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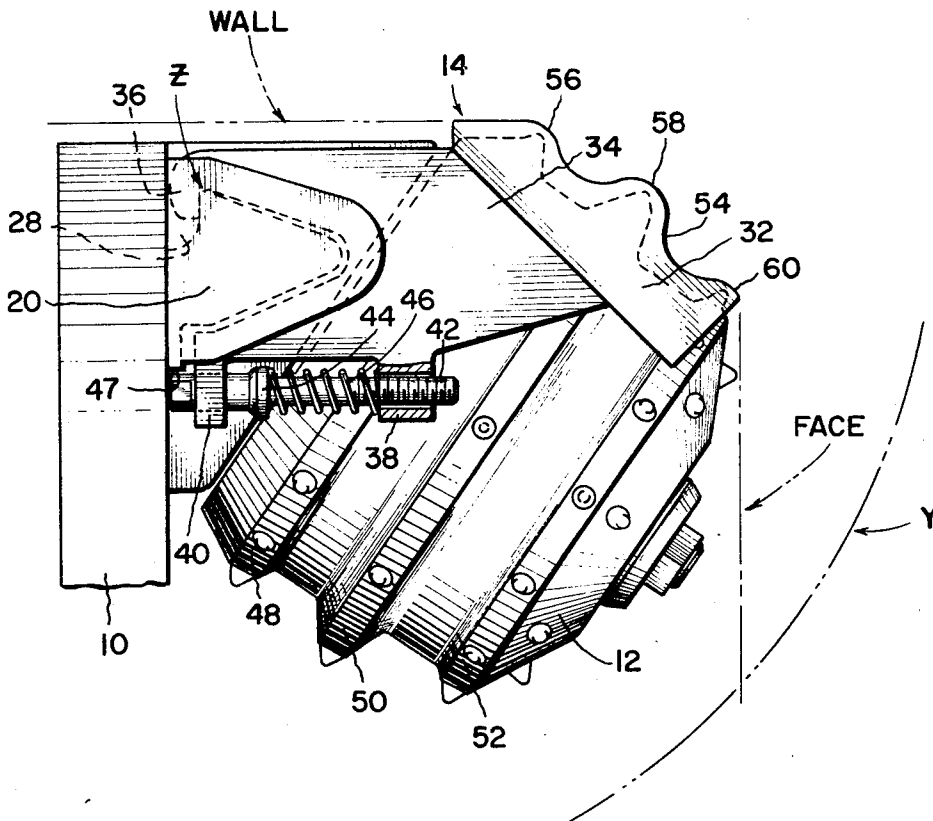
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[54] **MOUNTING HEAD ASSEMBLY**
13 Claims, 4 Drawing Figs.

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313, 381, 319

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ABSTRACT: For use with a mining machine or a tunneler and the like, a mounting head having cutters thereon for eroding the walls and facing of the bore of the tunnel or mine. The mounting head has scraper assemblies adjacent to the cutters disposed for clearing a path in advance of the cutters. The scraper assemblies are latchingly coupled to the mounting head and resiliently mounted to facilitate their withdrawal from the walls and facing upon encountering nonyielding rock, earth and like substances.



