

March 18, 1952

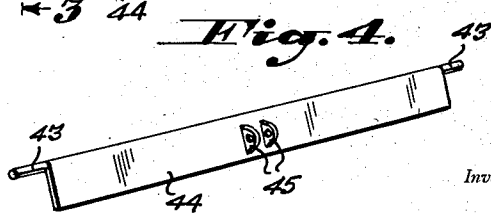
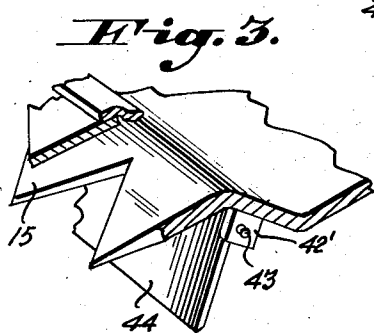
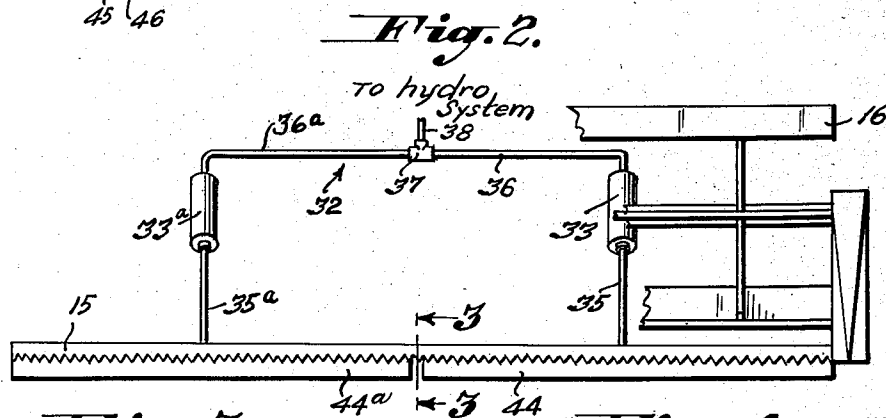
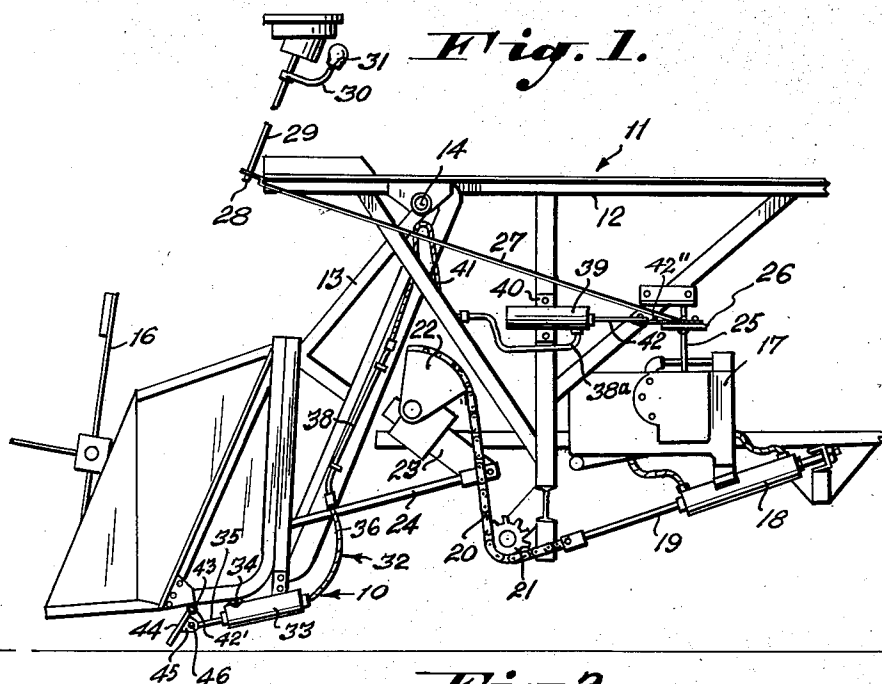
A. KESSELRING

2,589,553

SAFETY ATTACHMENT FOR CUTTER BARS

Filed June 13, 1949

2 SHEETS—SHEET 1



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2 SHEETS—SHEET 2

Fig. 5.

