March 17, 1959 J. E. TORGERSON 2,877,784

SAFETY WATER SUPPLY SHUT-OFF DEVICE

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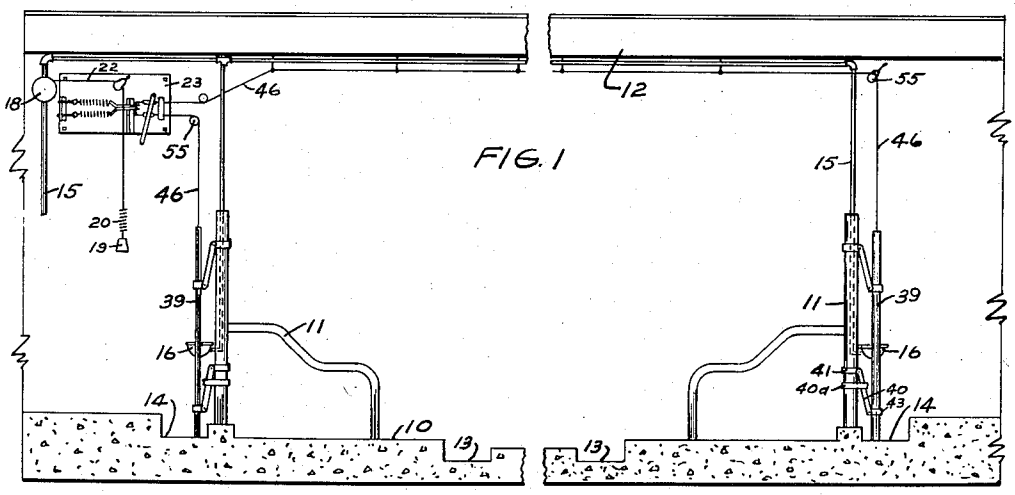


