Aug. 28, 1951 W. F. SIMPSON 2,565,668

SPRING TRIP STANDARD FOR CULTIVATORS

Filed April 8, 1947 2 Sheets-Sheet 1

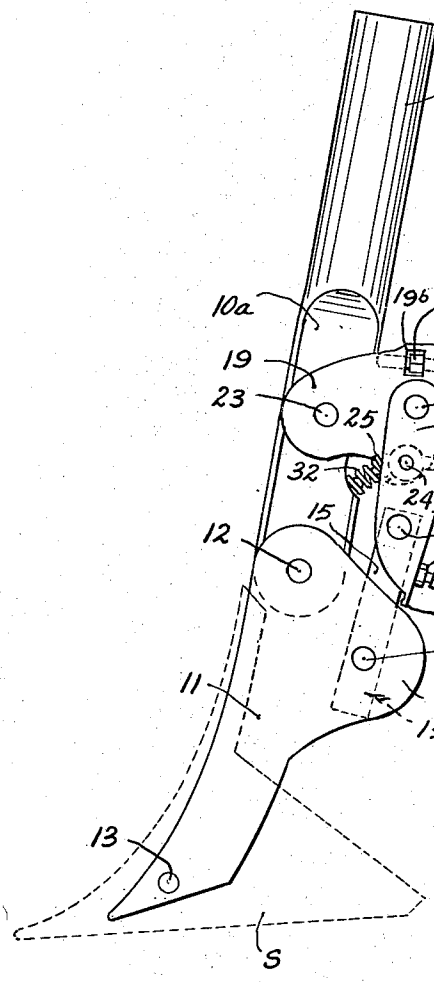



Fig. 1

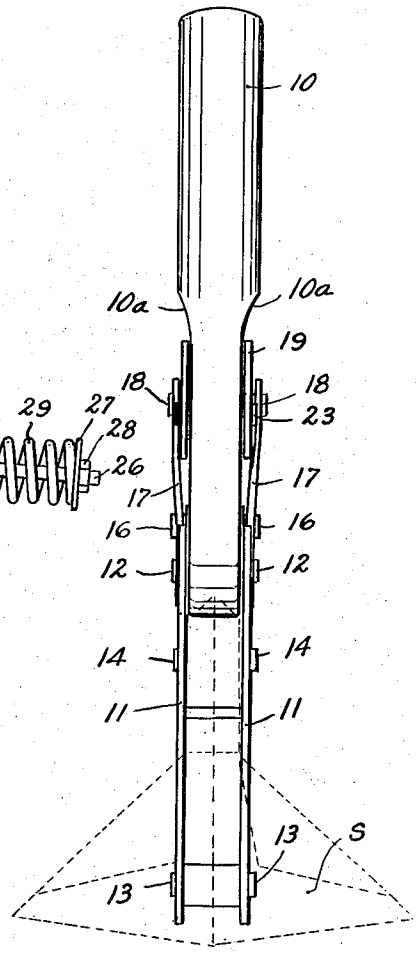



Fig. 2

Inventor
William F. Simpson
By Walter W. Burns
Attorney

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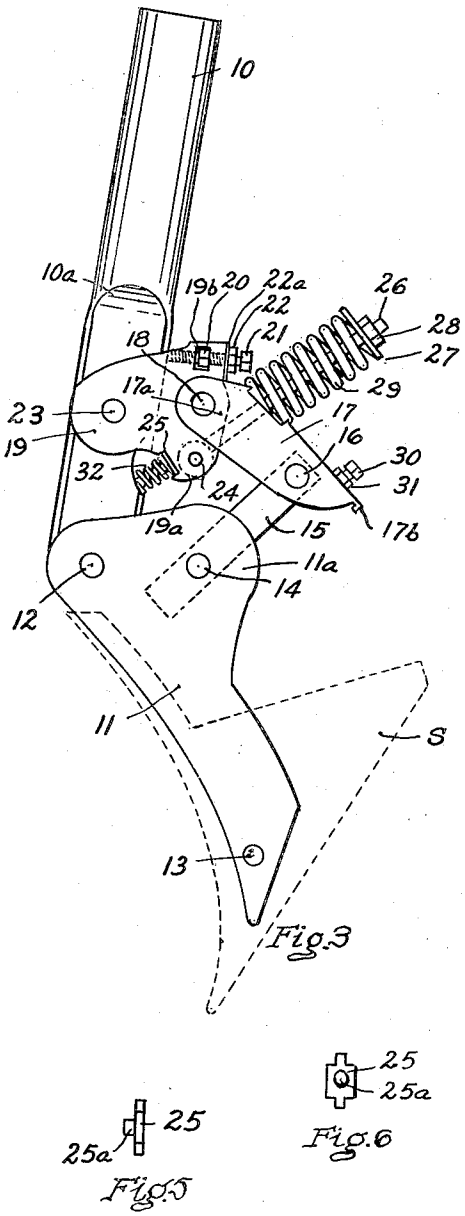