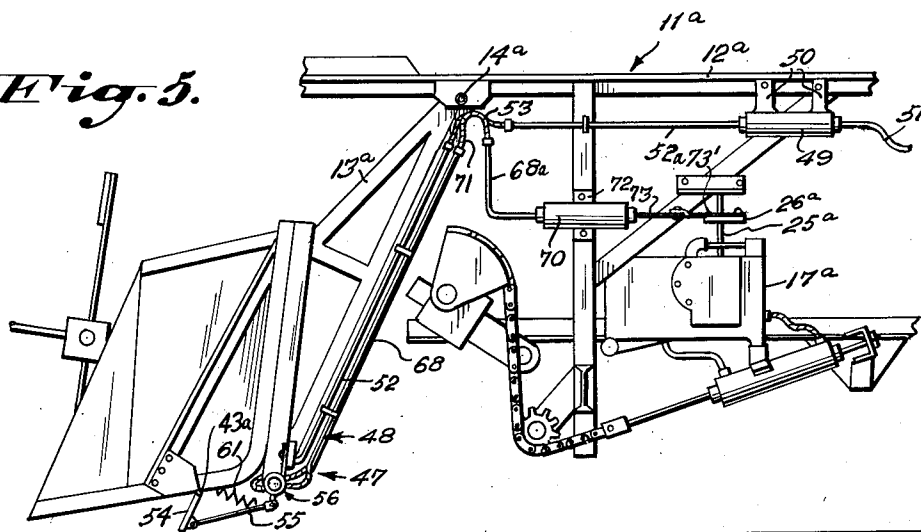


Fig. 6.

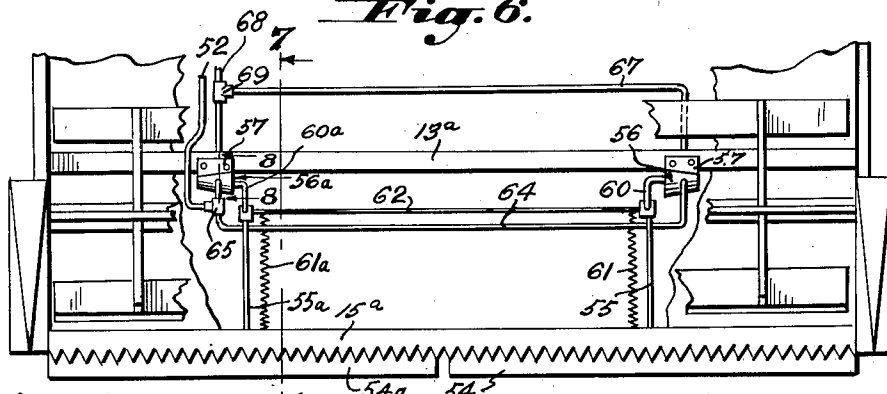


Fig. 7.

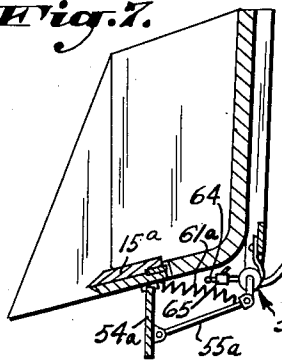


Fig. 9.

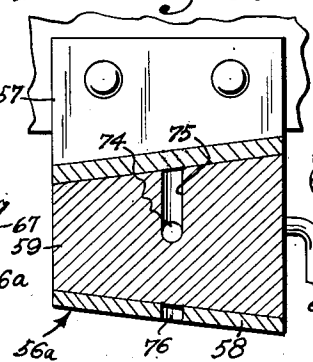
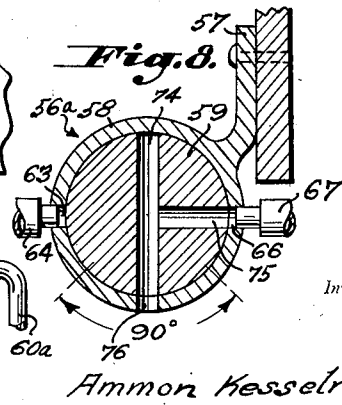


Fig. 8.



