I. D. HUMPHREYS.

INDICATOR AND ALARM.

APPLICATION FILED MAY 23, 1917.

1,281,013.

Patented Oct. 8, 1918.

2 SHEETS—SHEET 1.

Fig. 1.

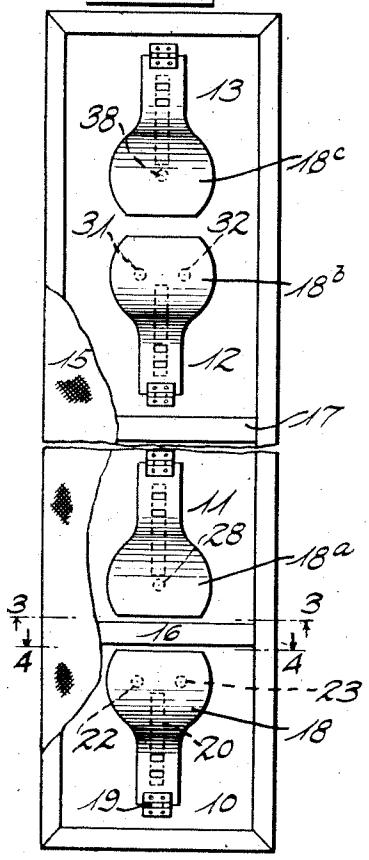


Fig. 2.

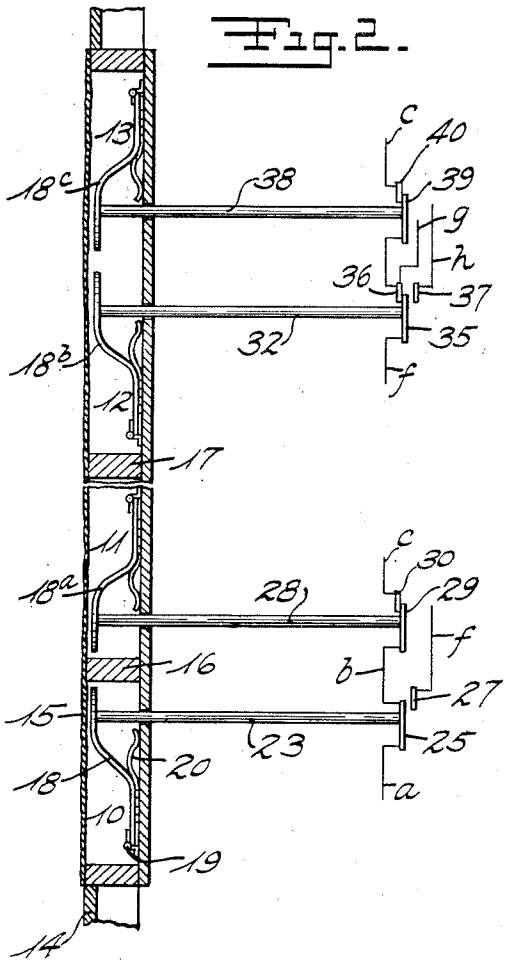


Fig. 3.

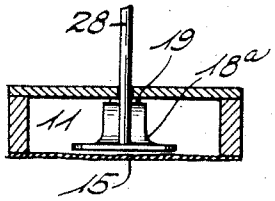


Fig. 4.

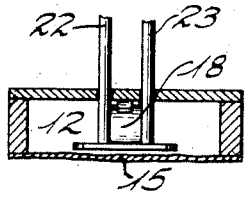
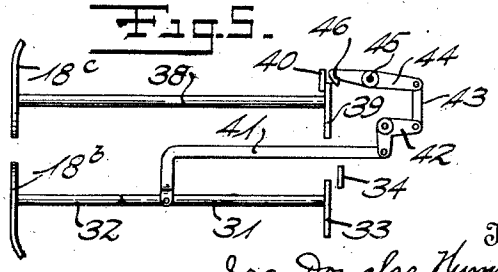


Fig. 5.



