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[56]

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[54] **ADJUSTABLE FEED-THROUGH RIPPER TIP**
5 Claims, 3 Drawing Figs.

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A01b 13/08, E02f 9/28

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 665, 663, 734, 735, 737, 719, 699, 736; 175/379;
 137/141, 142; 60/54.5

ABSTRACT: An adjustable feed-through ripper tip, in which the tip can be advanced by pressurized fluid in a hydraulic cylinder which is removably mounted in the lower portion of the ripper shank.

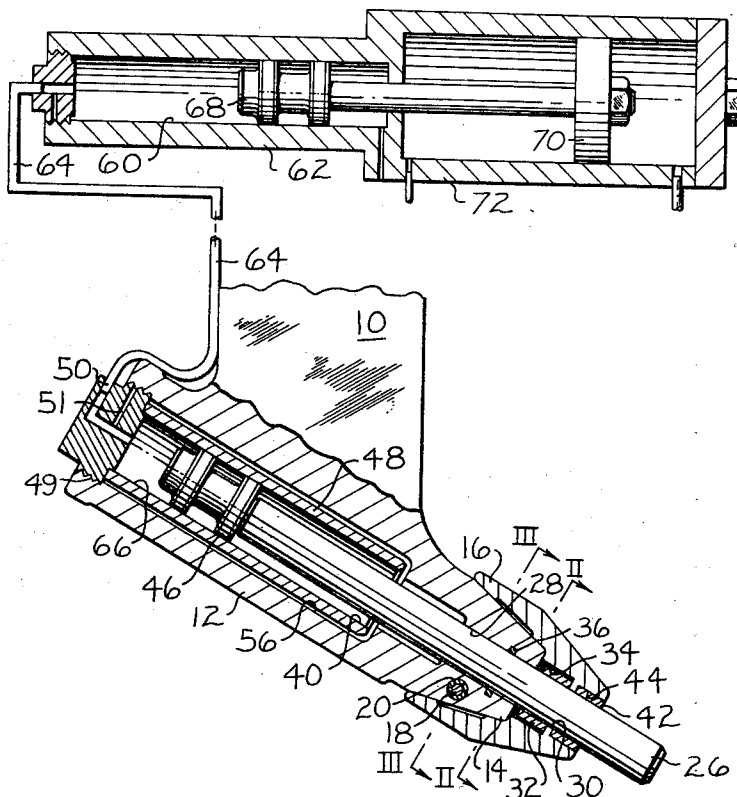


FIG. 1.

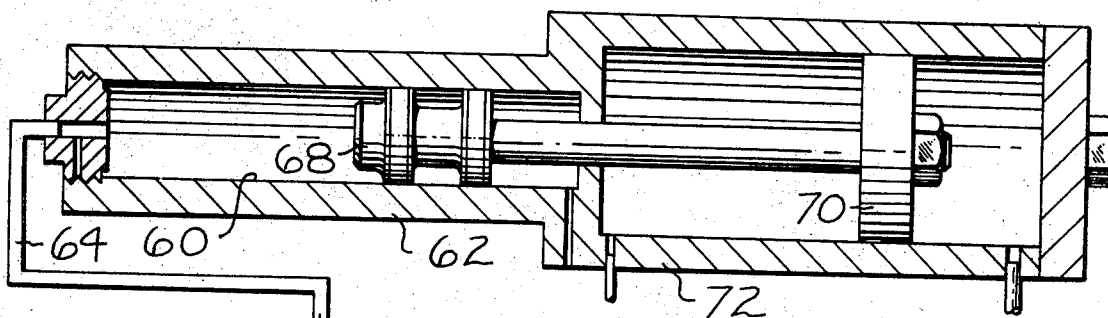


FIG. 2.

