ABSTRACT OF THE DISCLOSURE

A backfill blade for removing fill dirt piled on surface covering characterized by a skid bar forming the lower edge of the blade to prevent damage to the surface covering during backfilling operations. A preferred form of the blade includes a crossbar to facilitate attachment to the teeth of standard backhoe buckets and an upper sharp edge which can be utilized as a cutter or scraper when the position of the blade is reversed.

BACKGROUND OF THE INVENTION

This invention relates to excavating and earth working apparatus and, more particularly, to an improved backfill blade and improved means for attaching such devices and other devices to toothed buckets, for example, those employed on backhoes.

Description of the prior art

Many cutter and scraper blades have heretofore been devised for attachment to tractors, bulldozers, cranes and the like for employment in earth moving operations. Generally, in these operations, it is either intended that the surface covering, such as grass and top soil, be removed or damage to such covering is otherwise not a consideration. Under these conditions, such prior art devices have proved completely satisfactory for their intended function. However, all of these devices characteristically employ a relatively sharp lower edge which tends to cut into surface covering whenever contact is made. This situation renders them completely unsatisfactory for operations such as backfilling trenches when there is a requirement to clean the surface while preserving its original condition.

Today, many excavations are performed with power operated toothed or spiked bucket members. One such equipment enjoying great popularity is the backhoe. In order to expand the field of operation for their equipment, the manufacturers of backhoes have designed blades which can be attached to the bucket and which are advertised as being useful in backfilling operations. They indeed are useful in such operations but only as long as the surface covering need not be retained in its original condition. Typically, these backfill blades are pan-shaped and, in any event, their lower edge acts as a cutter which seriously damages the ground coverage upon contact.

For these reasons, the specially devised backfill blades, as well as the more conventional cutter and scraper blades referred to earlier, have generally proved unsatisfactory for backfilling operations in which it is necessary to preserve the original character of the surface covering. When performing such operations utilizing a backhoe, it is necessary to leave three (3) to five (5) inches of fill dirt on the surface, which must subsequently be removed by hand shovel and rake. Since an experienced backhoe operator can perform this type of initial backfilling operation using the bucket itself, the use of the backfill blade in such an operation has generally been discarded.

The removal of the fill dirt by hand labor is quite obviously an extremely expensive and time-consuming operation.

When the lower edge of one of these state-of-the-art backfill blades contacts an object, such as a water meter, a gas valve or a manhole cover, its configuration is such as to cause the blade to cut into them causing severe damage to the object, to the blade or to both. In other words, there is no capability in these blades to "ride" over such obstacles. Further, along the same line, the bolt and nut attachment connecting this type blade to the bucket, which positions the blade with respect thereto so that it is not possible to permit the blade to "float" with respect to the bucket. Consequently, the natural tendency of such a blade is to cut into any irregular rise in the ground surface with deleterious effect.

Another consideration in operating conventional backfill blades, such as those devised for use with backhoes, is that they are designed to operate in one direction only. Typically, the pan-shaped blade is attached to the bucket with its open face and that of the bucket oriented in the same direction so that the bucket is operated inwardly towards the tractor to perform the backfilling operation. This means that the bucket must be located on the opposite side of the trench from the backfill. If fill dirt is piled on both sides of the trench, the bucket must first be positioned on one side and then relocated on the other in order to perform the operation with existing equipment. This often becomes a serious and even insurmountable problem when the trench is located close to an obstacle such as a building. The only practical way to then remove the fill dirt from the side of the trench adjacent the obstacle is by expensive hand labor.

As previously indicated, conventional backfill blades designed for use with various types of buckets are attached to the bucket by bolts and nuts. Typically, such blades are provided with brackets and holes are drilled in the two side faces of the bucket. The brackets fit snugly against the side faces of the bucket, and bolts or rods are passed through the aforementioned holes to engage holes in the brackets. Connecting and disconnecting such blade to the bucket is a two-man job that cannot be considered a quick-connect or quick-disconnect operation. Movement of the disconnected blade itself from one location to another in the immediate vicinity of the tractor cannot be performed by an operator using the backhoe equipment, but must be performed by hand.

The holes provided in the side walls of the bucket for backfill blade attachment purposes are located close to the leading edges of the side faces. Second only to the teeth or spikes themselves, this is the part of the bucket which receives the greatest wear and tear during normal operations. Consequently, after many months of hard use, the leading edges can be damaged or worn to a point where the bolt holes are destroyed. At best, this condition requires relocation of the bolt holes and modification of the backfill blade brackets in order to facilitate further use of such blades with the same bucket.