FIG. 1

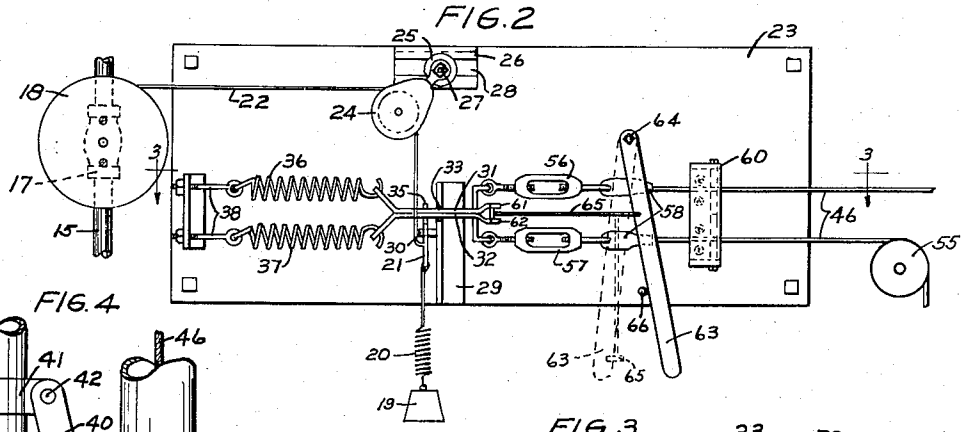


FIG. 2

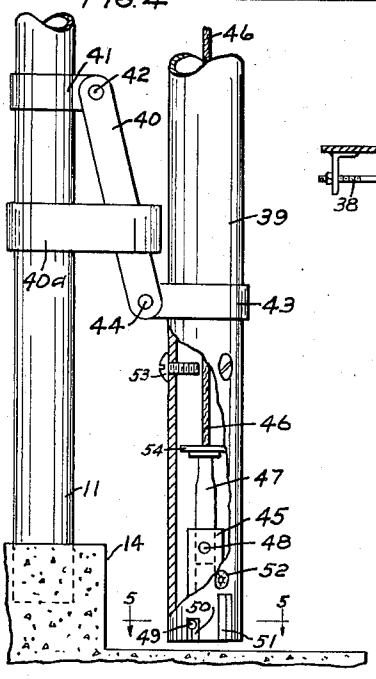


FIG. 4

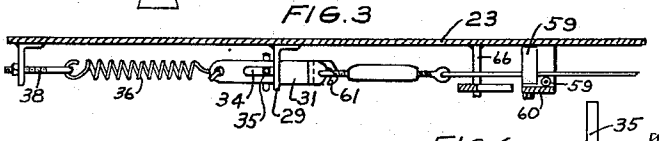


FIG. 3

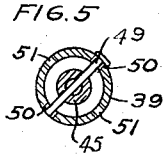


FIG. 5

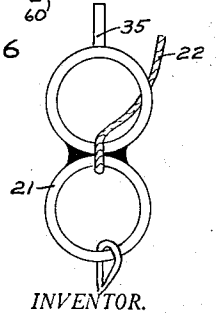


FIG. 6

INVENTOR.
JOHN E. TORGERSON
BY
Williamson, Schroeder,
Adams + Meyers
ATTORNEYS

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SAFETY WATER SUPPLY SHUT-OFF DEVICE

John E. Torgerson, Menomonie, Wis.

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6 Claims. (Cl. 137—67)

This invention relates to water supply shut-off mechanisms and more particularly to such mechanisms responsive to presence of small quantities of water in a barn manger due to such causes as the overflowing of livestock drinking cups.

Although having running water in a barn is highly desirable, one common disadvantage is that occasionally the barn floor will become flooded. One cause of this is the failure of drinking cup valves to close tightly when rust or scale or some other foreign matter gets under the valve element and prevents it from seating properly, or when the drinking cup paddle sticks and prevents closing of the valve.

It is believed to be obvious that it is extremely important that the barn floor be kept dry because if the floor is damp or flooded, cattle sickness is promoted, diseases are easily spread, feed is ruined, and of course there is substantial work involved in cleaning out a flooded floor.

An object of my invention is to provide new and improved apparatus of simple and inexpensive construction and operation for shutting off the water supply in a barn when flooding occurs in the barn.

Another object of my invention is the provision of a novel mechanism for detecting the presence of water standing on a surface and for causing operation of a water and supply control in response to presence of such water.

Still another object of my invention is to provide improved release mechanism operating in response to detected presence of water on a surface for actuating water supply shut-off mechanism.

A further object of my invention is to provide an improved water supply shut-off apparatus which may be placed in substantially any position in a barn without particular regard to the location of water presence detecting devices which cause operation of the apparatus.

A still further object of my invention is to provide novel apparatus for resetting the releasing and detecting mechanisms after presence of water has been detected and the water supply shut-off mechanism has been operated.

These and other objects and advantages of my invention will more fully appear from the following description made in connection with the accompanying drawings wherein like reference characters refer to the same parts throughout the several views and in which:

Fig. 1 is an elevation view showing the general arrangement of the present invention as applied in a barn;

Fig. 2 is an enlarged detail elevation of the control apparatus for operating the water supply shut-off device;

Fig. 3 is a detail section view taken on a horizontal plane as indicated at substantially 3—3 in Fig. 2;

Fig. 4 is a detail elevation view, partly broken away, of the water detecting release mechanism;

Fig. 5 is a detail transverse section view taken substantially at 5—5 in Fig. 4; and

Fig. 6 is a detail elevation of the connecting link to be hereinafter more fully described.

One form of the present invention is shown in the

drawings and is described herein. The barn structure includes a floor 10, stanchion fixtures 11 and a ceiling 12. The floor 10 of the barn has the conventional gutters 13 formed therein and mangers 14. A water supply is provided in the barn and is manifested by the water pipe 15 which connects to the drinking founts or cups 16 which are conventionally located above the mangers 14 and carried on the stanchion fixtures 11. The water supply has a shut-off device which in the form shown, is embodied by valve 17. Valve 17 controls the water supply to all of the cups 16. The water supply shut-off device could as well take a different form such as an electric switching mechanism for controlling the pump motor for the water supply and it is specifically understood that where, herein, the term water shut-off device is used, it is intended to embrace all such types of valves, pump control mechanisms and the like.

The valve 17 has a movable control member 18, which in the form shown comprises a pulley secured to the rotary valve handle and the valve stem for operating the valve when turned. Operating mechanism is provided for moving the valve control member 18 and in the form shown, such means comprise a weight 19 which is connected to an expandible coil spring 20 and a connecting link 21 and an elongated flexible connecting element 22 which in the form shown comprises a cable. A frame member or supporting structure 23 comprising a rigid metal plate is secured as by bolts to the barn wall. A guiding pulley 24 is carried by the frame plate 23 and has the cable 22 trained thereover. The position of pulley 24 is adjustable and pulley 24 is secured to the frame plate 23 through a slide 25 and a track 26 which is affixed to the plate 23. The slide 25 comprises in the form shown, an elongated bolt 27, the head of which bears against the inner surface of the track 26 and the shank of which extends outwardly through the slot 28 in the track. The shank is secured to the track by means of nuts and the pulley 24 is also secured on the shank by means of a nut. When the weight 19 is carried or supported by the cable 22, the control member 18 of the valve 17 is biased so as to move for closing the valve.