Fig. 3

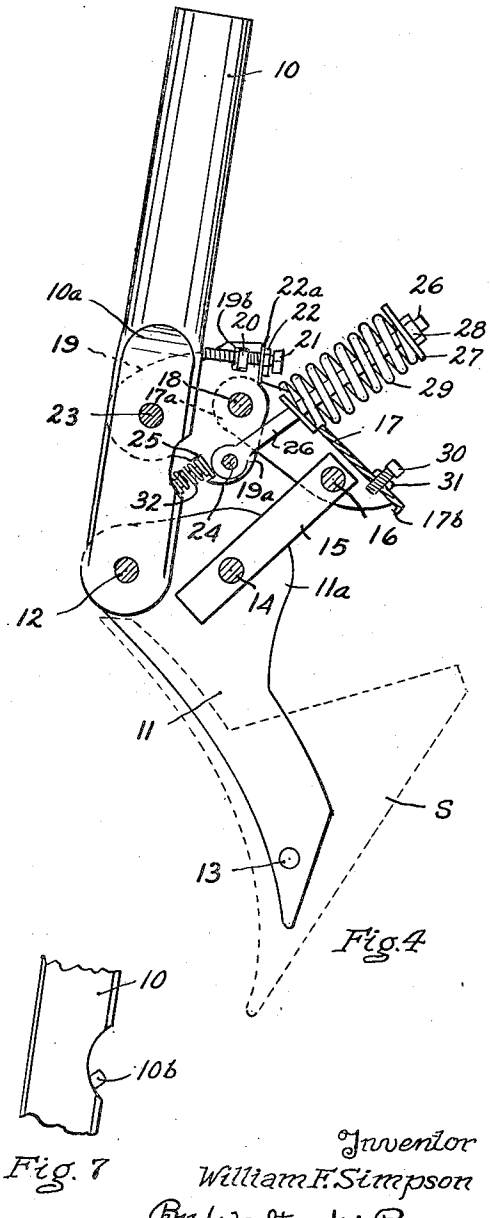



Fig. 4




Fig. 5




Fig. 6




Fig. 7

Inventor
William F. Simpson
By Walter W. Burns
Attorney

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## SPRING TRIP STANDARD FOR CULTIVATORS

William F. Simpson, Louisville, Ky., assignor, by mesne assignments, to Minneapolis-Moline Company, a corporation of Minnesota

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11 Claims. (Cl. 97—184)

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This invention relates to a spring trip standard for cultivators and the like.

In the usual type of spring trip standards when the parts are returned to normal or operating position from a trip operation, there is considerable shock to the parts at the end of the movement due to the taking up of the energy provided by the trip spring in moving the foot pieces and other parts after release from the obstruction. This sudden absorption of the shock at the end of the return movement of the foot pieces is, in a large measure, responsible for the excessive wear and consequent weakening of the parts which subsequently results in failures.

Further, in the usual type, the arc of trip is the same regardless of the forward adjusted position of the foot pieces.

This is a disadvantage for the reason that when the foot pieces are set for an extreme forward position, the trip position is not sufficiently to the rear.

The primary object of this invention is the provision of an improved spring trip standard for earth-working devices.

Another object of the invention is the provision of an improved spring trip standard wherein is provided a longer trip arc when the foot pieces are adjusted to a forward position than when in a position relatively to the rear.

A further object of the invention is the provision of an improved spring trip standard having a shock absorber for absorbing the energy provided by the trip spring as it returns the parts to operating position.

Another and still further object of the invention is the provision of a spring trip standard having a foot piece adjusting means which is capable of adjustment with but a slight change in the compression of the trip spring.

Other and further objects of the invention will be apparent from a reading of the complete specification.

Referring to the drawing wherein is illustrated an embodiment of the invention:

Fig. 1 is a side elevation of the improved spring trip standard.

Fig. 2 is a front view.

Fig. 3 is a side view showing the parts in partially tripped position.

Fig. 4 is a view similar to Fig. 3 but partially in section.

Figs. 5 to 7 are detail views.