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UNITED STATES PATENT OFFICE

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SAFETY ATTACHMENT FOR CUTTER BARS

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3 Claims. (Cl. 56—210)

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This invention relates to a safety attachment primarily adapted for use on combines and other farm machinery having swingably supported cutter bars with manually controlled power actuated means for raising or lowering the cutter bar and has for its primary object to provide a device which will be actuated by engagement with obstructions adjacent the cutter bar for automatically actuating the cutter bar lifting mechanism for raising the cutter bar for passing over such obstructions and which will likewise be actuated by engagement with the ground, in the event that the cutter bar is disposed too close to the ground, for actuating the cutter bar lifting mechanism sufficiently to elevate the cutter to a safe level above the ground over which it is passing.

A further object of the invention is to provide a safety attachment of extremely simple construction including abutment means to be engaged by an obstruction for actuating the cutter bar lifting mechanism through a fluid means.

Still a further object of the invention is to provide a safety attachment which may be readily applied to combines and other harvesters of conventional construction to function in conjunction with the conventional lifting mechanism thereof for automatically adjusting the cutting level of the cutting bar to compensate for irregularities or obstructions in the surface over which the cutting bar is moving.

Numerous other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating presently preferred embodiments thereof, and wherein:

Figure 1 is a side elevational view showing one form of the invention applied to a conventional combine;

Figure 2 is a fragmentary front elevational view thereof;

Figure 3 is an enlarged, fragmentary perspective view taken substantially along a plane as indicated by the line 3—3 of Figure 2;

Figure 4 is a perspective view of one of the abutment members of the attachment;

Figure 5 is a view similar to Figure 1 but illustrating another form of the invention;

Figure 6 is a fragmentary front elevational view thereof;

Figure 7 is a sectional view taken substantially along a plane as indicated by the line 7—7 of Figure 6;

Figure 8 is an enlarged sectional view taken substantially along a plane as indicated by the line 8—8 of Figure 6, and

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Figure 9 is a view taken at right angles to Figure 8 but illustrating a different position of the valve core.

Referring more specifically to the drawings and first with reference to the form of the invention as illustrated in Figures 1 to 4, the safety attachment as disclosed therein is designated generally 10 and for the purpose of illustrating a preferred application and use thereof a portion of a conventional combine, designated generally 11 has been illustrated in Figures 1, 2 and 3 and including a portion of the combine frame 12 on which a cutter bar supporting frame 13 is pivotally mounted at 14 for upward and forward and downward and rearward swinging movement. The cutter bar supporting frame 13 carries at its lower, forward end the usual combine cutter bar 15 disposed beneath the usual revolving reel 16. A hydraulic lift pump 17 is also supported on the frame 12 and is connected to a hydraulic pull-type cylinder 18 having a forwardly extending piston rod 19 which is connected to one end of a chain 20. The chain 20 is trained under a sprocket wheel 21 and is secured at its opposite end to a cam rock shaft 22 which is journaled on the frame 12 and which has a crank 23 projecting therefrom to which one end of a rigid connecting rod or link 24 is pivotally connected. The connecting rod 24 extends forwardly from the crank 23 and is connected at its opposite end to the cutter bar supporting frame 13 so that when the cam rock shaft 22 and its crank 23 are turned in a clockwise direction, as seen in Figure 1, the connecting rod 24 will be displaced forwardly for swinging the cutter bar supporting frame 13 and the cutter bar 15, carried thereby, upwardly and forwardly or when said parts 22 and 23 are turned counterclockwise the cutter bar supporting frame 13 and parts carried thereby will be permitted to swing downwardly and rearwardly, toward an operative position. A control shaft 25 extends upwardly from the hydraulic lift pump 17 and is rotatably mounted in the casing thereof and is provided adjacent its upper end with a laterally projecting arm or lever 26 on the outer end of which one end of a connecting rod 27 is pivotally connected. The connecting rod 27 extends forwardly and upwardly from the lever 26 and is pivotally connected at its opposite end to a crank portion 28 formed on the lower end of a shaft 29. The shaft 29 is provided with a laterally projecting operating lever 30 which is fixed thereto and provided with a knob or handle 31 which is adapted to be manually engaged by the operator of the combine 11 and swung forwardly from its