Another disadvantage of prior art backfill blades is that, even when considering those marketed by a single manufacturer, they are not universal in application. In other words, manufacturers of backhoes offer a variety of bucket sizes. The backfill blades marketed by the same manufacturer are designed to fit one bucket size or another, but not all. In some cases, certain blades are available from a manufacturer for attachment to certain of his buckets, but the manufacturer does not offer a blade for each of his bucket sizes. The problems associated with such conditions are self-evident.

The pan-shaped blades currently marketed for backhoe attachment are formed from a plurality of specially configured plate members which must be carefully welded.
together. As will subsequently appear, this type of construction is relatively expensive. These limitations of prior art blades utilized in earth working operations are substantially overcome by the present invention. It is therefore a primary object of this invention to provide a blade for earthworking operations which will permit fill dirt to be removed from surface covering without damage to the surface covering or to object embedded therein.

It is another object of this invention to provide a blade for earthworking operations which alternately can be employed in different positions in landscaping operations as a cutter or in backfilling operations without damage to surface covering.

It is a further object of this invention to provide an improved attachment for efficiently and effectively connecting earthworking devices to power operated toothed or spiked bucket members.

Another object of this invention is to provide a backfilling attachment for power operated toothed or spiked bucket members which can be used effectively for backfilling a trench from either side thereof without relocating the power source.

An additional object of this invention is to provide an attachment for connecting earthworking devices to power operated toothed or spiked bucket members which is universally adapted to be used on bucket members of multiple sizes.

A still further object of this invention is to provide an inexpensive backfilling blade for use with power operated toothed or spiked bucket members which can be alternately positioned so as to serve as a cutter in landscaping operations.

BRIEF DESCRIPTION OF DRAWINGS

The novel features that are considered characteristic of the invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of specific embodiments when read in connection with the accompanying drawings, wherein like numbers have been employed in the different figures to denote the same parts and wherein:

FIG. 1 is a side elevation view of a backhoe embodying this invention and being utilized in a backfilling operation;

FIG. 2 is a perspective frontal view of the unique earthworking blade of this invention connected to the backhoe bucket utilizing the novel attachment means of the invention;

FIG. 3 is a perspective rear view of the blade attached to the backhoe bucket;

FIG. 4 is an enlarged side elevation view taken along line 3-3 of FIG. 2 showing in more detail the unique attachment means of this invention; and

FIG. 5 is an enlarged side elevation view of an alternate form of the unique attachment means of the invention.

SUMMARY OF INVENTION

This invention briefly comprises a backfilling blade having means positioned along its lower edge to prevent the blade from cutting into the surface covering, which means in its preferred form comprises a circular skid bar. Unique means, in the form of a crossbar, preferably rectangular in cross-section, engages the grooves formed by the front faces of the teeth of a toothed bucket member, and threaded bolts connected thereto extend between the teeth and through bores provided in the blade to cooperate with lug nuts to fixedly position the blade between the lug nuts and the back of the teeth with the edge of the blade, which includes the skid bar, positioned in front of the teeth. In the preferred embodiment, the edge of the blade parallel to the skid bar is relatively sharp and can be employed in landscaping operation as a cutter when the position of the blade is reversed on the bucket utilizing the same novel attachment means described above.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to FIG. 1, a backhoe 10 will be seen connected to a tractor 11 in the conventional manner. The backhoe comprises a boom 12, a dipstick 13, a bucket 14 including teeth 15 and bucket linkage 16. As illustrated the tractor 11 is positioned with respect to a trench 17 so that the dipstick 13 and the bucket 14 extend over the trench in operative relationship with fill dirt 18. The trench 17 may have been previously excavated using the tractor 11 and backhoe 10 to remove the fill dirt and to pile it alongside the trench 17 on surface covering 19, which is illustrated in the form of grass. Connected to the backhoe bucket 14 is the unique blade 20 which comprises the subject of this invention. The backhoe 10 utilizing the blade 20 is shown being operated to refill the trench 17 with fill dirt 18.

The nature of this blade 20 and its mode of attachment to the bucket 14 may be more clearly seen by referring to FIGS. 2, 3 and 4.

As presented in FIG. 4, the bucket 14 is conventionally provided with a series of teeth mounting members 21 which are welded to the lower face 22 of the bucket and which extend a short distance in front of the edge 23 of this face on the open side 24 of the bucket. The teeth 15 include cavities (not illustrated) which permit them to be mounted on the members 21 and suitably connected thereto, as by peening. It is important to note that a groove 25 is formed between a portion 26 of the upper face 27 of each tooth 15 and its respective mounting member 21.

