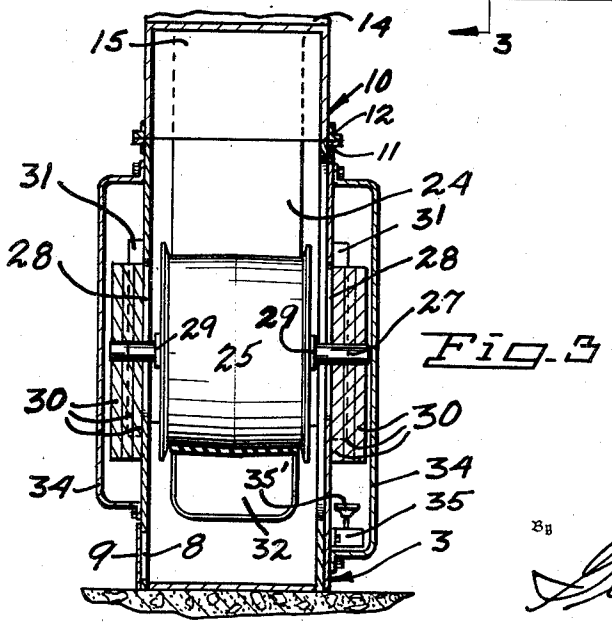


Fig. 3

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Fig. 4

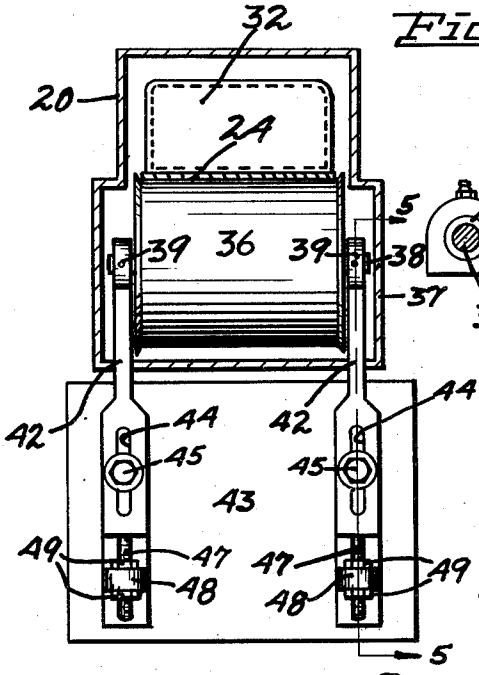


Fig. 5

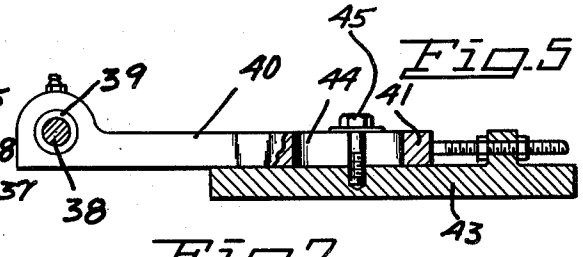


Fig. 7

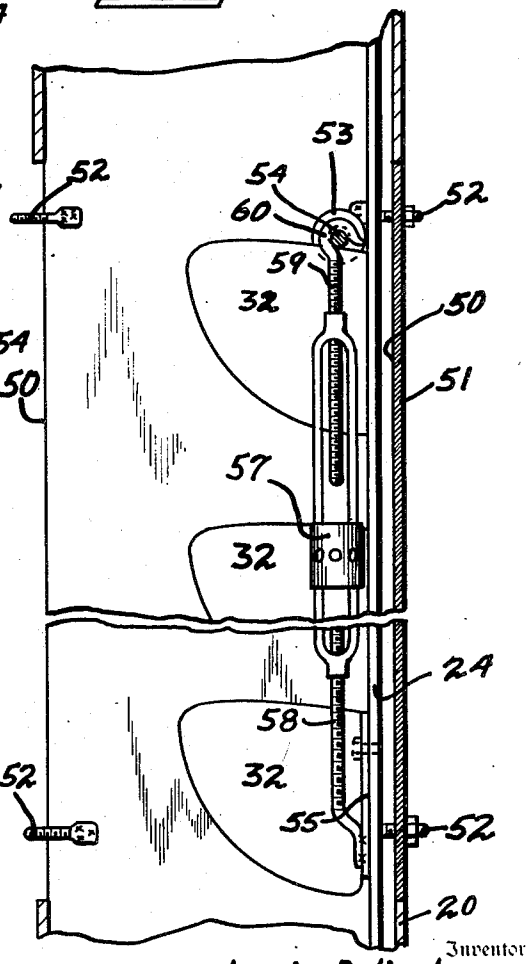
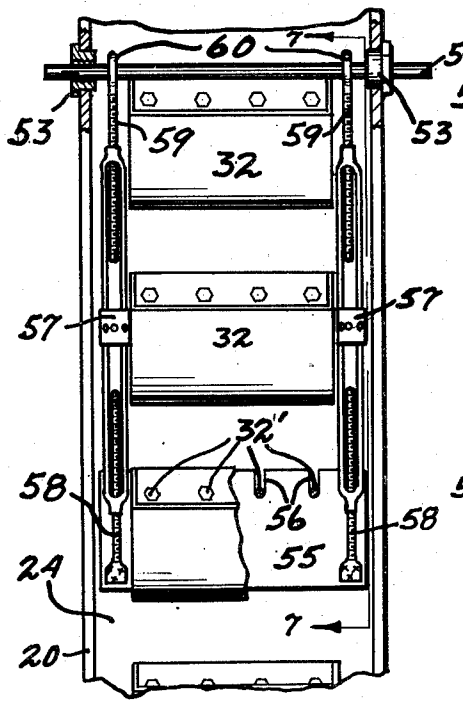


