March 19, 1946. H. E. McCAULEY 2,396,739

COMBINATION BULLDOZER AND RIPPER

Filed July 10, 1944 2 Sheets-Sheet 1

Fig. 1.

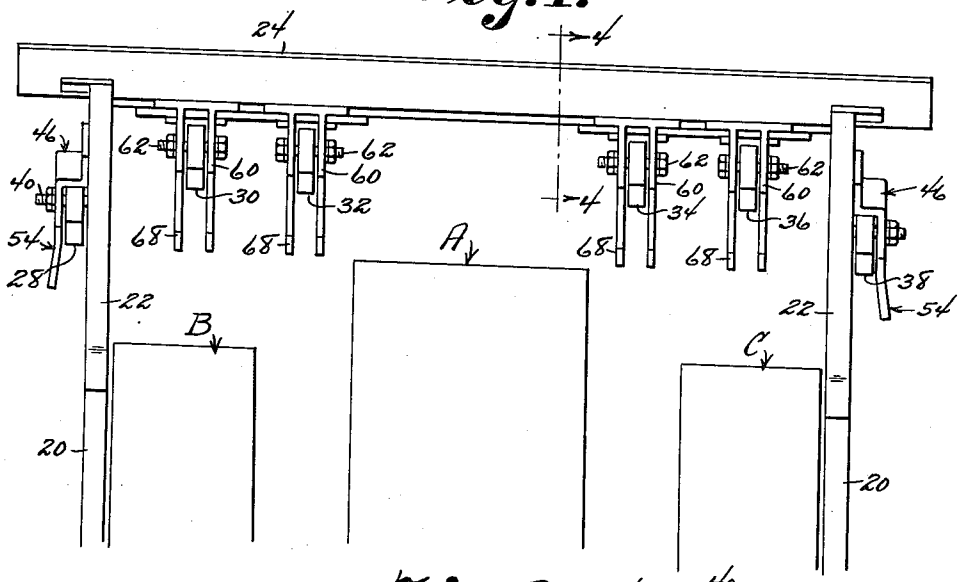


Fig. 3.

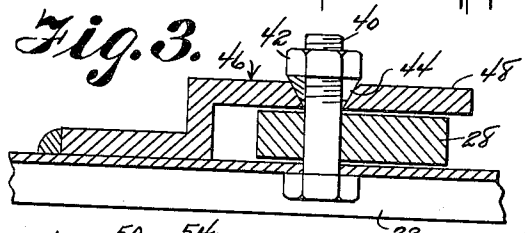


Fig. 7.

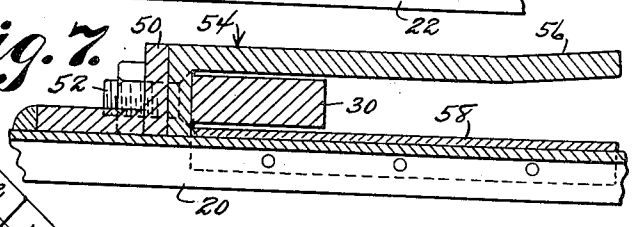


Fig. 2.

INVENTOR.

Halpin E. McCauley

BY Victor J. Evans & Co.

ATTORNEYS

March 19, 1946. H. E. McCAULEY 2,396,739

COMBINATION BULLDOZER AND RIPPER

Filed July 10, 1944 2 Sheets-Sheet 2

Fig. 10.