Referring to FIGS. 2, 3 and 4, the blade 20 is seen to include a flat plate 28 with a skid bar 29 welded to one of its edges 30 and extending its full length. In the preferred embodiment, the skid bar is circular in cross-section and enlarged with respect to the thickness of the flat plate 28. Its significance will be subsequently explained in detail. Also, the blade 20 includes a sharp edge 34 which is parallel to the skid bar 34.

As seen in FIGS. 2 and 4, a pair of apertures 31 pass through the plate 28, and welded to one face of the plate so as to be positioned over each aperture, is a collar 32 which may conveniently be a pipe section of appropriate size. Passing through each aperture 31 and collar 32 is a coarse threaded bolt 33, the aperture and collar being larger in size than the diameter of the bolt in order that the bolt can be quickly slipped through these members. One end of each of the bolts 33 is welded to a crossbar 34 to fixedly position the bolts in parallel relationship to each other and at a distance apart to be adaptable to pass between adjacent teeth 15 of the bucket 14. The crossbar 34 is rectangular in cross-section and oriented with respect to the bolts 33 so that a corner 35 thereof fits into the groove 25 with a side 36 thereof contacting a portion 26 of the upper face 27 of each tooth 15.

Cooperating with the threads of the bolts 32 are lug nuts 37 which seat against respective ends 38 of the collars 31 (see FIGS. 3 and 4). It will be appreciated that, when the blade 25 is positioned with the crossbar 34 in the grooves 25 of the teeth 15, tightening of the lug nuts 37 on the bolts 33 will fixedly seat the blade 20 against a section of the back 39 of the teeth and the mounting members 21. The crossbar 34 is actually locked in the grooves 25 against the upper faces 27 of the teeth 15.

An alternate form of crossbar is illustrated in FIG. 5. In this embodiment, a crossbar 41 is formed from a round bar, i.e., it is circular in cross-section. All other parts of this form of the invention remain unchanged and are identified with the same numbers as in the earlier discussed embodiment. Crossbar 41 snugly fits into the
groove 25 when its associated lug nuts 37 are tightened on the bolts 33. In backfilling operations, the operator may easily attach the bucket 14 without the assistance of others. The blade 20 is laid on the ground with the crossbar 34 side facing upwardly and with the lug nuts 37 loosened on the bolts 33. The backhoe 10 is manipulated in such a manner that the teeth 15 of the bucket 14 pass under the crossbar 34 with the skid bar 29 positioned in front of the teeth. Raising the bucket 14 then causes the grooves 25 to catch the crossbar 34 as the blade 20 is lifted from the ground. The operator gets off the tractor 11 and tightens the lug nuts 37 to fixedly position the blade against the back 39 of the teeth and the mounting members 21. Returning to the tractor 11, the operator positions the backhoe 10 so that the blade 20 is in operative relationship with the fill dirt 18, for instance, as illustrated in FIG. 1. As the bucket 14 is drawn downward to contact the fill dirt 18 with the blade 20 and inwardly toward the tractor 11, fill dirt is shoveled into the trench 17. During the course of repeated downward and inward strokes with the bucket 14, the backhoe 10 is intermittently covered 19 on numerous occasions; however, the rounded skid bar 29 extending along its lower edge 30 will minimize damage to the ground covering. In this manner, fill dirt 18 can be shoveled into the trench 17 leaving a substantially cleared and undamaged surface covering 19. Should the blade 20 contact a manhole cover, a meter or other object embedded in the ground covering in the course of a stroke, the force exerted on the curved surface of the skid bar 29 will cause the bucket 14 to rise and the blade will ride over the object, minimizing the possibility of damage to either the blade or the object.

Alternatively, the tractor 11 can be positioned on the same side of the trench 17 with the fill dirt 18 which can then be shoveled into the trench with repetitive downward and outward strokes of the bucket 14. Also, as previously indicated, if fill dirt is piled on both sides of a trench, all of it can be shoveled into the trench from one tractor position with first downward and outward bucket strokes against the fill dirt on the near side and then downward and inward strokes against the fill dirt on the far side of the trench. In any event, a very close and clean operation can be performed and the skid bar 29 will always preclude damage to the surface covering.

After the surface covering has been cleared with the fill dirt 18 in the trench 17, the operator can leave the tractor 11 and loosen the lug nuts 37. Returning to the tractor 11, the operator lowers the bucket 14 to lay the blade 20 on the ground (or alternately on a truck bed) and slides the teeth 15 from under the crossbar 34 thereby disengaging the backhoe 10 from the blade. The backhoe 10 is then ready to be utilized in other digging operations.