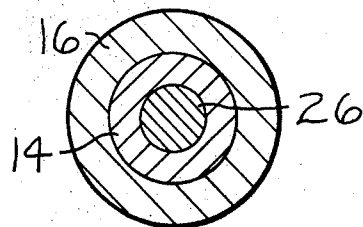
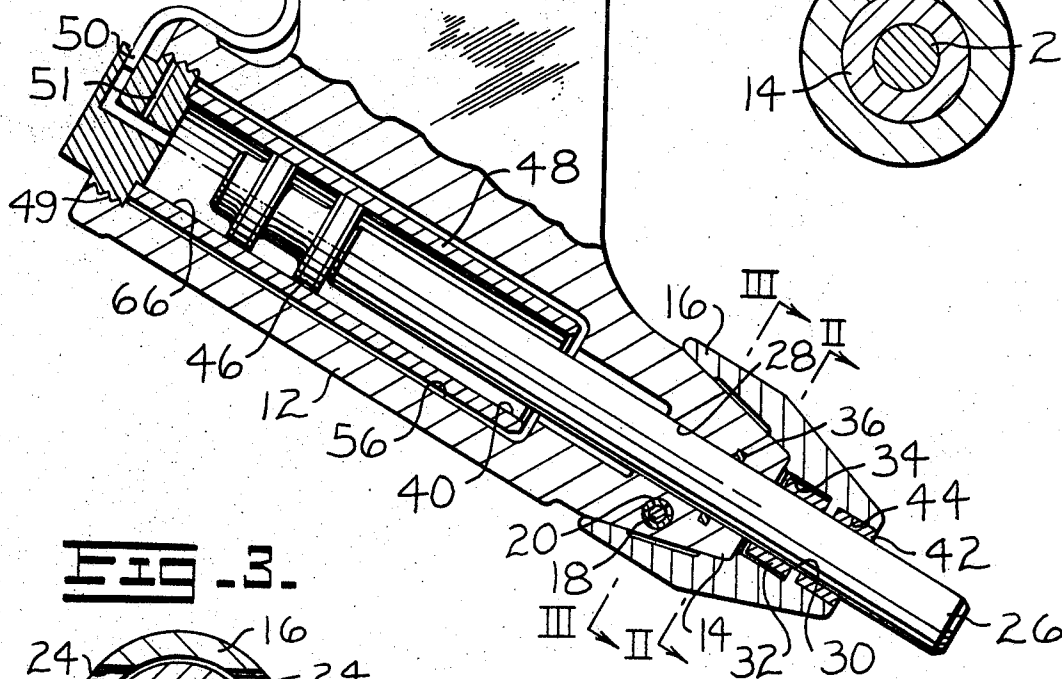
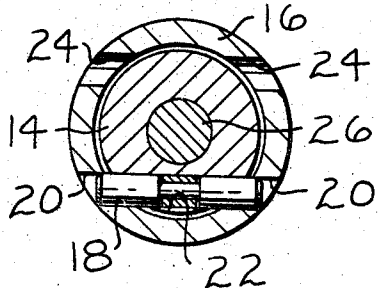


FIG. 3.



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ADJUSTABLE FEED-THROUGH RIPPER TIP

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates to ripper tips, and more particularly to a device for holding a tip within a ripper shank and for extending the tip out of the shank as the tip becomes worn.

Heavy-duty earthmoving equipment owners constantly desire to achieve the ultimate in productivity at the least cost. In the ripping field, various types of ripping equipment are available, with the majority employing a ground engaging, wedge-shaped replaceable point on a ripper shank. The replaceable tip is the critical and expensive component which is subjected to extremely high stresses and wear. The harder and/or more abrasive the material being ripped, the shorter the life of the tip and the more expensive it is to operate the equipment. Further, each time the tip becomes worn, it must be either replaced or advanced so as to present a new ripping point.

In U.S. Pat. application Ser. No. 686,501, filed in Nov. 21, 1967, and assigned to the assignee hereof, a ripper tip was disclosed which may be advanced in response to an operator control signal, so as to make up for the wear of the original tip caused by the frictional contact with the material being ripped.

The invention in this application now discloses an improved system for advancing the tip. Further, a system is disclosed in which safety features are provided which minimize any danger to the vehicle operator which might be caused by the use of mechanically advanceable tips.