Fig. 6



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2,525,167

UNITED STATES PATENT OFFICE

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GRAIN ELEVATOR

Louis Delivuk, Spokane, Wash.

Application February 13, 1948, Serial No. 8,034

1 Claim. (Cl. 198—40)

1

This invention relates to a grain elevator and more particularly to a grain elevator of the type disclosed in my prior Patent 2,246,723 issued June 24, 1941 and my prior application filed February 20, 1946, Ser. No. 649,053 now Patent No. 2,482,159 granted Sept. 20, 1949.

One object of the invention is to provide an elevator of such construction that grain may be raised from the pit to an overhead spout or head without emitting dust which is present in grain as brought from a field to the elevator.

Another object of the invention is to provide an elevator wherein the grain is carried upwardly from the pit to the spout or head by an endless conveyor belt having flights moving longitudinally through vertical legs, the leg through which the upwardly moving flight passes being of greater diameter than the leg through which the downwardly moving flight passes so that when the conveyor is in motion buckets carried by the conveyor belt and moving downwardly may serve as impellers for creating an air current which flows upwardly through the large leg about upwardly moving buckets and carries dust upwardly with it into the head or spout.

Another object of the invention is to provide a grain elevator which has improved means for urging a pulley at the lower end of the conveyor downwardly and keeping the conveyor belt under proper tension.

Another object of the invention is to provide a grain elevator wherein mechanism has been provided for angularly adjusting a pulley engaged by one of the vertically moving flights of the conveyor belt and thus compensating for uneven stretch of the belt.

Another object of the invention is to provide improved means for drawing portions of one flight of the conveyor belt towards each other and thus create slack in this flight so that a portion of the belt may be removed in order to shorten the belt when necessary.

Another object of the invention is to provide a grain elevator having associated therewith a switch which is actuated to close a circuit for a signal when the belt is excessively stretched and thus warn an attendant that the belt should be shortened.

With these and other objects the invention consists of a special construction and arrangement of parts disclosed in the accompanying drawings wherein:

Fig. 1 is a view showing an elevator building in vertical section and the improved elevating mechanism in side elevation.

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Fig. 2 is a sectional view upon an enlarged scale taken vertically through the lower portion of the elevator.

Fig. 3 is a sectional view taken at right angles to Figure 2 along the line 3—3.

Fig. 4 is a transverse sectional view upon an enlarged scale taken along the line 4—4 of Figure 1.

Fig. 5 is a sectional view taken along the line 5—5 of Figure 4.

Fig. 6 is a fragmentary view showing in elevation the mechanism for shortening a flight of the conveyor belt.

Fig. 7 is a sectional view taken vertically along the line 7—7 of Figure 6.

Fig. 8 is a transverse sectional view taken along the line 8—8 of Figure 2.

This improved grain elevator may be of any size desired and is installed in a building 1 having at one side thereof a pit 2 located below the street or ground level so that trucks loaded with grain may be moved into position for dumping grain into the pit. A boot 3 is erected in the building below the level of the pit and consists of a neck 5 leading at an upward incline therefrom and connected with a feed pipe 6 which communicates with the bottom of the pit so that grain may flow from the pit and into the boot. Two of the necks 5 and feed pipes 6 have been shown in the drawings and it will be understood that each feed pipe extends from a pit. The boot 3 has a bottom 7 which tapers towards its center so that grain flowing into the boot will gravitate towards the center of the boot where it may be readily removed. One side wall of the boot is formed at its bottom with a clean-out opening 8 which is normally closed by a removable closure 9. The top 10 of the boot fits snugly thereon and is firmly secured by bolts, or equivalent fasteners passed through outstanding flanges of strips of angle metal 11 and 12 mounted about the boot and its top and contacting with each other. A packing is provided between contacting faces of the strips 11 and 12 to form a tight joint and other joints between portions of the casing and its necks and pipes secured thereto are tightly sealed to prevent escape of dust. Necks 13 and 14 extend upwardly from the top or cover 10 and it should be noted that the outlet neck 14 is of greater diameter than the inlet neck 13 and has its lower portion flared to form a large mouth 15 having its upper wall portion extending at an upward incline from the lower end of the neck 13 to a point adjacent the upper end of the neck 14. This allows air and dust to freely enter the outlet neck and flow upwardly