Inventor,
Ira Douglas Humphreys,
By his Attorney,
W. B. Hutchinson,

I. D. HUMPHREYS.

INDICATOR AND ALARM.

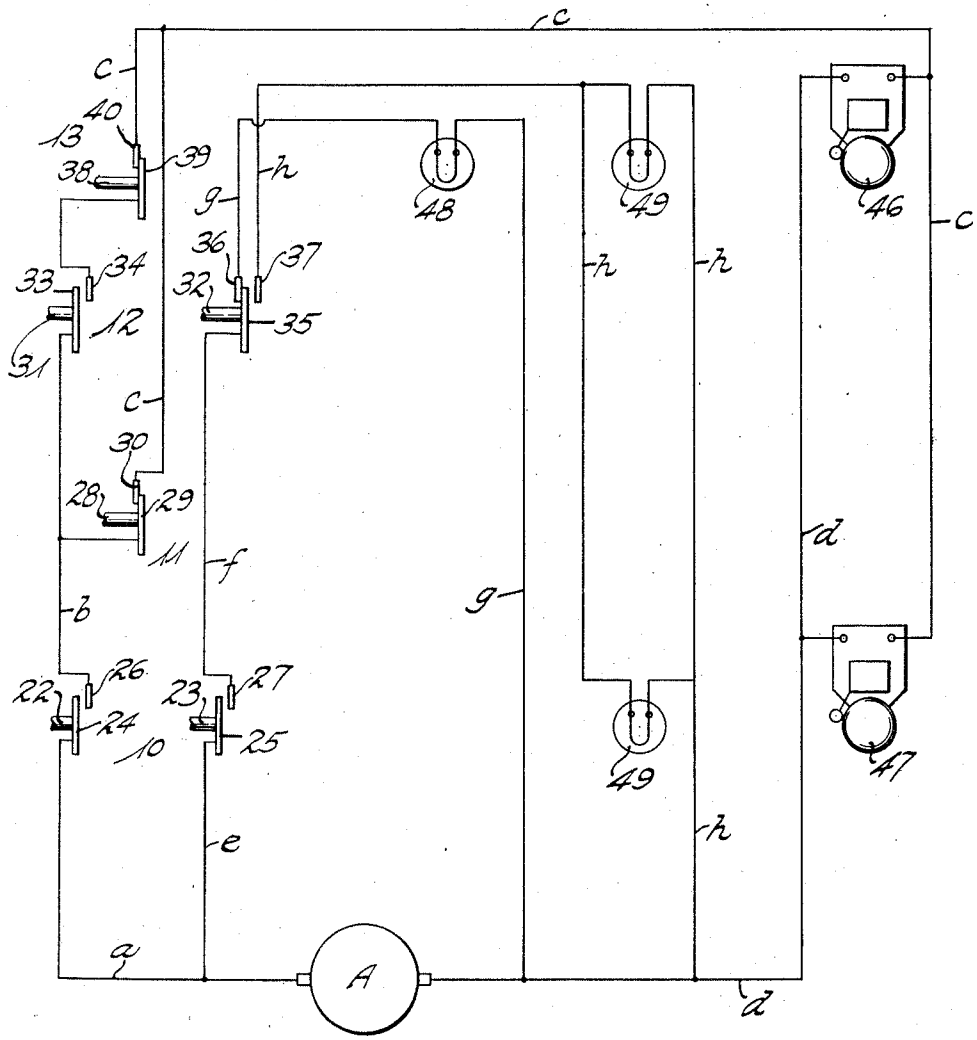
APPLICATION FILED MAY 23, 1917.

1,281,013.

Patented Oct. 8, 1918.

2 SHEETS—SHEET 2.

Fig. 6.



Ira Douglas Humphreys, Inventor,

By his Attorney,

W. B. Hutchinson.

UNITED STATES PATENT OFFICE.