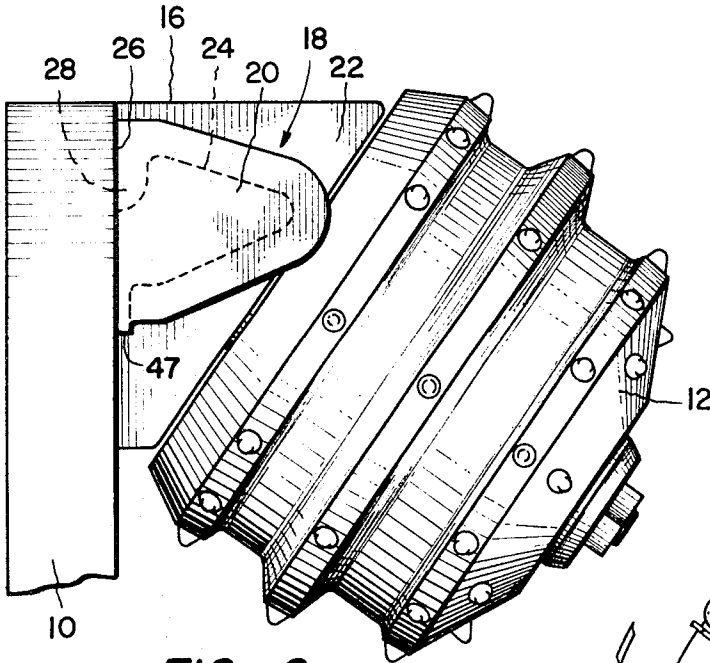


FIG. 2

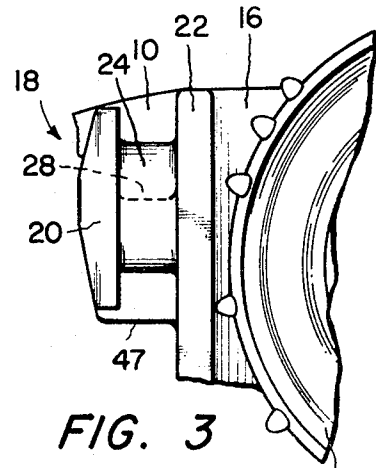


FIG. 3

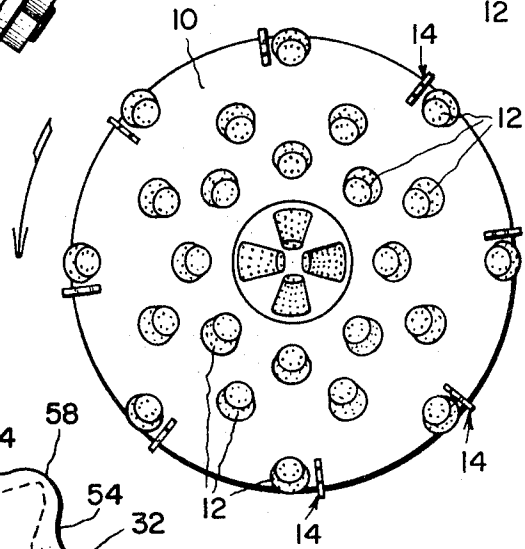


FIG. 1

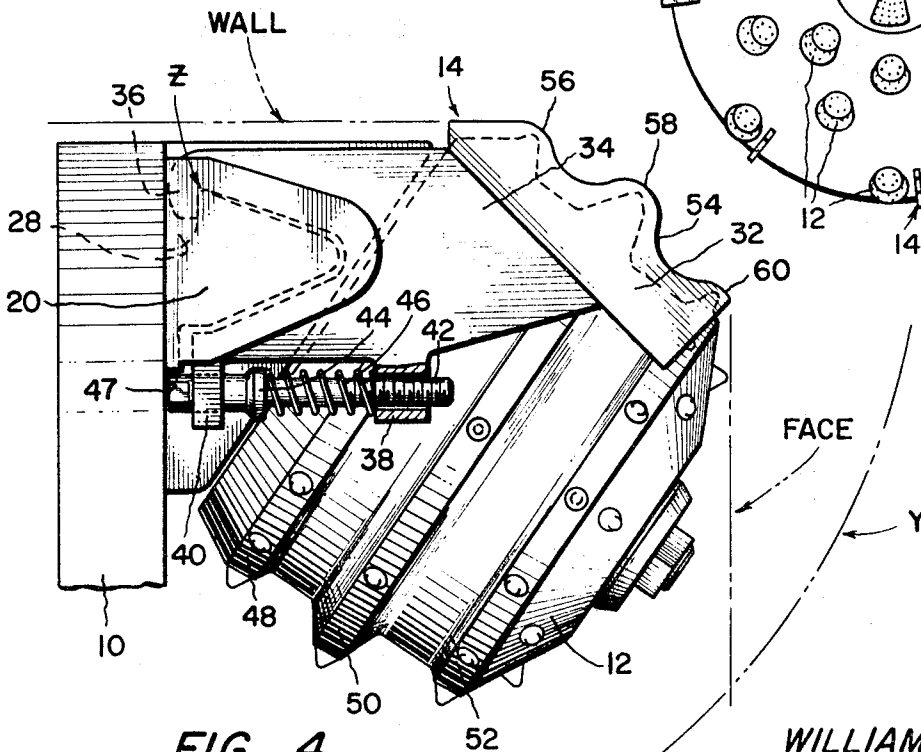


FIG. 4

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MOUNTING HEAD ASSEMBLY

This invention pertains to mounting heads for use with mining machines, tunnelers, and the like and in particular to mounting heads having means provisioned for enhancing or prolonging the life of the cutters.

It is known in the prior art to provision different structures for enhancing the life and durability of cutters mounted on a mounting head. However, such structures are more commonly concerned with the configuration of the cutter, its mounting features, and the like. However successful these prior, known improvements have been, there still remains the difficulty that the successively advancing cutters necessarily engage rubble, loosened rock, earth, and such materials which have been eroded by preceding cutters. Accordingly, the cutters are known to become encrusted with the loosened material, and the efficiency thereof, toward eroding the rock and earth, is greatly diminished thereby.

It is an object of this invention, therefore, to provide means for clearing rubble from a path in advance of cutters mounted on a movable mounting head. It is another object of this invention to provide path clearing means which are resiliently mounted so that they will retract from the walls and facing of the tunnel or mining bore upon encountering nonyielding material. A feature of this invention comprises the use of scraper assemblies which are latchingly mounted to the mounting head to one side of rock cutters. Another feature of this invention comprises the spring-loaded mounting of said scraper assemblies that they will yield, and withdraw from the wall or the face of the bore, upon meeting hard rock or earth.

Further objects and features of this invention will become more apparent by reference to the following description taken in conjunction with the accompanying figures in which:

FIG. 1 is a front elevational view of a rotary mounting head on which are mounted both cutters and scraper assemblies according to the invention;

FIG. 2 is a side elevation of a portion of the mounting head of FIG. 1, which shows a gage cutter supported thereon, and having a hanger for the latched mounting of the scraper assembly according to the invention; in this view the scraper assembly is not shown;