therethrough. Baffles 16 and 17 are mounted in the boot and the outlet neck for directing flow of grain into the boot and flow of air and dust upwardly through the neck 14. Air and dust should be prevented from flowing outwardly through the necks 5 and feed pipes 6, and this is accomplished by providing each neck 5 with a check valve 18 consisting of a plate of sheet metal pivoted at its upper end by a hinge pin 19 extending transversely through the neck and having the upper portion of the valve plate wrapped about it and secured. The valve is normally held in the closed position shown in full lines in Figure 2 by its own weight but when grain is dumped into the pit 2 and flows downwardly through the feed pipe leading therefrom and through the neck the valve will be swung upwardly to the opened position indicated by dotted lines in this figure.

Pipes 19 and 20, which may be referred to as legs extend upwardly from the necks 13 and 14 and are of an appropriate length to reach the head 21 mounted at an upper level of the building 1. This head is of the construction shown in my prior application filed February 20, 1946 bearing Ser. No. 649,053 and has a mechanism therein for separating dust from grain and delivering the clean grain to a spout 22 while the dust is discharged through the dust outlet 23. The leg 20 is of a diameter corresponding to that of the outlet neck 14 and is of appreciably greater diameter than the leg 19 and the inlet neck 13 to which the pipe 19 is attached.

An endless conveyor belt 24 has flights extending longitudinally through the vertical legs 19 and 20 and the necks 13 and 14 and has its lower end trained about a pulley 25 in the boot 3 and its upper end engaged about a conventional drive pulley 26 in the head 21. The pulley 25 is an idler pulley and is rotatably supported by an axle 27 which extends transversely of the boot and has end portions passing through slots 28 formed vertically in opposed side walls of the boot. Since the axle passes through vertical slots it may shift vertically in the casing and its weight will tend to apply tightening strain upon the conveyor belt. Sealed bearings 29 are provided at opposite sides of the pulley to accommodate the axle and retain grease by means of which they are lubricated. An appropriate number of metal plates or blocks 30 are mounted upon protruding end portions of the axle and constitute weights for imparting a downward thrust upon the axle and thereby cause the conveyor belt to be tightened by gravity pull, and in order to guide vertical movement of the weights there have been provided strips 31 which are secured vertically against outer faces of the side walls of the boot in such spaced relation to each other that the weights may slide freely between them.

During operation of the elevator the conveyor belt moves downwardly through the leg 19 and upwardly through the leg 20 and as buckets 32 carried by the belt move through the boot and about the pulley 25 they will scoop grain from a quantity of grain in the boot and carry it upwardly through the neck 14 and the leg 20. As the empty buckets move downwardly through the leg 19 and the neck 13 they serve as impellers for creating a flow of air through the casing and as this air flows upwardly through the pipe 20 it carries dust upwardly with it and into the head 21. The air displaced from the buckets, by filling with grain, will increase the velocity of the air travelling up the leg 20. The air current flowing upwardly through the pipe 20 is also augmented by a booster fan 33 which serves to withdraw dust from the pit 2. Hoods 34 which are removably secured against outer face of side walls of the boot enclose the weights and also serve to prevent escape of dust through the slots 28. One of the hoods is of greater depth than the other and in its lower end is mounted a switch 35 adapted to be closed by a pressure upon an upstanding button 35'. This switch is located under one of the weights and if the conveyor belt becomes stretched to such an extent that the buckets are liable to strike the bottom of the boot, pressure of this weight upon the button will close the switch and thus close a circuit for a signal (not shown) and an attendant will be warned that the conveyor belt must be shortened.