The main body of the standard is designated at 10. This main body 10 is cylindrical in form at its upper end, which upper end is used to secure the device to the vehicle to which it is attached—in a manner well known in the art. The lower end of the standard is forged flat at its sides as at 10a to form flat portions to which the operating portions are attached, as will be presently described.

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Foot pieces 11 are pivotally secured at the lower end of the standard 10 by the pivot pin 12. Spacing the lower forward ends of the foot pieces 11 from each other is a spacing pin 13 which holds these ends apart a distance slightly greater than the thickness of the flattened portions 10a of the standard 10. Ears 11a are provided to support a pivot pin 14 which pivots one end of the lower toggle link 15 to the foot pieces 11. The other end of the toggle link 15 is pivoted by a pin 16 to the central portion of the upper toggle link 17. The upper end of the toggle link 17 is pivoted on a pin 18 which is supported in the anchor plates 19. The anchor plates 19 are pivoted to the standard 10 at the upper portion of the flattened section 10a of the standard 10.

The rear upper portions of the anchor plates 19, hold a nut 20 in complementary slots as illustrated in Fig. 4. Threaded in this nut 20 is an upper set screw 21 which at its inner end engages the body portion 10 of the standard. A lock nut 22 and a lock-nut contacting piece or washer 22a are provided to lock the set screw 21 in adjusted position.

The anchor plates 19 are pivotally supported on the standard body 10 by the pivot pin 23. It is noted at this point that as the adjusting screw 21 is screwed inwardly, the upper end of the anchor plates 19 are moved outwardly. The lower rear portions of the anchor plates 19 are ear-shaped as at 19a and are provided with openings to receive the pivot pin 24.

The pivot pin 24 and its head are forged as integral parts of the strip spring bolt 26. This bolt has at its rearward end a plate 27 and a nut 28, the latter being threaded on the shank of the bolt 26. A trip spring 29 surrounds the bolt 26 and engages the plate 27 at its rear end and the upper side portions 17a of the upper toggle link 17 at its forward end.

In the operation of this invention it is necessary that the toggle never have the axes of its three pivot-points exactly in the plane to which the trip spring 29 normally tends to force them. In order to variably control the distance of the limit of position of the axis of the pivot 16 toward the plane containing the axes of the pins 14 and 18, there is provided an adjustable stop set screw 30 which is threaded in the lower end

of the upper toggle in position to have its inner end engage the rear face of the lower toggle link 15. It is believed clear that the action of the adjustable stop set screw 30 opposes the action of the trip spring 29. A lock nut 31 locks the set screw 30 in any desired adjusted position. By adjusting the screw outwardly to permit the axis of the pin 16 to approach the plane of the axes 14 and 18, the force necessary to break the toggle and permit the foot pieces 11 to swing rearwardly, is increased and in a like manner, the adjustment of the set screw 30 inwardly will permit a breaking of the toggle with a less force acting to the rear on the foot pieces 11.

To cushion the return of the parts to normal operative position after a tripping operation has taken place, there is provided a shock absorbing device. In the rear of the flattened portion of the standard 10, a depression is forged with a teat 10*b* in the center thereof and opposite this is a plate 25 having a teat 25*a*. This plate is held in place by notches in the lower forward sides of the ear lobes 19*a* of the anchor plates 19. These teats 10*b* and 25*a* are at substantially the same height and are of a size to receive the ends of a shock-absorbing spring 32.

The shock-absorbing spring 32 acts in opposition to the adjustable stop set screw 21 and tends to rotate the anchor plates 19 in a counter-clockwise direction as illustrated in Figs. 1 and 2.

The operation of the invention will now be described.

The parts are assumed to be in position as illustrated in Fig. 1 with the sweep or other ground working element S secured to the foot pieces 11. As the toggle elements are in their set position, it is clear that the parts 15 and 17 are held rigid relatively to each other so that if it is desired to adjust the sweep S to a forward position, it is necessary only that the complete toggle 15, 17 be forced downwardly. In order to bring about this downward movement, the adjustable stop set screw 21 is screwed in. This causes the anchor plates 19 to move clockwise as illustrated in Fig. 1. This movement brings about the downward movement of the toggle 15, 17 and causes clockwise movement of the foot pieces 11 about the pin 12 as a center. This latter movement forces the lower portions of the foot pieces forward. Rotating the adjustable stop set screw outwardly or to the rear, permits the shock absorbing spring 32 to rotate the anchor plates counter-clockwise to lift the toggle 15, 17 and move the lower ends of the foot pieces 11 to the rear—along with the sweep or other ground working elements S attached thereto.