IRA DOUGLAS HUMPHREYS, OF ELKVILLE, ILLINOIS.

INDICATOR AND ALARM.

1,281,013. Specification of Letters Patent. Patented Oct. 8, 1918.

Application filed May 23, 1917. Serial No. 170,422.

To all whom it may concern:

Be it known that I, IRA DOUGLAS HUMPHREYS, a subject of the King of Great Britain, and a resident of Elkville, Jackson county, Illinois, have invented a new and useful Improvement in Indicators and Alarms, of which the following is a full, clear, and exact description.

My invention relates to improvements in indicators and alarms, and is especially applicable to bins which are to be filled with fine flowing material such for instance as grain, and which will indicate by both audible and visual signals when the bin is nearly full. The object of my invention is to produce a very simple and reliable device which will work positively, and which when the bin is filled to a certain point will operate to sound an audible signal and set the visual signal, such for instance as closing a circuit through an electric bell, and also through a cautionary light, preferably a green light. When the material rises a little farther the apparatus operates to open the bell circuit but to leave the cautionary light burning. When the grain rises still farther, the circuit through the caution light is broken and the circuit closed through danger signals such for instance as red lights, and the bell circuit again closed, and when the material reaches practically the top of the bin the audible signal is stopped and the red lights left burning so that an attendant can see that the bin is full and he can shut off the source of supply. In carrying out this invention I use preferably a set of diaphragms arranged in series one above the other in the bin wall and these operating by the pressure of the material against them actuate circuit closers as above indicated. It will be understood from the description which follows, however, that the apparatus can be made to operate any usual or preferred audible or visual signals. Another object of my invention is to make the apparatus as simple as possible and to arrange the flexible diaphragms and signal operating mechanism so that the operating parts cannot well be disturbed or disarranged, but will be positive in operation.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar reference characters indicate corresponding parts in all the views.

Figure 1 is a broken front elevation of a part of the apparatus embodying my invention.

Fig. 2 is a vertical section of the structure shown in Fig. 1.

Fig. 3 is a cross section on the line 3—3 of Fig. 1 looking in the direction of the arrow.

Fig. 4 is a cross section on the line 4—4 of Fig. 1 looking in the direction of the arrow.

Fig. 5 is a detail of a mechanical connection between parts of the two lower sections of the apparatus, and

Fig. 6 is a diagram of the electrical circuits.

The apparatus as shown has four sections 10, 11, 12 and 13 arranged one above the other, the two lower sections being in separate cells or chambers, and the two upper sections being in a cell or chamber, but so far as the working of the apparatus is concerned the division of the cells is not material, and there might be a greater or less number of sections of the apparatus, though I find four to be the best suited for the purpose. The several cells or sections are covered by a flexible diaphragm 15 which can be of loose canvas, or anything suitable for the purpose, and this part of the apparatus is preferably contained in the wall 14 of the bin. The partitions 16 and 17 indicate the separation between the cells or chambers 10, 11 and 12, and I have shown a break between the sections 11 and 12 to indicate that the two lower sections can be spaced apart some little distance from the two upper sections if desired. In the lower section and lying close behind the diaphragm 15, is a swinging arm 18 preferably wider at one end than at the other, and while this might be a spring arm, I prefer to have it hinged at the narrow end as shown at 19 and normally pressed toward the diaphragm by a spring 20. It is provided with two outwardly extending rods 22 and 23, the former having the contact 24 to touch a fixed contact 26, and the latter 23 having a contact 25 to touch the fixed contact 27. The circuits of these contacts will be traced below and described in the operation of the apparatus.

In the section 11 is a second arm 18^a like the arm 18 except that it is preferably reversed having its narrow part uppermost,

and this has a rod 28 with a contact 29 at one end engaging a fixed contact 30.

Above the section 11 is a third swinging arm 18^b which has two rods 31 and 32 extending outward and provided with contacts 33 and 35, the contact 33 being adapted to connect with a fixed contact 34 and the contact 35 moving between the two fixed contacts 36 and 37.