Some conveyor belts have a tendency to stretch at one side edge more than they do at their other side edge and in order to compensate for this there has been provided a pulley 36 located in a chamber 37 which projects laterally from the leg 19 intermediate the height thereof. This pulley may be termed an equalizer pulley and is rotatably mounted by an axle 38 which has end portions projecting from the pulley and rotatably mounted in bearings 39 formed at ends of the arms 40 of bearing brackets 41. The arms pass through openings 42 formed in the rear wall of the chamber 37 and the bearing brackets rest flat upon a platform 43 mounted horizontally back of the chamber. A slot 44 is formed longitudinally of each bearing bracket to accommodate a screw 45 engaged in a threaded socket formed in the platform 43 and from the rear end of each bracket extends a threaded stem 47. The stems slidably pass through lugs 48 rising from the platform and carry nuts 49 for engaging front and rear faces of the lugs. When the screws 45 are loosened the brackets may be individually shifted longitudinally to bring the pulley 36 into engagement with the conveyor belt and the nuts 49 then turned until all portions of the pulley have flat contacting engagement with the belt. The nuts will then be adjusted until they have gripping engagement with the lugs and the screws tightened until the brackets are firmly gripped. It will thus be seen that the two brackets will be securely held in adjusted positions and that each may be individually adjusted if it is found that the belt has become unevenly stretched and has a tendency to curl transversely.

When the belt becomes stretched to such an extent that the buckets are liable to strike the bottom of the boot and the switch 35 is closed to sound an alarm the belt must be shortened and in order to do so the device shown in Figures 6 and 7 is used. Openings 50 are formed in the leg 20 and normally closed by closure plates or doors 51, the doors being formed with openings to receive bolts 52 carried by the leg and serving to removably secure the doors in place. When the doors are removed a portion of the conveyor belt and its buckets will be exposed, it being understood that only one door may be removed if so desired. Bushings 53 are mounted through wall portions of the leg at opposite sides thereof to receive a rod 54 which is passed through the leg after the doors are removed. This rod extends across the leg above one of the buckets and after it is in place the belt is moved to shift the bucket under the rod upwardly into engagement with the rod. A plate 55 is then slid into place back of a bucket near lower ends of the openings 50

and pushed upwardly until the securing rivets **32'** for the buckets are engaged in slots **56** formed in the upper edge of the plate. Turnbuckles **57** have their lower threaded stems **58** secured to the plate and these turnbuckles extend upwardly near opposite ends of the blade in spaced relation to opposite side edges of the belt. The upper threaded stems **59** are formed with hooks **60** at their upper ends and these hooks are engaged over the rod **54**. It will thus be seen that the belt-lifting implement will be suspended from the rod **54** and anchored to a lower portion of the belt by the plate. By turning the turnbuckles upward pull will be exerted upon the plate and the rivets **32** engaged by the plate and the portion of the belt between the anchoring plate and the bucket engaged with the rod will be drawn upwardly until the lower end of the belt and the idler pulley **25** are raised a sufficient distance to eliminate danger of the buckets striking the bottom of the boot as they move about the idler pulley. The slackened portion of the belt is then cut to remove a portion thereof and the severed ends of the belt riveted to each other, thus again forming an endless belt and the belt-lifting implement removed and the doors or closure plates replaced.

Having thus described the invention, what is claimed is:

In a grain elevator, a hollow U-shaped boot provided with upwardly extending arms and having side walls formed with opposite vertically extending slots midway the legs, a hollow head having depending arms disposed over the arms of said boot in alignment therewith, tubular legs extending vertically between said head and said boot and connected with companion arms thereof, an idler pulley in said boot, an endless conveyor trained about said pulley and having flights extending longitudinally through the arms of the

boot and the head, an axle for said pulley having end portions extending from the pulley and passing through said slots and protruding from opposite sides of the boot, guides mounted vertically against outer faces of the side walls of said boot and spaced transversely from opposite sides of the slots, weights fitting loosely about the protruding end portions of said shaft and slidable vertically between said guide for urging the pulley downwardly and tightening said conveyor, hoods removably mounted against outer faces of the side walls of said boot and enclosing the weights and their guides, and a switch mounted at the bottom of one hood under the weight therein and actuated by the said weight for closing a circuit for a signal when the said weight moves downwardly an excessive distance into position to engage and close the switch.

LOUIS DELIVUK.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
222,137	Imhorst	Dec. 2, 1879
643,037	Bryan	Feb. 6, 1900
715,449	Willson	Dec. 9, 1902
748,551	Wilfley	Dec. 29, 1903
1,077,339	Farrell	Nov. 4, 1913
1,152,371	Meyer	Aug. 31, 1915
1,185,464	Baker	May 30, 1916
1,217,412	Chaplin	Feb. 27, 1917
1,391,703	Sturtevant	Sept. 27, 1921
1,728,283	Fisher	Sept. 17, 1929
1,934,481	Beyl	Nov. 7, 1933
1,995,425	Herring	Mar. 26, 1935
2,191,626	Rogers	Feb. 27, 1940