FIG. 3 is a front view of the hanger structure, of FIG. 2, to which the scraper assembly is designed to be latched and on which it is carried; and

FIG. 4 is a side elevation of a portion of the mounting head, a view identical to FIG. 2 except that the scraper assembly, according to the invention, is shown in place on the hanger.

As shown in FIG. 1, a rotary mounting head 10 supports on the working surface thereof a plurality of cutters 12. The cutters are disposed for engaging and eroding rock, earth and like substances from the walls and face of the mine or tunnel bore. Adjacent, and to one side of each of the gaging cutters, i.e., the peripheral cutters 12, is disposed a scraper assembly 14. Each scraper assembly 14 is disposed on a radial line extending from the axis of rotation of mounting head 10. This is a preferred embodiment. However, the scraper assemblies could just as well be arranged on lines offset from radial lines, or canted across radial lines—to direct the leading edge thereof toward, or away from the direction of travel. But these are considerations arising from practical expedients; any such variations practice my invention in that they are taught by my disclosure.

The scraper assemblies 14 are shown arranged for path clearing in advance of the gaging cutters. Now, this is done only to illustrate an example of the use of the invention. Scraper assemblies 14, of course, can be associated with the face cutters as well, with the most beneficial results. So, also, scraper assemblies, in accordance with the teaching of my invention, can be deployed with other tunneling and mining apparatus—75 other than with rotatable mounting heads, for instance—in association with cutters thereof to clear paths before such cutters.

In FIG. 2 and 3 it is seen that a trunnion support 16, only a portion of which is shown, projects from the mounting head 10 for supporting a cutter 12 thereon. Adjacent to one side of trunnion support 16 a hanger 18 is mounted to the mounting head 10. The hanger 18 comprises an outer gusset 20 and, as best shown in FIG. 3, an inner wall plate 22. The outer gusset and the inner plate are spaced therebetween by a recessed saddle or support section 24. Adjacent to a surface 26 of the mounting head, section 24 has a deeply recessed depression 28. As will be discussed subsequently, recessed depression 28 is provisioned to provide for a latching engagement of the scraper assembly 14 with the hanger 18.