When in operation below the ground surface, if the sweep or other ground-working element S encounters an obstruction such as a rock, sufficient reactive force is applied to the foot pieces 11 to overcome the action of the trip spring 29 on the toggle 15, 17 with the result that the toggle breaks, the sweep or other ground working member S, swings to the rear with the foot pieces 11. As the obstruction is passed and the toggle is released for return to normal position, the trip spring 29 forces the toggle back to normal position.

In order to take up the shock of suddenly stopping the rapidly moving parts, there is provided the shock absorbing spring 32, already described. On reaching its adjusted forward position, the foot pieces 11 exert a pull on the toggle link 17. Since the upper toggle 17 has already reached its



position with relation to the toggle link 15, the pull of the latter is transmitted to the upper toggle link 17 which pulls downwardly on the pin 18. This action rotates the anchor plates 19 about the axis of the pin 23, compressing the shock-absorbing spring 32 and moving the stop set screw 15 away from the main body 10 of the standard. The strength of the spring 32 is such that the shock of the parts being forced back by the trip spring 29 to operative position, will be taken up before the spring 32 is fully compressed, at which time, the shock absorbing spring 32 returns the parts to normal position ready for operation.

If it is found that the toggle 15, 17 is too rigid, the adjustable set screw 30 is adjusted inwardly and locked with the lock nut 31 and if the toggle 15, 17 is found to be not stiff enough, the screw 30 is adjusted outwardly and then locked in adjusted position.

It should be noted that the relative lengths of the toggle links 15 and 17 are such that when brought to an acute angle relation by an obstruction in the path of the sweep or other earth working member, any change in the adjustment of the adjustable stop set screw 21 will not materially change the position of the sweep or other earth-working member S when the latter is in this retracted position. The practical effect of this construction is that regardless of the adjustment of the screw 21 to vary the operative position of the foot pieces 11 and the sweep or other earth working device S carried thereby, the latter is always assured of a full rearward movement when an obstacle is encountered. And further, the adjustment of the set screw 21 forwardly not only moves the foot pieces 11 forwardly but this action also compresses the shock absorber spring 32. This compression is to be desired since with the pieces adjusted to a forward position, the return movement is longer with a resultant greater amount of energy to be absorbed by the spring 32 under the greater tension. The spring 32 is constructed with sufficient length and strength so that at its greatest compression, there is still sufficient compression to absorb the energy of the parts returning to their positions.

The shape of the toggle link 17, its relative position to the toggle link 15 and the position of engagement of the safety stop 17*b* are such that should the adjustable set screws 30 become screwed too far to the rear, or lost, the axis of the pin 16 will still be held from coming into the plane of the axes of the pins 14, 18. This construction insures definite operation even though the loss of the adjusting screw 30 might mean the loss of the desired adjustment.

While there has been illustrated and described in detail an embodiment of the invention it is to be understood that the disclosure is merely illustrative and that modifications and changes may be made without departing from the spirit of the invention and within its scope as claimed.

Having described the invention, what is claimed is:

1. A spring trip standard comprising a body portion, foot piece means swingingly secured to the body portion for securing an earth-working element in place, means secured to the body portion and including a trip spring for holding the foot piece means in operative position until a predetermined reactive force is encountered by the earth-working element and to then release the foot piece means for relatively rearward movement and a foot piece adjusting mechanism in-

cluding a resilient member in position to coact with the foot piece means and body portion to resiliently hold the foot piece means in normal operative position.

2. A spring trip standard comprising a body portion, foot piece means swingingly secured to the body portion for securing an earth-working element in place, a toggle means, including a trip spring, for holding the foot piece means in operative position until a predetermined reactive force is encountered by the earth-working element and to then release the toggle to permit rearward movement of the earth-working element and a spring adjusting mechanism connected between one end of the toggle and the body member to predetermine the setting of the forward position of the foot piece means when in normal operative position and to absorb energy from the trip spring as the parts return to operative position after tripping.

3. A spring trip standard comprising a body portion, foot piece means for securing an earth-working element in place, a trip spring mechanism, including a tension control means, a toggle means for holding the foot piece means in operative position until a predetermined reactive force is encountered by the earth-working element and to then release the toggle to permit rearward movement of the earth-working element, a resiliently held member for supporting one end of the toggle and toggle moving mechanism for moving the whole toggle mechanism independently of the trip spring tension control means for adjusting the forward position of the earth-working element.

4. A spring trip standard comprising a body portion, foot piece means for securing an earth-working element in place, a trip spring mechanism, including tension control means, a toggle means for holding the foot piece means in operative position until a predetermined reactive force is encountered by the earth-working element and to then release the toggle to permit rearward movement of the earth-working element, a resiliently held swinging member for supporting one end of the toggle and toggle moving mechanism for moving the whole toggle mechanism independently of the trip spring tension control means for adjusting the forward position of the earth-working element without substantially changing its rearward tripped position.