Means are provided for supporting the weight 19 on the frame plate 23 and restraining movement of the control 18 and in the form shown, an angle 29 is affixed as by welding to the plate 23, and a supporting lug 30 is affixed to the angle 29. Link 21 receives the lug 30 through its upper eyelet and is normally supported thereon for supporting the weight 19 and precluding operation of the valve 17.

A triggering mechanism is provided for moving the link 21 off the lug 30 and thereby permitting the weight 19 to bear against and move the valve control member 18 for closing the valve. Such triggering mechanism also includes mechanism for detecting the presence of water standing in the manger 14 of the barn. In the form shown such triggering mechanism includes a pair of elongated and rigid actuating members 31 and 32 which are shiftably mounted in a slot 33 in the angle 29. Actuating members 31 and 32 have elongated slots 34 therein which are normally in registration with respect to each other and which are disposed with one end immediately adjacent the angle 29. An upwardly projecting finger 35 is provided on the link 21 and normally extends upwardly through the slots 34. Springs 36 and 37 are respectively connected with actuating members 31 and 32 and are secured to the frame plate 23 as by bolts 38 for normally urging the actuating members 31 and 32 toward the left as seen in Figs. 2 and 3 and for urging the link 21 off the lug 30.

The detecting mechanism which is best seen in Figs. 1 and 4 is connected with the actuating members 31 and 32 to restrain movement thereof until the presence of

water is detected in one of the mangers 14. An elongated tubular mounting 39 is mounted in an upright position on each of the stanchion fixtures 11 adjacent the corresponding manger 14 and the tubular mounting 39 is adjustably secured to the stanchion fixtures for vertical shifting movement. Connecting arms 40 are vertically swingably secured to the stanchion fixtures 11 by means of a bracket 41 to which the arm 40 is secured by a pivot 42. Swingable arms 40 are connected to the tubular mountings 39 by means of brackets 43 and pivots 44. Tubular mountings 39 are retained with their lower ends adjacent the bottom of the manger by means of a retaining band 40*a* which encircles the stanchion post and the swingable arm 40 and is slidable upwardly to release the arm 40 and permit upward swinging of tubular mounting 39.

A releasable retaining element 45 is secured in the lower end of tubular mounting 39. The release element 45 may be constructed of any suitable material which is substantially weakened when in contact with moisture so as to permit tearing and pulling apart by tension applied thereto. The release element 45 is connected by means of cable 46 to one of the actuating members in the triggering mechanism for holding the actuating member against the tension of the corresponding spring to prevent movement of the actuating member. In the form shown, release element 45 is constructed of a short length of tubular kraft cardboard. Release element 45 is connected to the cable 46 in the form shown, by a short length of copper tubing 47 which is crimped at its upper end onto the cable 46. The lower end of the connector 47 is inserted into the interior of release element 45 and a pin 48 extends into suitably provided apertures in the release element 45 and connector element 47. Another pin 49 extends through the lower end of release element 45 to be secured in the lower end of tubular mounting 39. Two pairs of diametrically opposed pin-receiving slots 50 and 51 are formed in the bottom of the tubular mounting 39 and it will be noted that the slots 51 are longer than the slots 50 whereby to provide adjustability in the position of the release element 45 in relation to the bottom surface of the manger 14. Apertures 52 are provided in the tubular mounting 39 above the slots 51 to permit water to flow into the interior of the pipe 39 if the bottom should become plugged.

A number of radially inwardly projecting screws 53 are carried in the tubular mounting 39 adjacent the lower end thereof, and an enlarged abutment 54, which in the form shown comprises an annular disc or washer is carried on the upper end of the connecting element 47 whereby to restrict the upward movement of cable 46 when the release element 45 ruptures and permits movement of the cable.

The cables 46 extend upwardly through the tubular mountings 39 and are guided by suitable pulleys 55 to the frame plate 23, and are connected to the actuating members 31 and 32 by means of turnbuckles 56 and 57 to permit adjustment of the length of the cables. Cables 46 are connected to the turnbuckles as by crimped cable connectors 58. A plurality of horizontal and vertical guiding rollers 59 are carried on a suitable bracket 60 which is affixed as by welding to the frame plate 23. The cables 46 pass between adjacent horizontal rollers and along the vertically disposed rollers to be guided thereby so as to properly guide the cables 46 to exert pressure against the actuating members 31 and 32 in a direction parallel to the movement thereof.