position of Figure 1 for turning the shaft 29 in a direction to exert a forward pull on the connecting rod 27 and lever 26 for turning the shaft 25 in a direction to actuate the hydraulic lift pump 17 so that hydraulic pressure will be applied to the forward end of the cylinder 18 for displacing the piston rod 19 rearwardly or inwardly of said cylinder 18 for exerting a pull on the chain 20 to rock the cam rock shaft and crank 23 clockwise, as previously described, for elevating the cutter bar supporting frame 13. Movement of the lever 30 in the opposite direction permits the fluid to be bled out of the forward end of the cylinder 18 and fluid pressure applied to the rear end of said cylinder for projecting the piston rod 19 forwardly so that the parts 22, 23, 24 and 13 may move in the opposite direction to enable the cutter bar supporting frame to return to a lowered, operative position. The parts 11 to 31, previously described, constitute no part of the present invention but have been merely illustrated and briefly described to afford a clearer understanding of the safety attachment 10, comprising the invention and which functions therewith.

The safety attachment 10 includes a hydraulic system, designated generally 32, including a pair of corresponding hydraulic cylinders 33 and 33a which are supported beneath the cutter bar frame 13 by hinges 34. The cylinders 33 and 33a are disposed longitudinally of the combine 11 and in laterally spaced relationship to one another. Cylinders 33 and 33a have piston rods 35 and 35a, respectively, which project forwardly therefrom. The piston rods 35 and 35a are reciprocally mounted in the cylinders 33 and 33a and are each connected to a reciprocating piston, not shown, disposed in its respective cylinder. Pipes or conduits 36 and 36a are connected at their remote ends to the opposite, rear ends of the cylinders 33 and 33a, respectively, and are connected at adjacent ends thereof by a T-coupling 37 to one end of a conduit section 38 an opposite end section 38a of which is connected to a hydraulic cylinder 39 adjacent the rear end thereof. The cylinder 39 is supported by a bracket 40 on the frame 12 and longitudinally thereof and is disposed forwardly of and adjacent the lever or arm 26. Adjacent ends of conduit sections 38 and 38a are connected by a flexible intermediate section or hose portion 41 which is disposed adjacent the cutter bar frame pivot 14 and which is of sufficient length to accommodate the swinging movement of the frame 13 relatively to the combine frame 12 since the conduit section 38 is carried by the swingable frame 13 and the conduit section 38a is supported by the frame 12 through its connection with the cylinder 39, as clearly illustrated in Figure 1.

The cylinder 39 likewise contains a reciprocating piston, not shown, having a piston rod 42 projecting therefrom through the rear end of said cylinder and which is reciprocally disposed in said end. The piston rod 42 has a pivotally mounted horizontally swingably free end portion 42' which is pivotally connected at its free end to the arm or lever 26, near the outer end thereof.

A plurality of aligned, transversely spaced ears 42' are suitably secured to the under side of the bottom stationary portion of the cutter bar 15 and depend downwardly therefrom and are provided with aligned openings for journaling pins or trunnions 43 which project from the ends and upper edge of the elongated abutment plates 44 and 44a which are supported by said ears 42' be-