In FIG. 4 is shown a scraper assembly 14 fixed in place on the mounting head 10. The scraper assembly comprises a scraper head 32 carried on one end of a support plate 34. The end of the support plate which is opposite the scraper head has a latching lip 36 in engagement with the recessed depression 28. In addition the scraper assembly 14 has a forward, bored appendage 38 and a rearward, bored appendage 40 extending laterally therefrom for supporting resilient mounting means. A rod 42 extends through the bores of the appendages 38 and 40, and rod 42 has a shoulder 44 formed thereabout between the ends thereof. A compression spring 46 is disposed about rod 42 and has one end thereof bearing against shoulder 44 and the other end thereof bearing against appendage 38.

A threaded end of rod 42 protrudes beyond appendage 38 and the opposite end thereof protrudes beyond appendage 40. The opposite end is snubbed or pressed against a terminal edge 47 of hanger 18. This engagement of rod 42 with edge 47 provides a positive means of keeping lip 36 latched in recessed depression 28.

In an alternate arrangement it would be feasible to dispense with this rod 42 and edge 47 keeper arrangement. The reaction forces of spring 46 alone will hold lip 36 in latched engagement with depression 28, as long as the scraper head 32 is engaged with the wall and face of the bore. Shoulder 44 will bear against appendage 40, or the unthreaded end of rod 42 will bear against the mounting head 10. In either case, with the scraper head 32 constrained against the bore wall and face, this—together with the urging of spring 46—sufficiently retains lip 36 in latched engagement with hanger 18.

In operation, as mounting head 10 is rotated, for instance, in the direction of the arrow shown in FIG. 1, cutters 12 are engaged with the wall and face of the tunnel or mining bore; wall and facing are indicated in FIG. 4 to show the relationship thereof with respect to the cutter 12. A cutter 12 which has just eroded rock and earth is followed by a scraper assembly 14 which removes the eroded rubble in advance of a succeeding cutter 12. Therefore, successive cutters 12 engage only nonyielding material, the loosened material having been removed by the scraper assembly 14 proceeding in advance thereof.

In the prior art there has been some teaching of rudimentary scrapers, but these have a number of disadvantages. The known scrapers are fixed to the mounting head by bolting, or rivets, and the like. In that they are scrapers—not cutting elements—they wear rapidly. Accordingly, their effective life is of such brevity that they require frequent replacement. However, the secure fastening of such scrapers necessitates the expenditure of considerable time and labor, in nonconfined areas, to effect their replacement.

It is for this reason, at least, that I teach the latching engagement of my novel scraper assembly 14 with the mounting head 10. When wear has substantially eliminated the effectiveness of a scraper assembly 14, it can be removed from its hanger 18 most readily. A nut is turned on the threaded end of rod 42, to compress spring 46 and to move rod 42 away from edge 47, and then scraper assembly 14 can be lifted from hanger 18.

The prior art scrapers, in being fixedly secured to the mounting head, wear down to “clear” the more prominent outcroppings of rock in the tunnel or mine bore. That is, as they cannot retract when met with nonyielding material, they experience wear and a new shaping of the scraping surface

resulting from such wear. So, then, they wear back to a scraping surface configuration which corresponds with the more prominent outcroppings and, as a result, are inefficient for scraping the furrows and kerfs between the outcroppings. The more they are used, the more they wear, and less and less of the rubble can they scrape.

Having this problem in mind, I devised, and now teach, the resilient-loading of the scraper assembly 14 against the walls and facing of a tunnel or mining bore.

When my scraper assembly 14 encounters nonyielding earth or yet unbroken rock, it is forced to pivot about point Z (FIG. 4) on hanger 18. Accordingly it more fully seats on the saddle or supporting section 24 and, as a result, compresses spring 46. Appendages 38 and 40 move therewith, relative to rod 42 with which they have a clearance fit, and the scraper assembly 14 is withdrawn from the walls and facing of the bore. After passing the nonyielding material the scraper head 32 is returned to the wall or face of the bore by the same spring 46 to clear rubble formed by cutting rows 48, 50, and 52. The pivotal arc, in which scraper assembly 14 swings about point Z, is indicated by the arcuate arrow Y in FIG. 4.