The above operations were described in a manner illustrating how simply the tractor operator can, without assistance, connect the blade 20 to the bucket 14 and disconnect it therefrom. Of course, if a helper is available, he can even loosen the lug nuts 37 as necessary and, under these circumstances, the operator need never leave his position on the tractor 11. The blade 20 can be easily moved from one location to another, e.g., from truck bed to ground, vice versa, or from one ground location to another, by the tractor operator alone using the backhoe 10. The teeth 15 are merely slipped under the loose crossbar 34, the blade 20 raised and swung over to the new location, then lowered and the teeth slid from under the crossbar.

When clearing an uneven surface covering, it is often desirable to loosely fit the blade 20 to the bucket 14. In this case, the lug nuts 37 are only tightened sufficiently to preclude the crossbar 34 from jumping out of the groove 25 when pushing against the fill dirt 18. There is then enough play between the crossbar 34 and the teeth 15 to permit the crossbar to "float" up and down within the groove 25 as the uneven covering is traversed. To use the blade 20 in landscaping operations, it is attached to the bucket 14 in a manner similar to that previously described; however, in this instance the blade position is reversed with the sharp edge 40 extended forwardly of the teeth 15. The blade 20 can then be employed as a cutter, i.e., to level rough ground, excavate a ditch for paving operations, etc.

A typical blade made in accordance with this invention comprises a flat plate 28 formed of 0.15-inch high carbon steel, 1/2-feet long and 11/4-feet wide. The skid bar 29 is 2-inches in diameter and a pair of 11/4-inch apertures 31 are positioned on 16-inch centers, 10 inches from the crossbar 34. The crossbar 34 is 28-inches long and 11/4-inches square in cross-section. Bolts 33 are 5/4-inches long and course threaded. A 16-inch distance between the axes of the bolts permits universal application of this blade to, for instance, 12-, 18-, 24-, 30- and 36-inch backhoe buckets.

Obviously, this structure does not require expensive parts or machining operations and can be fabricated with a minimum amount of effort.

Additionally, it should be noted that the unique crossbar and bolt means of attachment permit the bolts 33 to be positioned between any variety of teeth 15 on a particular bucket 14. This means that the blade 20 can be offset a considerable distance with respect to the center line of the bucket 14. Thus, when the location of the tractor 11 and/or the backhoe 10 is restricted for some reason peculiar to a particular job, the normal position of the unique blade 20 with respect to the center line of the bucket 14 can be altered to obtain a greater reach or swing for the blade. Those who work in this field will readily appreciate the significance of this aspect of the invention.

This invention may be practiced or embodied in other ways without departing from the spirit or essential character thereof. For instance, the circular skid bar 29 could be offset on either side of the flat plate 28, or formed by rolling one edge of a flat plate, or hemispherical in cross-section. Similarly, the unique attachment means can be employed to connect a plurality of tools or equipment to a variety of toothed bucket members.

The invention claimed is:

1. A backfilling attachment for application to the toothed bucket of a power shovel comprising:

- a plate member having at least one straight edge with a cross-section that is enlarged with respect to the thickness of said plate member and is substantially circular;
- means carried by said plate member for attaching it to the bucket teeth so that said straight edge having an enlarged and substantially circular cross-section projects in front of said teeth, said means including a crossbar extending across and gripping a plurality of teeth; and
- whereby said straight edge having an enlarged and substantially circular cross-section minimizes cutting into surface covering when said bucket with said plate member connected thereto is operated to remove fill dirt from said surface covering.

2. The backfilling attachment of claim 1 wherein said crossbar is rectangular in cross section.

3. The backfilling attachment of claim 1 wherein said crossbar is circular in cross section.

4. The backfilling attachment of claim 1 wherein said plate member has at least one aperture passing through and additionally including at least one threaded rod connected to said crossbar and extending between adjacent said teeth and said aperture, and a lug nut engaging each said threaded rod, whereby said crossbar can be engaged with the front face of said teeth when
said lug nut is tightened with said blade being fixedly positioned between the back of said teeth and said lug nut.

5. The backfilling attachment of claim 1 wherein said plate member has a sharp edge substantially parallel to said straight edge having an enlarged and substantially circular cross-section and disposed on the opposite side of said attaching means therefrom, said attaching means being adapted to connect said blade to said teeth with either said sharp edge or said edge having an enlarged and substantially circular cross-section extended in front of said teeth, whereby said sharp edge can be used as a cutter when said bucket with said plate member connected thereto is used in landscaping operations.

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EDGAR S. BURR, Primary Examiner

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