SAFETY LATCH FOR EARTHMOVING SCRAPER BOWL

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This invention relates to a latch mechanism particularly adapted for use on an earthmoving scraper to prevent accidental lowering of the scraper bowl.

One type of scraper now commonly employed for collecting and moving large quantities of earth or like material comprises a large bowl supported on ground engaging wheels having a draft connection by means of which it is connected to and drawn by a tractor. The bowl is adapted to be lowered into scraping contact with the earth to collect material which is deposited in the bowl as the scraper is drawn forwardly. The lowering and raising of the bowl may be controlled by cables associated with a powered cable drum mounted on the tractor or by a hydraulic ram operated under hydraulic pressure which is usually supplied by a pump driven by the tractor engine.

The rear of the bowl is closed by an ejector supported for forward sliding movement to empty the bowl of its contents. Movement of this ejector may also be accomplished by means of a second cable or another hydraulic ram.

In a scraper of this type, the bowl is held in its raised position while transporting material which it has collected and is to be deposited at another selected area. The bowl is supported in this transport position by the tension on the cable which is maintained by a brake on the cable winding drum or by hydraulic pressure in the bowl-raising ram, depending upon the type of power controls associated with the tractor and scraper unit. Such scrapers are frequently towed at relatively high speeds over rough terrain imposing high shock loads on the means used to hold the bowl in the transport position. These shock loads occasionally result in failure of either the bowl raising cable or the brake, allowing the loaded bowl to drop into engagement with the earth bringing the scraper and the tractor to an abrupt halt. In a hydraulically controlled scraper bowl, failure of the hydraulic pump, a broken pressure line, or a leak in the hydraulic ram would also result in the bowl being dropped. Abrupt stops of this nature are detrimental to the tractor and scraper parts, and under some conditions may result in injury to the tractor operator.

Many of these tractor and scraper units are equipped with brakes actuated by a fluid, such as air, under pressure. In the event of a failure in the fluid pressure supply, the bowl may be lowered slowly to contact the earth, where it serves as a drag or emergency brake to bring the unit to a gradual stop.

It is therefore an object of the present invention to provide a latch to support the scraper bowl and prevent sudden dropping or lowering of the bowl in the event of a failure of the bowl support means.

It is another object of this invention to provide a fluid actuated safety latch for a scraper bowl which is automatically retracted should the fluid pressure supply fail, so that the bowl may be lowered as an emergency method of bringing the unit to a stop.

In the drawings:
Fig. 1 is a view in side elevation of a tractor drawn scraper with the latch mechanism of the present invention and with parts broken away to more clearly illustrate the invention.

Fig. 2 is an enlarged fragmentary view of the draft member of the scraper showing the safety latch mounted thereon.

Fig. 3 is a central transverse section of the control lever for the bowl raising means showing the valve assembly incorporated within the lever in open position; and

Fig. 4 is a similar view showing the valve assembly in a closed or exhaust position.

In Fig. 1 a cable controlled earth moving scraper of the type in which the present invention may be employed, although it is not necessarily limited to a cable controlled scraper, is illustrated as comprising an earth receiving bowl 10 having a scraping edge 11 to collect earth as the scraper moves forwardly. An ejector 12 is disposed at the rear of the bowl adapted to move forwardly to discharge the contents of the bowl in a conventional manner. The bowl is supported at its rear end by a pair of ground engaging wheels, only one of which is illustrated at 13. Intermediate its ends the bowl is supported by a draft frame comprising spaced side arms 16 extending rearwardly from a tubular cross member 16 and a forwardly extending draft arm 17. The spaced side arms are pivotally connected to the bowl by pins 18. The draft arm is supported at its forward end by a universal hitch 19 on the rear of a wheel type tractor or the like indicated generally at 21.

The tractor 21 carries a cable control unit 22 of conventional construction which includes a pair of cable winding drums powered for rotation by a rear power takeoff shaft from the tractor.

In the present example, one of the cable drums controls a cable 24 for the raising and the lowering of the front end of the bowl, while the other drum controls another cable, not shown, which moves the ejector to empty the scraper bowl. A lever shown at 23 controls a clutch, not shown, within the cable control unit 22 to transmit power from the tractor to the cable drum and raise or lower the bowl as it may be desired. The cable control unit contains a brake, not shown, to retain the bowl in its raised position. In operation, the control lever 23 is positioned to release this brake and allow the scraper edge 11 of the bowl to contact the earth and collect material as the scraper is drawn forwardly by the tractor. When the bowl is filled, the control lever 23 is repositioned to engage the clutch within the cable control unit and wind in the cable 24 to raise the scraper bowl to the transport position shown in Fig. 1.