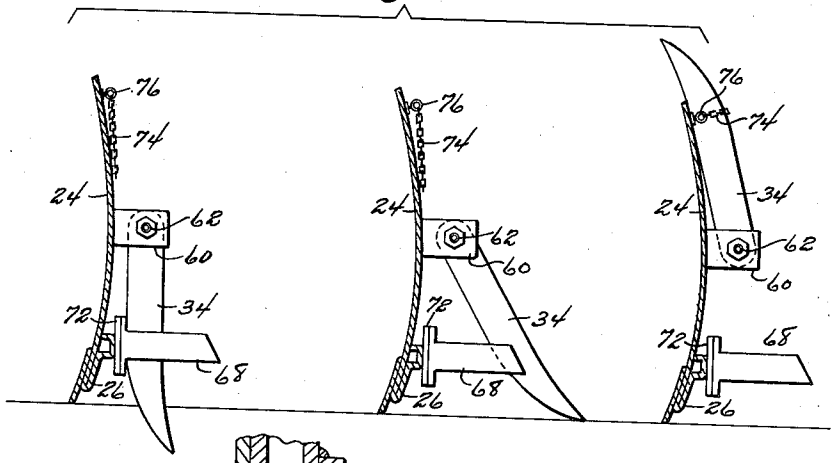


Fig. 6.

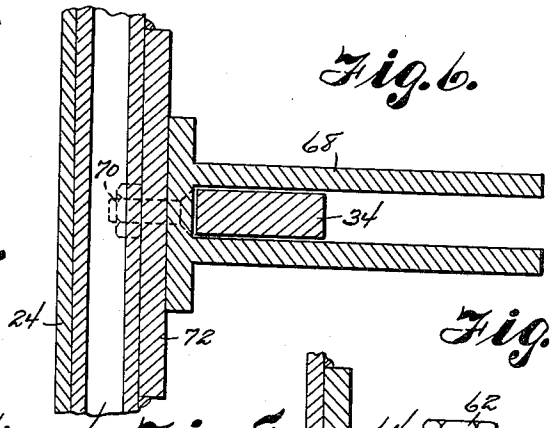


Fig. 5.

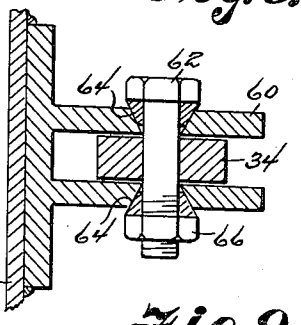


Fig. 9.



Fig. 4.

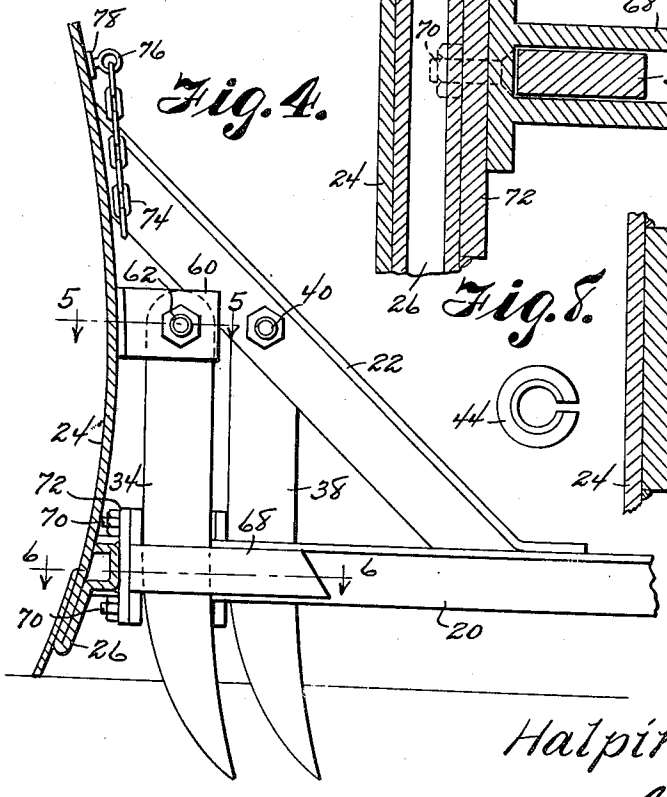


Fig. 8.

INVENTOR.

Halpin E. McCauley

BY Victor J. Evans & Co.