neath and transversely of the cutter bar 15. The abutment members or plates 44 and 44a are mounted for swinging movement forwardly and rearwardly of the combine 11. In the embodiment of Figures 1 to 4, two abutment plates 44 and 44a have been disclosed, one of which is associated with each cylinder 33 and 33a and it will be readily apparent, as the description proceeds, that any desired number of abutment plates could be employed with a corresponding number of cylinders, all of which could be connected to the conduit 38. Each abutment plate 44 and 44a is provided with a pair of spaced ears 45 which project from the rear surface thereof to receive the forward end of the piston rod 35 or 35a which is disposed behind said abutment plate and which is pivotally connected to the ears 45 by a pivot pin 46. The abutment plates 44 and 44a normally extend downwardly and forwardly from the cutter bar frame 13 and are adapted to be disposed adjacent a surface over which the combine 11 is moving. The hydraulic system 32, including the cylinders 33, 33a and 39 and conduit portions 36, 36a, 38, 38a and 41 contains a hydraulic fluid, not shown.

In the event that either of the abutment plates 44 or 44a strikes an obstruction or a ridge or high point in the ground or surface over which the combine is moving, said plate will be swung rearwardly on its pivots 42', 43 for exerting a rearward thrust on the piston rod 35 or 35a which is connected thereto so that the hydraulic fluid will be forced from the cylinder 33 or 33a of said connecting rod through the conduit portions 36, 36a, 38, 41 and 38a to produce a pressure in the forward end of the cylinder 39 which will force the piston thereof, not shown, forwardly to exert a forward pull on the piston rod 42 to swing the arm or lever 26 forwardly, in the same manner as previously described, for actuating the hydraulic lift pump to turn the cam rock shaft 22 and crank 23 clockwise as seen in Figure 1 for elevating the frame 13 and cutter bar 15. As soon as the cutter bar supporting frame 13 is elevated sufficiently so that the actuated abutment plate clears the obstruction which caused actuation thereof, it will cease to exert a rearward thrust on the piston rod 35 or 35a connected thereto so that the cutter bar supporting frame will only be elevated sufficiently to permit the abutment member 44 or 44a to clear the obstruction after which said frame 13 may return to its original position by the normal movement of the crank 26 back to its initial setting, after the obstruction has been passed.

Figures 5 to 9, inclusive, illustrate a slightly different form of the invention and wherein the safety attachment is designated generally 47 and is mounted on a combine 11a, corresponding to the combine 11 and the corresponding parts of which are designated by corresponding reference numerals and the letter "a." The safety attachment 47 includes a vacuum system, designated generally 48, including a vacuum tank 49 which is supported by brackets 50 on the frame 12a and which has a conduit 51 leading from one end thereof and adapted to be connected to a vacuum source, not shown, such as the intake manifold of the internal combustion engine constituting the prime mover of the combine 11a, not shown. The vacuum system 48 also includes a vacuum line including a section 52a leading from the opposite, forward end of the vacuum tank 49 and supported by the frame 12a and a section 52 supported by the cutter bar supporting frame 13a. The adjacent ends of sections 52 and 52a are con-

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ected by a flexible intermediate section 53 located adjacent the pivot 14a and for the same purpose as the flexible conduit section 41.

A pair of abutment plates 54 and 54a are pivotally mounted at 43a on the under side of the stationary section of the cutter bar 15a in the same manner and for the same purpose as the abutment plates 44 and 44a and each of said abutment plates 54 and 54a is pivotally connected to an end of a rearwardly extending connecting rod 55 and 55a, respectively. A pair of corresponding valves, designated generally 56 and 56a, are supported on the bottom portion of the frame 13a, one behind each of the abutment plates 54, each by a supporting bracket 57 which is fastened to a part of the frame 13a. Each valve includes a frusto-conical housing 58 and a frusto-conical core or valve body 59 which is disposed rotatably in its housing 58 and in close fitting engagement therewith, as illustrated in Figures 8 and 9. A crank arm 60 is suitably fixed to and projects from the larger end of the valve body of valve 56 and a crank arm 60a projects from the enlarged end of the valve body of valve 56a and the angularly disposed free end of the cranks 60 and 60a are pivotally connected to the opposite, rear ends of the connecting rods 55 and 55a, respectively. A pair of contractile coil springs 61 and 61a are secured to a rod 62 which connects the crank arms 60 and 60a. The springs 61 and 61a extend forwardly therefrom and are anchored at their opposite ends to portions of the frame 13a for urging the crank arms to turn with the valve bodies 59 in a clockwise direction, as illustrated in Figures 5 and 7, for normally positioning the valve bodies or cores 59 as seen in Figure 8 and for displacing the connecting rods 55 and 55a forwardly to cause the abutment plates 54 and 54a to normally assume the positions as illustrated in Figures 5 and 7.