Above the arm 18^b is a fourth arm 18^c in the section 13, which has a rod 38 extending outward and provided with a contact 39 engaging the fixed contact 40.

The rod 31 of the arm 18^b has a fixed arm 41 thereon connecting with a pivoted bell-crank 42, and the latter connects with a link 43 of the tilting lever 44 which is pivoted as shown at 45 and has a hook 46 at the end to engage the contact 39 when the latter is pushed in, and prevent it from again closing the bell signal when the material in the bin is lowered as presently described. Obviously other means might be employed for the same purpose. The same connection just above described between the sections 12 and 13 is also applied to the two lower sections 10 and 11, so that when the bin is being emptied the bell circuit will be prevented from operating and ringing the bell, and the grain or other material leaves the member 18^a.

It will of course be evident that the pressure of the material on the diaphragm and on the several arms 18, 18^a, 18^b and 18^c and on their connecting rods, might be made to operate various forms of visual and audible signals, but the simplest and most obvious signals to operate are electric bells and lights. I have therefore shown electric connections for this purpose.

Referring to the diagram, a source of electric supply A connects by a wire *a* with the contact 24, and the contact 26 connects by the wire *b* with the contacts 33 and 29. The contact 30 adjacent to the contact 29 connects by a wire *c* with the two bells 46 and 47, and from these a wire *d* leads back to the source of supply A. From the wire *a*, a branch wire *e* connects with the contact 25, and a wire *f* leads from the adjacent contact 27 to the contact 35. From one of the adjacent contacts 36 a wire *g* leads through the cautionary or green light 48 back to the source of electric supply, and from the contact 37 a wire *h* leads through the red lights 49 back to the source of electric supply.

The operation of the apparatus is as follows: As the loose material rises in the bin it reaches the diaphragm 16 over the lower section 10, and the pressure of the material pushes the diaphragm against the arm 18 which moves outward and closes the contacts 24—26 and 25—27, whereupon the bell circuit is closed, the current flowing from the source A through the wire *a*, the contacts 24—26, the wire *b*, the contacts 29—30, the wire *c*, the bells 46—47, and the wire *d* back to the source. The circuit through the cautionary light 48 is also closed, the current flowing from the source A, through the wires *a*—*e*, the contacts 25—27, the wire *f*, the contacts 35—36, and the wire *g* including the light 48, back to the source. As the material continues to rise it comes opposite the next section 11 and pushes out the arm 18^a which breaks the circuit between the contacts 29 and 30, thereby cutting out the bell circuit and stopping the annoyance of the ringing gongs, but leaving the cautionary signal 48 burning. As the continuously rising material reaches the next section 12 it pushes out the arm 18^b thereby closing the contacts 33—34 and 35—37. The breaking of the circuit at the points 35—36 cuts out the cautionary signal 48, and the closing of the circuit at the point 33—34 again cuts in the bell circuit, the bell circuit flowing from the source A through the wire *a*, the contacts 24—26, the wire *b*, the contacts 33—34, the wire *c* including the contacts 39—40, the bells, and the wire *d* back to the source. At the same time the circuit through the red lights is closed the current passing from the source A through the wire *e*, the contacts 25—27, the wire *f*, the contacts 35—37, the wire *h*, including the red lights 49 back to the source. When the material rises opposite the last section 13 the bell circuit is again cut out because the upper arm 18^c and rod 38 are moved outward thereby breaking the bell circuit at the points 39—40 but leaving the red lights burning through the circuit just above traced.