ATTORNEYS

Patented Mar. 19, 1946

2,396,739

UNITED STATES PATENT OFFICE

2,396,739

COMBINATION BULLDOZER AND RIPPER

Halpin Edward McCauley, Cliff, N. Mex.

Application July 10, 1944, Serial No. 544,222

13 Claims. (Cl. 37—145)

This invention appertains to improvements in earth moving or working machines generally, and more particularly to a bulldozer type thereof.

One of the several objects of the invention is to provide a machine of this kind with a multiplicity of earth loosening or ripping spikes, which will be automatically effective during the movement of the machine in one direction and substantially ineffective during the movement of the machine in the opposite direction.

Another object of the invention has to do with the mounting of the earth loosening or ripping spikes in close proximity to the blade of the bulldozer, so that they will operate within a limited area to loosen or rip up hard packed earth extending in the path of the ground gripping tracks and thus reduce the resistance to the blade of the bulldozer in its earth moving operations.

A further object of the invention lies in the provision of novel means for mounting the earth loosening or ripping spikes, which admits of the ready adjustment and replacement of the spikes and associated parts that are subject to excessive wear, by the use of simple conventional tools.

With these and other objects and advantages in view, the invention resides in the certain new and useful combination, construction, and arrangement of parts, as will be hereinafter more fully described, set forth in the appended claims, and illustrated in the accompanying drawings, in which:

Figure 1 is a top plan view, showing the relative transverse spacing of the earth loosening or ripping spikes along the blade of a conventional form of bulldozer;

Figure 2 is an end elevation of the bulldozer blade and a portion of its supporting structure, showing the manner of mounting the spikes relatively thereto;

Figure 3 is an enlarged sectional detail, taken through the line 3—3 of Figure 2;

Figure 4 is a vertical section, taken through the line 4—4 of Figure 1, showing the manner of attachment of one of the spikes and its associated guide to the blade of the bulldozer;

Figure 5 is an enlarged sectional detail, taken through the line 5—5 of Figure 4;

Figure 6 is a sectional detail similar to that of Figure 5, but taken through the line 6—6 of Figure 4;

Figure 7 is another similar sectional detail, taken through the line 7—7 of Figure 2;

Figure 8 is an end view of a conical lock element or washer;

Figure 9 is a side view of the lock element or washer shown in Figure 8; and

Figure 10 is a view, in three sections, illustrating the operative and inoperative positions of one of the earth loosening or ripping spikes.

Referring to the drawings, wherein like characters of reference denote corresponding parts in the several views, and more particularly to Figure 1, A, B and C, indicated respectively, the power plant and the two ground gripping tracks of a tractor as conventionally used for operating a bulldozer blade 24, which is carried at the outer ends of angled metal frame members 20 that project forwardly from opposite sides of the tractor. The top portion of the blade 24 is given strengthened support from the frame members 20 by diagonal brace members 22, while the lower portion of the blade 24 is reinforced by a channel member 26 extending lengthwise of its rear side, substantially in line with the points of connection of the frame members 20 therewith. The parts A, B, and C, constitute no part of the present invention, except insofar as they furnish the motive power for the bulldozer operation and, in some instances, influence the positioning of the spikes during forward and backward directional movements of the bulldozer.

The embodiment of the invention, as it is exemplified in the drawings, is comprised essentially in a plurality of earth loosening or ripping spikes, six of which are shown for purposes of the present description and are designated 28, 30, 32, 34, 36 and 38, and these are all of similar construction and, in those cases where practical, may be identical in construction.