In Fig. 2 a safety latch 25 mounted on the cross member 16 shown in an extended position. Air from a pressure supply system, not shown, is admitted by way of a flexible line 26 to a passage chamber 27 within a diaphragm assembly 28. The diaphragm 29 will be deflected to the right, as shown in the drawing, compressing a return spring 30 and moving the safety latch 25 to its extended position by means of linkage generally indicated at 31.

While the bowl is being raised, with the latch in its normally extended position, the safety latch 25 will be moved to the position shown by the dotted lines in Fig. 2 by engagement with a hook 32 fixed to a front cross member 33 of the bowl, and thus deflecting a lost motion spring 34 associated with the latch linkage 31. After the hook 32 is raised above the latch, the spring 34 will return the latch to its extended position.

While the load is being transported, the bowl is carried in the position shown in Figs. 1 and 2 with the hook slightly above the safety latch so that the latch may be retracted to allow the bowl to be lowered without first raising the bowl. Should there be a failure of the means used to retain the bowl in the transport position, the hook
would engage the safety latch and prevent the bowl from dropping suddenly and causing a dangerous, abrupt stop.

The control lever 23, as shown in Fig. 3, incorporates a valve plunger 35 which admits air by way of inlet pipe 36 through valve port 37 and thence through ports 38 which direct the air under pressure through passages 39 to the flexible air line 26 of Fig. 2 which is connected to the control handle at the threaded opening 40. A biasing spring 41 urges the valve assembly 35 upwardly and allows the valve port to remain open in normal operation. This admits air under pressure to line 26 and retains the safety latch in an extended position as described above.

To retract the safety latch, a valve control button 45 in the control handle 25 is depressed to engage valve plunger 35 and close valve port 37 to allow the escape of the air under pressure from the pressure chamber in the diaphragm assembly 28 and line 26 through an exhaust port 46 and vents 47 in the control handle. The return spring 30 will then move the linkage 31 and safety latch 25 to its retracted position shown in phantom lines at 25a. The valve plunger 35 may be held in this release position by moving a lock-out lever 48 to the position shown in Fig. 4. A retaining spring 49 holds the lever in this position until it is manually released.

Brakes employed on the tractor and scraper wheels may be actuated by air under pressure from the same source which supplies fluid to the latch actuating diaphragm assembly 28. Should this common fluid supply fail, return spring 30 will automatically retract safety latch 25 to allow the scraper bowl to be lowered into contact with the ground where it may be employed as a drag or emergency braking means.

We claim:
1. In an earthmoving scraper and tractor unit having a bowl adapted to be raised and lowered, a latch normally positioned to prevent the dropping of the bowl, mechanism for raising and lowering the bowl, a control handle for the bowl raising mechanism, and control means carried by said handle to render the latch inoperative.

2. In combination with a tractor and scraper unit which includes an earth receiving bowl adapted to be raised and lowered and power actuated means to raise and lower the bowl including a control handle, latch means normally extended into the path of downward movement of a part of the bowl to prevent dropping of the bowl from its raised position, means to retract said latch means to provide for lowering of the bowl when said control handle is manipulated to lower the bowl, and means on the control handle operable by the same hand employed for said manipulation to actuate the latch retracting means.

3. In combination with a tractor and scraper unit which includes an earth receiving bowl adapted to be raised and lowered and power actuated means to raise and lower the bowl including a control handle, latch means normally extended into the path of downward movement of a part of the bowl to prevent dropping of the bowl from its raised position, resilient means tending to retract said latch means, a system including fluid under pressure to hold the latch means in an extended position, and means on the control handle for releasing said fluid whereby said resilient means will retract the latch means.

4. In combination with a tractor and scraper unit which includes an earth receiving bowl adapted to be raised and lowered, power actuated means including a control to raise and lower the bowl, and a fluid pressure brake system, latch means normally extended into the path of downward movement of a part of the bowl to prevent dropping of the bowl from its raised position, resilient means tending to retract said latch means, and means including fluid under pressure from said brake system to hold the latch means in an extended position whereby upon failure of pressure in the brake system the resilient means will retract the latch to enable the bowl to be lowered into braking contact with the ground.

5. In combination with a scraper having a frame and an earth receiving bowl adapted to be raised and lowered relative to the frame, a latch part on the bowl, a latch part on the frame adapted to underlie the latch part on the bowl in spaced relation thereto when it is fully raised and to interrupt it if it starts to drop, resilient means tending to urge one latch part to its release position, manually controlled power actuated means normally holding the said one latch part in its latching position, the space between the latch parts when the bowl is fully raised being sufficient to permit movement of said one latch part to its released position without contacting the other latch part.

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