The valve housings 58 have corresponding forwardly opening ports 63, as seen in Figure 8, with which the ends of a conduit 64 connect. The opposite end of the conduit 52 is connected by a T-coupling 65 to a portion of the conduit 64 and thereby connected to each of the valves 56 and 56a through its port 63.

Each of the valve housings 58 is also provided with a rearwardly opening port 66 which is located diametrically opposite to its port 63 and which connects with an end of a conduit 67 so that the ports 66 are in communication through said conduit 67. One end of a conduit 68 connects with the conduit 67 by means of a T-coupling 69, as best illustrated in Figure 6, and said conduit 68 extends upwardly therefrom and is supported by the frame 13a and another 68a is connected to one end of a vacuum cylinder 70 and supported thereby. The conduits 68 and 68a are connected by an intermediate flexible conduit section 71 likewise located adjacent the pivot 14a and for the same purpose as the flexible conduit section 41. The cylinder 70 is supported by a bracket 72 on the frame 12a and longitudinally thereof and the conduit 68a connects with the forward end of said cylinder 70. The cylinder 70 contains a piston, not shown, which is reciprocally disposed therein and has a piston rod 73 extending from its rear end and reciprocally disposed therein. The cylinder 70 is adapted to be located in the same position as the cylinder 39 and a rear pivoted section 73' of the piston rod 73 is pivotally connected to the outer free end of the crank or lever 26a of the pump actuating shaft 25a.

Referring to Figures 8 and 9, each valve body

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or core 59 has a bore or passage 74 extending diametrically therethrough and is also provided with a radial bore or passage 75 which projects inwardly from a portion of its periphery and communicates with the intermediate portion of the passage 74. Each valve housing 58 is also provided with a vent port 76 in its bottom.

Figure 8 illustrates the normal position of the valve bodies 59 when the abutment plates 54 and 54a are in their positions, as seen in Figures 5 and 7 and when thus disposed, it will be noted that the passage 75 of each valve body 59 is in communication with the conduit 67 and that one end of the bore or passage 74 is in communication with the vent port 76 so that the rear end of the cylinder 70 may be vented through either or both ports 76 to permit the piston thereof and its piston rod 73 to move rearwardly and so that the arm or lever 26a can assume its normal position as illustrated in Figure 5. When either of the abutment plates 54 or 54a is engaged by an obstruction or an uneven part of the surface over which the combine 11a is moving, both plates will be swung rearwardly in the manner as previously described with reference to the individual abutment plates 44 and 44a through the connection of the valve cranks 60 and 60a by the rod 62 for thereby rotating the valve bodies 59 counterclockwise, as seen in Figure 8, to move the passages 74 out of registry with the vent ports 76 and into registry with the ports 63 and 66 so that the vacuum in the line 52, 53, 52a will create a vacuum in the line 68, 71, 68a and in the forward end of the cylinder 70 for displacing the piston rod 73 forwardly, as previously described with reference to the safety attachment 10, and which will result in the hydraulic lift pump 17a being actuated by its shaft 25a for elevating the cutter bar 15a and its supporting frame 13a, in the same manner as previously described. Likewise, after the plate 54 or 54a has passed over the obstruction the springs 61 and 61a will return the plates 54 and 54a to their positions of Figures 5 and 7 to return the valves 59 to their positions of Figure 8 so that the rear end of the cylinder 70 can be vented through the ports 76 to permit the piston rod 73 and arm 26a to return to their positions of Figure 5 and so that the cutter bar can be returned to its operative position of Figure 5.

It will likewise be readily apparent that the vacuum system 48 may be actuated by either abutment plate 54 or 54a to act on the hydraulic lift pump 17a in substantially the same manner as the hydraulic system 32.