As shown in Figure 1, two of the spikes 28, 38, are each pivotally supported, as at 40, in an angled bracket 46, which is secured, as by welding, to one side, preferably the outer side, of one of the diagonal brace members 22. Angled brackets 50 are likewise secured to the same sides of the frame members 20 for the securement thereto, as by bolts 52, of reversely angled guide brackets 54, the latter, together with the brackets 46, having arms 56 and 48, respectively, extending rearwardly in spaced relation to the opposed sides of the frame members 20 and the brace members 22, so that the spikes 28, 38, may be swung from normal pendent positions of operation to elevated positions of non-use. When pendent from the pivots 40, the lower portions of the spikes 28, 38, engage with the guide brackets 54, which serve to sustain the spikes in their operative positions, with the arms 56 of the same, together with wear plates 58, secured

on the opposed sides of the frame members 20, acting to prevent their lateral displacement. The pivots 40, as best shown in Figure 3, are each preferably in the form of a bolt that is passed through a brace member 22 and a bracket arm 48 and has a nut 42 threaded on its outer end bearing against a split lock element or washer 44, which is preferably of conical form and is forcibly seated within a similarly shaped recess in the outer face of the bracket arm 48, when the nut is tightened.

The remaining of the earth loosening spikes 30, 32, 34 and 36, are mounted directly on the bulldozer blade 24 and, to such end, each of the spikes has its upper end engaged on a pivot 62 that bridges the gap between the parallel arms of a substantially U-shaped bracket 60, which is secured, as by welding, to the rear side of the blade 24. As shown in Figure 1, the spikes are preferably arranged in pairs, one pair to each side of the vertical center of the blade 24, the spikes 30, 32, on the one hand, and the spikes 34, 36, on the other hand; the spikes of each pair being disposed in closely spaced relation, one with respect to the other and to and adjacent of the frame members 20, the spacing being such that the spikes 28, 38, when operative, are positioned to break ground slightly beyond the outer sides of the paths of travel of the tracks B, C, of the tractor; the spikes 32, 34, to break ground slightly beyond the inner sides of the track paths; and the spikes 30, 36, the ground within the paths between the outer and inner lines of ground disturbance.

Associated with each of the spikes 30, 32, 34 and 36, is a guide bracket 68, which is also substantially U-shaped and is secured, as by bolts 70, to a metal plate 72, that is secured, as by welding, to the channel member 26, at the rear side of the lower portion of the bulldozer blade 24, the lower portions of the spikes engaging between the arms of these brackets, when pendent from the pivots 62. The several brackets 46, 62, are disposed in the plane of the longitudinal center of the blade 24, and the spikes 30, 32, 34, and 36, are to be disengaged from the guide brackets 68 and swung upwardly on their pivots 62, after the manner of the spikes 28, 38, on the pivots 40, to positions of rest on the top edge of the blade 24, during the non-working travel of the bulldozer.

Each of the pivots 62 takes the form of a headed bolt that is mounted in split lock elements or washers 64, which are seated within recesses formed in the outer faces of the parallel arms of a bracket 60 and these grip the bolt to prevent its turning when subjected to the tightening up pressure of a nut 66 threaded on the unheaded end of the bolt. These lock elements or washers 64 are made to the same conical form as that of the elements or washers 44 associated with the pivot bolts 40.

To retain the several spikes 28 through 38 in their inoperative positions, suitable latching devices are provided and each of the same preferably takes the form of a length of chain 74, that has its ends engaged with a pair of eyes 76, which are spacedly mounted on a supporting bracket or plate 78 secured, as by welding, to the blade 24, above the brackets 46, 52. As shown, the lower ends of the spikes are downwardly and rearwardly curved and also tapered substantially to a knife edge.

In operation, during the non-working travel of the bulldozer, the several spikes 28 through 38 will be latched by the chains 74 at their inoperative positions as shown in the right hand view of Figure 10. When the bulldozer is put to work, the spikes are released from the chains 74 and lowered to the positions as shown in the middle view of Figure 10. During any forward travel of the bulldozer, the dozer blade 24 will perform its conventional function without any work performance on the part of the spikes, which continue in the trailing positions. However, during any rearward movement of the bulldozer, the spikes, by reason of their pointed ends and angle of contact with the ground, are automatically forced into a ground digging position, as shown in the left hand view of Figure 10, where they will be held by the weight of the dozer blade assembly, thus causing the earth to be loosened and broken up, throughout continued rearward movement of the bulldozer. The loosening of the ground in this manner obviously reduces resistance to the subsequent forward movement of the dozer blade 24, and permits of the movement of a materially increased volume of earth, with an accompanying speeding up of bulldozer operation.