Means are provided for resetting the triggering mechanism after the same has been operated by rupturing of one of the release elements 45. The actuating members 31 and 32 are provided with adjacent, but spaced hooks 61 and 62. A resetting lever 63 is swingably secured on a post 64 and has a substantially T-shaped connecting element 65 swingably secured thereto for simultaneously

engaging both the hooks 61 and 62, and for individually engaging the different hooks 61 and 62, dependent whether or not both of the members 31 and 32 need resetting. An abutment post 66 is affixed to frame plate 23 as by welding adjacent the outer end of lever 63 to provide means for holding the lever 63 in its resetting position.

In operation, the valve 17 is normally open so as to permit water to flow to the drinking cups 16. If for any reason the drinking cup valve (which is conventional to livestock watering cups and which is operated by the livestock) becomes stuck for any reason so as to permit water to continue to flow, the water will accumulate in the manger 14. When the level of the water in the manger rises to the lower end of the tubular mounting 39 and into engagement with the release element 45, the release element will absorb water and will rupture under the influence of one of the springs 36 and 37 which bears thereagainst through cable 46. The connecting element 47 and abutments 54 will move upwardly until the abutment engages the stop screws 53. The movement permitted is sufficient to permit one of the actuating members 31 or 32 to move the link 21 off the lug 30. It should be noted that because the slots 34 are elongated, movement of only one of the actuating members 31 is needed to move the link 21 off the lug 30. It is extremely unlikely that both of the release elements in the different mangers would release simultaneously although it is extremely desirable that either one should operate the release mechanism.

When the link 21 is removed from lug 30, weight 19 bears against the valve control member 18 which turns the same to operate the valve. When the valve is closed, the water supply to the drinking cups is shut off.

To reset the triggering mechanism, the T-shaped connecting element 65 is connected to the hook of the actuating member which has been released and the lever 63 will be swung from the dotted position thereof shown in Fig. 2 to the full line position and will be pressed against the abutment 66 so as to be held in that position. The band 40*a* which holds the tubular mounting 39 in its downward position, will be moved upwardly to release the arm 40 and the tubular mounting 39 will thereupon be swung upwardly. When tubular mounting 39 is swung upwardly, the ruptured release element 45 and connecting element 47 extend downwardly through the open lower end of the tubular mounting. If necessary a small tool may be used to reach up into the tubular member and pull the ruptured release element and cable downwardly. Pin 48 will then be removed and a new release element 45 will be inserted to replace the one which has previously ruptured. The pin 49 will be inserted into the new release element, and the release element will be moved upwardly into the lower end of tubular mounting 39 and the pin 49 will be repositioned into one of the slots 50 and 51. Tubular mounting 39 will thereafter be swung downwardly and held in position by the band 40*a*. At this time tension will be re-established in the cable 46. The connecting element 65 is released from the hook and permitted to swing downwardly as shown in the dotted position in Fig. 2.

It will be seen that I have provided a new and improved mechanism for detecting the presence of water in the manger of a barn before the water overflows to the barn floor and for operating the water supply shut-off device in response to the detected presence of water.

It should also be noted that I have provided a new and improved triggering mechanism of extremely simple and novel construction for causing operation of biasing means bearing against the control of the water shut-off device. The triggering mechanism may be located in any desired position relative to the valve and the cable-guiding pulley may be adjusted to permit this relative positioning so as to cause vertically guided movement of the weight which operates the valve.

It will, of course, be understood that various changes may be made in the form, detail, arrangement and proportion of the parts without departing from the scope of my invention which consists of the matter described herein and set forth in the appended claims.

What is claimed is:

1. In apparatus for controlling the water supply in barns and the like, comprising a water supply shut-off device having a movable control for shutting off the water, operating means connected with said control for moving the same, triggering mechanism connected with said operating means and restraining operation thereof, said triggering mechanism including an upright tubular member having a lower end disposed closely adjacent the bottom of the manger of the barn, movable means secured to the barn structure mounting said tubular member for vertical shifting, a release element constructed of water-absorbent material which substantially weakens when wetted to permit rupturing thereof, said release element being mounted on the lower end of said tubular member, an elongated connecting element secured to the release element and extending upwardly through the tubular member, and said triggering mechanism including a movable spring-pressed actuator for triggering said operating means, said actuator being connected with said connecting element to be restrained thereby, whereby when water in the manger engages the release element, the water shutoff device will be operated.