Therefore, it is an object of this invention to provide an improved ripper with adjustable tip.

It is also an object of this invention to provide such a ripper in which a tip can be advanced under the influence of pressurized fluid which is contained in a hydraulic cylinder mounted, as a unit, within the ripper shank.

It is also an object of this invention to provide a mechanically advanceable ripper tip which is designed so as to produce maximum safety.

It is also an object of this invention to provide the above-described arrangement having a reversible conical wedge-shaped nose protector on the ripper shank.

It is a further object of this invention to provide such a device in which a hardened bushing is mounted in the protector so as to prevent peening of the bore through which the tip is extended.

It is a further object hereof to provide the above-described arrangement with a spring ring in a groove of the ripper shank, encompassing the tip, to reduce the amount of dirt and other material which may work its way around the tip and into the cylinder.

It is a still further object hereof to provide such an assembly in which alignment of the tip and its actuating means is not critical, thereby reducing manufacturing tolerance problems.

It is also an object hereof to provide a new and improved ripper tip which can be adjusted from a remote source, such as the operator's station.

Other objects and advantages of the present invention will become apparent from the following description and claims as illustrated in the accompanying drawing which, by way of illustration, shows a preferred embodiment of the present invention and principles thereof and what is now considered to be the best mode contemplated for applying these principles. It is recognized that other embodiments of the invention utilizing the same or equivalent principles may be used, and structural changes may be made as desired by those skilled in the art, without departing from the present invention and purview of the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic sectional view of the ripper of the present invention, together with a means for advancing the ripper tip;

FIG. 2 is a cross-sectional view of the assembly taken along a line II-II of FIG. 1; and

FIG. 3 is a cross-sectional view of the assembly taken along a line III-III of FIG. 1.

DETAILED DESCRIPTION

Referring now to FIG. 1, a hydraulically adjustable feed-through ripper tip is shown, comprising a ripper shank 10 with a cylindrical adapter 12 at its lower end. The adapter has a conical-shaped nose 14 upon which is telescopically mated a protector 16, which is retained thereto by a pin 18 inserted in a pair of holes 20 of the protector and a hole 22 of the adapter.

The pin 18 may be a commercially available retaining pin with a friction spring, or any other suitable pin.

The protector 16 is a replaceable member and may be manufactured to be reversible by providing a second pair of holes 24 which, when the protector is reversed, would be coaxial with hole 22 in the adapter.

A feed-through tip 26 which may be of constant cross section extends from the lower end of the adapter and through the protector. The tip may be retained within a bore 28 in the adapter and a bore 30 in the protector by a wide, encompassing split spring ring 32 located in a counter bore 34 of the protector. Of course, the spring ring could be located in a counter bore in the nose of the adapter.

A spring ring 36 within a groove in the nose 14 encompasses tip 26 in such a manner as to reduce the amount of dirt and other material which may work its way up the tip and into a chamber 40. Dirt in chamber 40 could possibly hinder the adjustment of the tip.

A hardened bushing 42 in a counter bore 44 of the protector helps prevent peening of the bore against the tip 26.

The rear end of the ripper tip 26 is abutted by a free piston 46 within a cylinder 48. The cylinder is fastened to the rear end of the adapter 12 by means such as threads 49. Since piston 46 is not secured to the tip in any manner, a slight misalignment of the cylinder with the center of the ripper tip will not cause binding of the tip within the bores 28 and 30. Thus, close tolerances need not be maintained between a bore 56 of the adapter and the outside diameter of the cylinder 48.

Grease or some other hydraulic substance may be introduced behind piston 46 by means of a fitting (not shown) positioned at the point 50, to advance the piston and extend the tip.

As a safety precaution, a passage 51 may be provided at the upper end of the cylinder housing so that removal of the cylinder or disassembly of the parts cannot be accomplished without venting the cylinder of the high-pressure grease or fluid.