5. A spring trip standard comprising a body portion, foot piece means for securing an earth-working element in place, a trip spring, a toggle means for holding the foot piece means in operative position until a predetermined reactive force is encountered by the earth-working element and then release the toggle to permit rearward movement of the earth-working element, an anchor plate means swingingly connected to the body portion, one end of the toggle being pivotally connected to the anchor plate means and the other being pivotally connected to the foot piece means and an adjusting mechanism, including a spring to swing the anchor plate means to any one of a plurality of positions and thereby move the toggle to swing the foot piece means to regulate its forward position.

6. A spring trip standard comprising a body portion, foot piece means for securing an earth-working element in place, a trip spring, a toggle means for holding the foot piece means in operative position until a predetermined reactive force is encountered by the earth-working element and then release the toggle to permit rearward movement of the earth-working element, an anchor plate means swingingly connected to the body portion, one end of the toggle being pivotally connected to the anchor plate means and the other being pivotally connected to the foot piece means and adjusting mechanism for swinging the anchor plate means and thereby move the toggle to swing the foot piece means to regulate its forward position, and resilient means normally tending to counteract the action of the adjusting means.

7. A spring trip standard comprising a body portion, foot piece means swingingly secured to the body portion for securing an earth-working element in place, a toggle mechanism including a trip spring and tension control device therefor, for holding the foot piece means in operative position until a predetermined reactive force is encountered by the earth-working element and to then release the toggle to permit rearward movement of the earth-working element, a screw controlled resilient forward-position adjusting means connected to the toggle and body portion for predetermining the forward position of the foot piece in normal operative position while permitting movement of the foot piece forward of the forward operative position, when the parts are returning to operative position from tripped position.

8. A spring trip standard comprising a body portion, foot piece means for securing an earth-working element in place, a toggle means including a trip spring mechanism for holding the foot piece in operative position until a predetermined reactive force is encountered by the earth-working element and to then release the toggle to permit rearward movement of the earth-working element, a mechanism including a screw-threaded member and a counteracting spring for adjusting the forward position of the earth-working element and adjustable means between the toggle members to vary the angle between the toggle members when in operative position, the toggle members having a limiting means between them to provide a limit of adjustment adjacent to but less than 180 degrees between them.

9. A spring trip standard comprising a body portion, foot piece means swingingly secured to the body portion for securing an earth-working element in place, a trip spring mechanism connected to the body portion for holding the foot piece means in operative position until a predetermined reactive force is encountered by the earth-working element and to then release the foot piece means for relatively rearward movement and an adjustable yielding shock absorbing mechanism between the body portion and the foot piece in position to normally hold the trip spring mechanism and foot piece in operating position for breaking and to resiliently arrest the return movement of the parts after the reactive force has been removed.

10. A spring trip standard comprising a body portion, foot piece means pivotally secured at the lower end of the body portion and for securing an earth-working element in place, anchor plate means pivoted on the body portion, a toggle connection being pivotally connected to the anchor plate means at one end and to the foot piece means at the other end, a trip spring having one end connected to one of the toggle members at a place spaced from its pivots and having its other end secured in place to be held when the toggle is broken, the trip spring normally holding the

toggle in operative position to cause the foot piece means to be extended and to release the toggle when a predetermined reactive force is applied to the earth-working element, adjustable abutment means carried by the anchor plate and bearing against the body portion operable to pivotally move the former to cause bodily movement to the toggle, thereby varying the forward position of the foot piece means.

11. A spring trip standard comprising a body portion, foot piece means pivotally secured at the lower end of the body portion and for securing an earth-working element in place, anchor plate means pivoted on the body portion, a toggle connection being pivotally connected to the anchor plate means at one end and to the foot piece means at the other end, a trip spring having coactive relation with one of the toggle members at a place spaced from its pivots and having its other end secured to the anchor plate means to hold this said other end in place when the toggle moves relative to the body portion, the trip spring normally holding the toggle in operative position to cause the foot piece means to be extended and to release the toggle when a predetermined reactive force is applied to the earth-working element, adjusting means between the anchor plate and body portion to pivotally move the former relative to the latter to cause bodily movement to the toggle, thereby varying the forward position of the foot piece means and a spring normally tending to oppose the movement of the adjusting means and in position to absorb the shock of the parts returning to normal position after tripping.

WILLIAM F. SIMPSON.

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