Without further description, it is thought that the advantages to be had from the disclosed embodiments of my invention will be apparent to those skilled in the art and, also, it is to be understood that the number of earth loosening or ripping spikes to be used in combination with any particular dozer blade will be governed materially by its overall length, while the exact location of the spikes will be determined somewhat by the manner in which the dozer blade is supported from a tractor. It is to be further understood that any and all changes in form, construction and arrangement of parts, to which my invention is susceptible, may be resorted to, without departing from the spirit of the invention, or its scope as claimed.

What I claim is:

1. In a ground moving machine, the combination with a frame having a ground engaging blade carried at the end of said frame, of ground engaging spikes pivotally mounted adjacent said blade and on said frame, said spikes being pivotally mounted on the inside of said frame to said blade and on the outside of said frame to reinforcing arms secured to said blade and said frame, said spikes being adapted to have ground digging engagement with the ground upon rearward movement of the blade but trailing upon the ground during forward movement of the blade, and means for restraining the spikes from lateral deflection.

2. In a bulldozer, the combination with a blade, ground engaging scarifiers pivotally mounted on said blade, said scarifiers being adapted to have ground digging engagement with the ground upon rearward movement of said blade but trailing upon the ground during forward movement of the blade, and guides mounted on said blade for restraining said scarifiers from lateral deflection.

3. The invention as in claim 2, with brackets attached to the rear face of said blade, and pivot means connecting the scarifiers with said brackets.

4. The invention as in claim 2, with brackets attached to the rear face of said blade, and the pivots for said scarifiers are carried by the brackets.

5. The invention as in claim 2, with brackets attached to the rear face of said blade, and the pivots for said scarifiers are mounted in said

brackets, and a wear means is mounted on the rear face of said blade to be engaged by said scarifiers.

6. The invention as in claim 1, with a wear plate interposed between said blade and the spike restraining means.

7. The invention as in claim 1, with means for latching said scarifiers in inoperative positions.

8. The invention as in claim 1, with a chain latching means for securing each of said scarifiers in inoperative positions.

9. The invention as in claim 1, with angled brackets welded to said blade and having openings, said scarifiers having openings co-axial with the openings in said brackets, bolts extending through the respectively aligned openings to pivotally connect the scarifiers with the brackets, and split locking elements on said bolts and engaging the walls of the openings in their respective brackets to frictionally secure the bolts against rotation.

10. In a bulldozer, the combination with a frame having a ground engaging blade carried at the end of said frame, outside and inside ground working spikes, the outside spikes being located on the ends of said frame and near the rear ends of the blade and pivoted to reinforcing arms secured to said blade and said frame, means pivotally mounting the inside spikes rearwardly of and close to the blade for forward and rearward movement with relation to the blade, and means for limiting the forward movement of the spikes to dispose the same in substantially vertical ground engaging positions during rearward travel of the bulldozer, said spikes trailing on the ground during the forward travel of the bulldozer.

11. In a bulldozer, the combination with the ground engaging blade, frame members carrying the blade, outside and inside ground working spikes, the inside spikes being located between the frame members and the outside spikes outwardly of the frame members, reinforcing arms secured to said blade and said frame, adapted to pivotally mount the outside spikes thereon, means pivotally mounting the inside spikes on said blade for forward and rearward movement relatively to the blade, and means carried by the frame members and the blade for limiting the forward movement of the spikes with relation to the blade.

12. The invention as described in claim 2, wherein means is provided for limiting the forward movement of the scarifiers with relation to the blade.

13. The invention as described in claim 2, wherein the scarifiers are longer than the distance between said pivot mount and the lower edge of the blade and have rearwardly curved lower ends, and means positioned above said curved edge for limiting the forward movement of the scarifiers with relation to the blade.

HALPIN EDWARD McCAULEY.