Scraper head 32 has a scraping surface 54, which, as is clear in FIG. 4, has an undulated surface. The wave crests 56, 58 and 60 of the surface are directly in line with cutting rows 48, 50 and 52, respectively, of cutters 12. Therefore, as cutter 12 forms kerfs or grooves in the rock or earth being bored, the wave crests 56, 58 and 60 of the scraper head 32 clean out the kerfs in advance of succeeding cutting rows of a successive cutter. Accordingly, successive cutters are kept clear of any loosened dirt and broken rock created in the path thereof by a preceding cutter 12.

The tunneling or mining operations will occasion requirements for the mounting head 10 to be turned in or withdrawn from the borehole. When this occurs the scraper assembly 14 will "bump" along the wall of the borehole, in that it is being moved backwards. As a result, it would be dislodged from the mounting head 10 unless provision was made to insure its retention. The latching engagement of lip 36 with depression 28 provides such retention, and assures that the scraper assembly 14 will not fall free.

While I have described my invention in connection with specific embodiments thereof, it is to be clearly understood that this is done only by way of example and not as a limitation to the scope of my invention, as set forth in the objects thereof and in the appended claims.

I claim:

1. A cutting assembly, for a tunneling machine or the like, comprising:
 - a mounting head movable relative to walls and facing of a drilling bore;
 - cutters mounted to said mounting head for eroding rock, earth, and the like from said walls and facing;
 - first means latchinglly mounted to said mounting head for clearing paths of eroded rubble, in advance of said cutters, on said walls and facing;
 - second means carried by said mounting head for urging said path-clearing means into continuous scraping engagement with said walls and facing; and wherein
 - said second means comprises a hanger projectingly extending from said mounting head.

2. The invention, according to claim 1, wherein:

said second means further comprises means for accommodating displacement of said path-clearing means from said walls and facing, upon said path-clearing means encountering nonyielding, obstructing material along said paths.

3. The invention, according to claim 1, wherein:

said mounting head is rotatable about an axis common with the axis of said bore;

said cutters comprise a plurality of gage cutters arranged about the periphery of said mounting head; and said first means is carried in proximate adjacency to at least one of said gage cutters, along lines extending transverse to said rotary axis.

4. The invention, according to claim 3, wherein:

said transverse lines comprise radial lines extending from said rotary axis; and

said first means is interposed between adjacent gage cutters.

5. The invention, according to claim 3, wherein:

said first means is disposed immediately adjacent to one side of each of said gage cutters.

6. The invention, according to claim 5, wherein: said one sides are common sides.

7. The invention, according to claim 1, wherein:

said first means comprise a scraper head secured to one end of an extended mounting plate, said plate having a tanglike lip formed on the other end thereof; and said hanger has a latching recess formed therein which engageably receives said lip.

8. The invention, according to claim 1, wherein:

said second means include resilient means operatively disposed between said mounting plate and said mounting head.

9. The invention, according to claim 8, wherein:

said mounting plate has a plurality of spaced-apart, bored-through, lateral appendages; and said resilient means is supported in the bores of said appendages.

10. The invention, according to claim 9, wherein:

said resilient means comprise a rod in penetration of said bores, and a spring having one end in biasing engagement with one of said appendages.

11. The invention, according to claim 10, wherein:

said appendages are two in number;

said rod has a circumferential shoulder formed thereabout, intermediate the ends thereof, which shoulder is interpositioned between said appendages, and said rod having one end thereof constrained against said hanger; and said one end of said spring is constrained against said shoulder.

12. The invention, according to claim 1, wherein:

said cutters have a plurality of prominent rows of cutting elements for eroding kerfs in said walls and said facing; and

said first means comprise a scraper head having a scraping surface extending transverse to said rows.

13. The invention, according to claim 12, wherein:

said surface comprises an undulated surface in which the crests of the waves thereof are in alignment with said rows.