From a safety standpoint, since the adapter is subjected to wear which gradually erodes it, the operator can see when the adapter has worn since the outer diameter of the cylinder 48 will then be exposed, without danger of venting the pressure in cylinder. Thus, the cylinder itself is never subjected to wear. If the cylinder was integral with the adapter, it would be difficult to tell when the cylinder was worn thin, thereby creating a hazardous condition due to pressure in the cylinder.

The remainder of FIG. 1 discloses a schematic diagram for an oil-over-grease slave cylinder arrangement for adjusting the feed-through tip from a remote source such as the operator's station.

Grease, or other hydraulic substance, from chamber 60 of master cylinder 62 is forced through a passage 64 to a chamber 66 within the cylinder 68 to force the slave piston 46 and the tip 26 downward.

A master piston 68 is advanced into the chamber 60 in response to hydraulic pressure being directed against the head end 70 of the actuating cylinder 72.

It should be noted that a similar pressure relief system to that provided for cylinder 48 is also present in the master cylinder.

When it is desired to install a new tip 26, the piston 46 can be retracted by retracting piston 68 to cause a vacuum in the chamber 60, withdrawing grease from chamber 66. This permits the piston 46 to be retracted when the new ripper tip 26 is inserted.

As a further safety measure, the piston 70 may be of a larger size than piston 68 so that, when extremely high pressures are exerted on the hydraulic components by the forces acting on ripper tip 26, the increase in the total square inches of piston area 70 lowers the pressure acting on the cylinder 72 so as to keep within a safe operating range.

Thus, the applicant has disclosed a new and improved means for holding a ripper tip within a shank and for advancing it in response to a remotely actuated signal. Although a single embodiment has been disclosed and illustrated herein, it will be obvious that those skilled in the art may readily produce a different device through modification and variation, without exceeding the purview of the following claims.

I claim:

1. In a ripper tooth assembly for an earthworking apparatus having ripper shank means for supporting a ripper tip in ground engaging position to disrupt the surface over which said apparatus is moved, the combination comprising:

an adapter body secured to the lower portion of said shank means and having a bore directed forward and downward with respect to the direction of travel of said earthworking apparatus;

a cylindrical sleeve disposed in said bore of said adapter body in coaxial relationship therewith and having an open forward end and a closed back end;

a linear ripper tip rod disposed coaxially in said bore of said adapter body and having a front end which extends forward from said body and having a back end which extends into said sleeve within said body;

a free piston disposed coaxially in said sleeve behind said rod and in abutment therewith; and

means for selectively forcing an incompressible fluid into said back end of said sleeve to block any rearward movement of said rod in said bore from load forces acting rearwardly thereon and to urge said piston away from said back end whereby said ripper tip rod may be progressive-

ly advanced in said bore of said adapter body as wearing occurs.

2. The combination defined in claim 1 wherein said bore of said adapter body is stepped with the forward portion of said bore conforming in diameter with said ripper tip rod and with the more rearward portion of said bore being of large diameter which large diameter exceeds the outside diameter of said sleeve to provide clearance space therebetween.

3. The combination defined in claim 1 wherein said adapter body has a conical forward end coaxial with said ripper tip rod and further comprising an annular protective nose element having a conical cavity in one end into which said forward end of said adapter body is received whereby said nose fits onto said forward end of said adapter body to protect said body against abrasion, said nose having an axial passage through which said forward portion of said ripper tip rod extends and further comprising an annular bushing disposed coaxially around said ripper tip rod within the forward end of said nose to resist deformation of said nose from shock forces on said rod and further comprising annular sealing means disposed coaxially around said rod rearwardly from said bushing.

4. The combination defined in claim 1 wherein said cylindrical sleeve is supported by a threaded rear closure member which engages threads in said bore of said adapter body to position said sleeve therein, said closure member having a passage communicating with the back end of said sleeve for receiving said fluid.

5. The combination defined in claim 4 wherein said closure member has an additional passage communicating with said back end of said sleeve, said additional passage being positioned to be closed when said closure member is fully engaged in said threads of said bore and being positioned to vent said back end of said sleeve prior to full disengagement of said closure member from said threads of said bore.

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