It will be readily apparent that other forms of abutment members or plates could be provided in lieu of the plates 44 and 44a and 54 and 54a and which could be mounted for sliding as well as swinging movement for actuating the piston rods 35 or 35a or connecting rods 55 or 55a.

Various other modifications and changes are likewise contemplated and may obviously be resorted to, without departing from the spirit or scope of the invention as hereinafter defined by the appended claims.

I claim as my invention:

1. A safety attachment for farm machines equipped with swingably supported cutter bars and an actuating unit for raising and lowering the cutting bar thereof, comprising at least one abutment member supported beneath the cutter bar for movement forwardly and rearwardly of the farm machine, a rod supported on the machine, frame for reciprocating movement relatively thereto and having one end connected

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to an actuating lever of the actuating unit for raising and lowering the cutter bar, a second rod connected to said abutment member and extending rearwardly therefrom, and power transmission means including a conduit containing a fluent medium forming an operative connection between said first mentioned rod and said second rod for automatically operating the cutter bar actuating unit when said second rod is displaced rearwardly by the abutment member striking an obstruction and being moved rearwardly relatively to the cutter bar thereby, said power transmission means comprising a vacuum system including a vacuum line having a vacuum cylinder at one end thereof, said first mentioned rod comprising a piston rod having one end reciprocally mounted in said cylinder, a valve interposed in said vacuum line and provided with an actuating crank, and said second rod having its opposite end pivotally connected to said crank for opening the valve for creating a suction in the vacuum cylinder when said abutment member is displaced rearwardly.

2. A safety attachment for farm machines equipped with swingably supported cutter bars and an actuating unit for raising and lowering the cutting bar thereof, comprising at least one abutment member supported beneath the cutter bar for movement forwardly and rearwardly of the farm machine, a rod supported on the machine frame for reciprocating movement relatively thereto and having one end connected to an actuating lever of the actuating unit for raising and lowering the cutter bar, a second rod connected to said abutment member and extending rearwardly therefrom, and power transmission means including a conduit containing a fluent medium forming an operative connection between said first mentioned rod and said second rod for automatically operating the cutter bar actuating unit when said second rod is displaced rearwardly by the abutment member striking an obstruction and being moved rearwardly relatively to the cutter bar thereby, said power transmission means comprising a vacuum system including a vacuum line having a vacuum cylinder at one end thereof, said first mentioned rod comprising a piston rod having one end reciprocally mounted in said cylinder, a valve interposed in said vacuum line and provided with an actuating crank, said second rod having its opposite end pivotally connected to said crank for opening the valve for creating a suction in the vacuum cylinder when said abutment member is displaced rearwardly, and a second abutment member

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mounted in longitudinally aligned relationship to said first mentioned abutment member, a rod extending rearwardly from said second abutment member, a by-pass line forming a part of the vacuum system and by-passing said valve, and a second valve interposed in the by-pass line and having a crank pivotally connected to the rod of the second abutment member for selectively actuating the attachment.

3. A safety attachment for farm machines equipped with swingably supported cutter bars and an actuating unit for raising and lowering the cutting bar thereof, comprising at least one abutment member supported beneath the cutter bar for movement forwardly and rearwardly of the farm machine, a rod supported on the machine frame for reciprocating movement relatively thereto and having one end connected to an actuating lever of the actuating unit for raising and lowering the cutter bar, a second rod connected to said abutment member and extending rearwardly therefrom, and power transmission means including a conduit containing a fluent medium forming an operative connection between said first mentioned rod and said second rod for automatically operating the cutter bar actuating unit when said second rod is displaced rearwardly by the abutment member striking an obstruction and being moved rearwardly relatively to the cutter bar thereby, said abutment member being pivotally connected adjacent one longitudinal edge thereof to the cutter bar and extending downwardly therefrom for rearward and upward swinging movement upon striking an obstruction, said abutment member being normally disposed in an elevated position above and out of engagement with a surface over which the cutter bar is moving.

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