The structure shown in Fig. 5 is to prevent the necessity of operating a switch when the bin is emptied, and to prevent the bell circuit from being again closed. It will be seen that when the arm 18^b is pushed out by the rising material, it will act on the rod 41, bell crank 42, link 43 and lever 44, so as to bring the hook 46 into position to engage the contact 39, when the latter is pushed outward at the time the material rises to the position opposite the arm 18^c. The hook engaging the contact 39 prevents the contact from springing back against the contact 40 when the material is lowered and pressure is reduced from the arm 18^c. Otherwise the pressure from the arm 18^c would allow the contacts 39—40 to close, thus closing the bell circuit when the bin is being emptied and making it necessary to operate some form of switch to stop the annoyance of the bell signal.

From the foregoing description it will be seen that I provide a simple and absolutely automatic device which will indicate both audibly and visually when the bin is

approaching fullness, and will do this in time to allow an attendant to make any necessary provisions for stopping the flow or shifting the flow from one bin to another. Also that the gongs are cut out at the proper time, and that the visual signal is cut in and left in at the danger point so that the attendant has merely to notice the red light or a similar signal to know that the bin is substantially full.

It will be further understood that as above noted other forms of visual and audible signals can be substituted for those shown without affecting the invention.

Attention is called to the fact that while the apparatus can be used as a whole in the manner described, either of the series of indicators can be used separately to indicate the fullness of the bins.

I claim:—

1. An apparatus of the kind described comprising visual and audible signals, a diaphragm arranged in contact with the material in a container, apparatus arranged in series behind the diaphragm and actuated by the movement of the diaphragm, one part of said apparatus acting to cut in both the audible and visual signals, and the second part of the apparatus acting to cut out the audible signal.

2. An apparatus of the kind described comprising a flexible diaphragm arranged in contact with material in a bin or the like, a cautionary visual signal, an audible signal, a danger signal, and apparatus arranged in series one above the other and actuated by the pressure of material against the diaphragm, the lower section of apparatus acting to cut in the audible and cautionary visual signals, the second set of apparatus being arranged to cut out the audible signal, and the third set of apparatus being arranged to cut out the cautionary signal and cut in the visual danger signal and the audible signal.

3. An apparatus such as described comprising a visual cautionary signal, an audible signal, and a visual danger signal, and mechanisms arranged in series one above the other and actuated by rising material in a bin or the like, the lowest set of mechanism acting to operate both the cautionary and audible signals, the second set of mechanism acting to cut out the audible signal, the third set of mechanism acting to cut out the cautionary signal and cut in the audible and danger signals, and the fourth set of mechanism acting to cut out the audible signal.

4. An apparatus of the kind described comprising visual and audible signals, a diaphragm arranged in contact with the material in a container, and mechanism arranged in series one above the other behind the diaphragm and actuated by varying height of material in the container pressing against the diaphragm to vary the system of signals by cutting in and out the audible and visual signals.

5. An apparatus of the kind described comprising an electric bell, a cautionary electric light, a danger electric light, a series of members arranged one above the other in the wall of a bin or the like and actuated by the pressure of rising material in said bin, and electric connections whereby the lowermost member cuts in the bell and cautionary light, the next member above cuts out the bell, the next succeeding member cuts out the cautionary light and cuts in the danger light and bell, and the final member cuts out the bell.

6. An apparatus of the kind described comprising an audible electric alarm, a cautionary electric light, a danger electric light, a series of movable members arranged one above the other and operated by the rise of material in a bin or the like, slide rods operated by said members, and electric connections whereby the outward movement of the lower member cuts in the audible alarm and the cautionary light, the second member cuts out the audible alarm, the third cuts out the cautionary light and cuts in the audible alarm and the danger light, and the fourth cuts out the alarm.

7. An apparatus of the kind described comprising audible and visual signals, movable members arranged one above another in position to be acted on by the pressure of material in a bin or the like, mechanism for operating the audible and visual signals by the rise of material in the bin and the outward movement of said movable members, and means for preventing the operation of the audible signal when the material is lowered in the bin and the movable members swing inward.

IRA DOUGLAS HUMPHREYS.

Witnesses:
J. W. Pappan,
W. J. Roberts.