2. The invention as set forth in claim 1 wherein said tubular mounting has two pairs of longitudinally extending pin-receiving slots in the lower end thereof, each of said slots being opposite the other slot in its pair, one of said pairs of slots being longer than the other of said pairs and a pin extending through said release element and also extending through one pair of slots for securing the release element in the tubular member.

3. The invention as set forth in claim 1 and said release element being constructed of kraft cardboard.

4. In apparatus for controlling the water supply in barns and the like, comprising a water supply shut-off device having a movable control for shutting off the water, an elongated flexible connecting element secured to said control, biasing means secured to said connecting element and continuously bearing thereagainst for operating said control, a frame securable to the barn structure and having a lug affixed thereon, a connecting link removably mounted on said lug and secured to said connecting element intermediate the movable control and the biasing means for restraining the biasing means and precluding operation of the movable control, said connecting link having an outwardly projecting finger thereon, a pair of actuating members shiftably mounted in juxtaposition on the frame for parallel movement and adjacent the link for engaging and moving the link off the lug, said actuating members having elongated slots in registration with each other, said finger extending through the registered slots to be moved by one of the actuating members to disengage the link from said lug, a pair of springs respectively bearing against said actuating members and against the frame for individually moving said actuating members, whereby to move said link off the lug, and a pair of releasable water-detecting mechanisms secured on the barn structure and being constructed and arranged for detecting the presence of water standing on the barn floor, said water-detecting mechanisms being respectively disposed in different locations in the barn structure and being respectively connected with said actuating members and bearing against said springs to normally restrict movement of the actuating members, whereby when water is detected on the barn floor by one of said water-detecting mechanisms the respective actuating member is released to move the link off the lug and permit operation of the movable control for shutting off the water supply.

5. In apparatus for detecting the presence of water standing in the mangers of a barn, comprising a water supply shut-off device having a movable control for shutting off the water, operating means connected with said control for moving the same, triggering mechanism connected with said operating means and restraining operation thereof, an elongated upright support adapted to be secured to the barn structure adjacent a manger therein, said triggering mechanism including an upright tubular member adjacent said upright support and having a lower end disposed closely adjacent the bottom of the manger, a pair of vertically spaced and vertically swingable arms mounted on the upright support and swingably secured to the tubular member to permit vertical shifting thereof, said arms being normally swung downwardly from the upright support when the lower end of said tubular member is disposed adjacent the bottom of the manger, a pair of securing bands encircling said arms and the upright support and holding said arms in downwardly swung position, said bands being upwardly shiftable for releasing the arms and permitting upward swinging of the tubular member, a release element constructed of water-absorbent material which substantially weakens when wetted to permit rupturing thereof, said release element being mounted on the lower end of said tubular member, an elongated connecting element secured to the release element and extending upwardly through the tubular member, and said triggering mechanism including a movable spring-pressed actuating member for triggering said operating means, said actuating member being connected with said connecting element to be restrained thereby, whereby when water in the manger engages the release element, the water supply shut-off device will be operated.

6. In apparatus for controlling the water supply in barns and the like, comprising a water supply shut-off device having a movable control for shutting off the water, and elongated flexible connecting element secured to said control, biasing means secured to said connecting element and continuously bearing thereagainst for operating said control, a frame securable to the barn structure and having a lug affixed thereon, a connecting link removably mounted on said lug and being secured to said connecting element intermediate the movable control and the biasing means for restraining the biasing means and precluding operation of the movable control, an actuating member shiftably mounted on the frame adjacent the link for moving the link off the lug, spring means bearing against the frame and said actuating member for moving said link off the lug whereby to permit operation of the movable control, a manually operable resetting lever swingably mounted on the frame adjacent the actuating member, said lever being connected to and manually releasable from the actuating member whereby to move the same against said spring means to permit resetting of the releasable water-detecting mechanism, and a releasable water-detecting mechanism secured on the barn structure and being constructed and arranged for detecting the presence of water standing on the barn floor, said water detecting mechanism being connected with the actuating member and bearing against said spring means to normally restrict movement of the actuating member, whereby when water is detected on the barn floor, the actuating member is released to move the link off the lug and permit operation of the movable control for shutting off the water supply.

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