

[54] **DEMOLITION MACHINE**

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[58] Field of Search **299/37, 70, 88; 37/2, 117.5**

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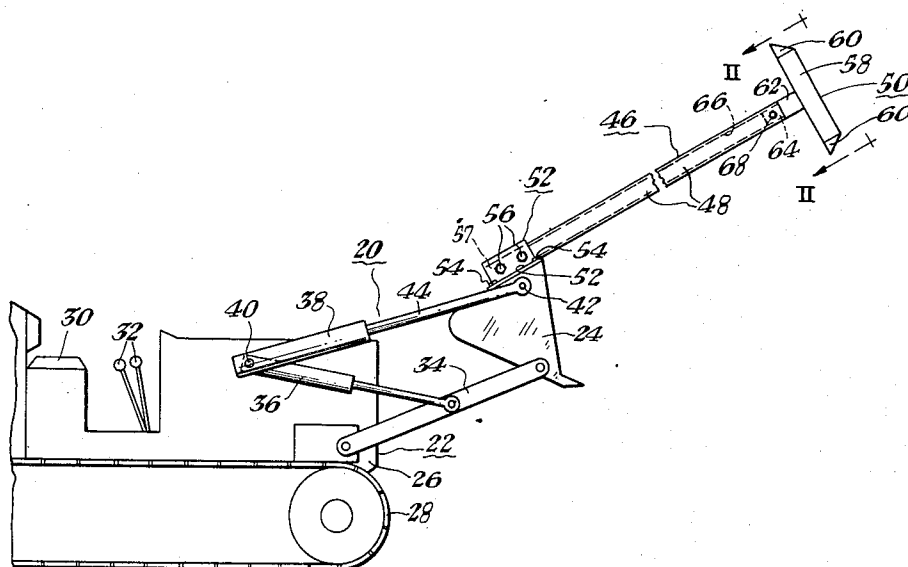
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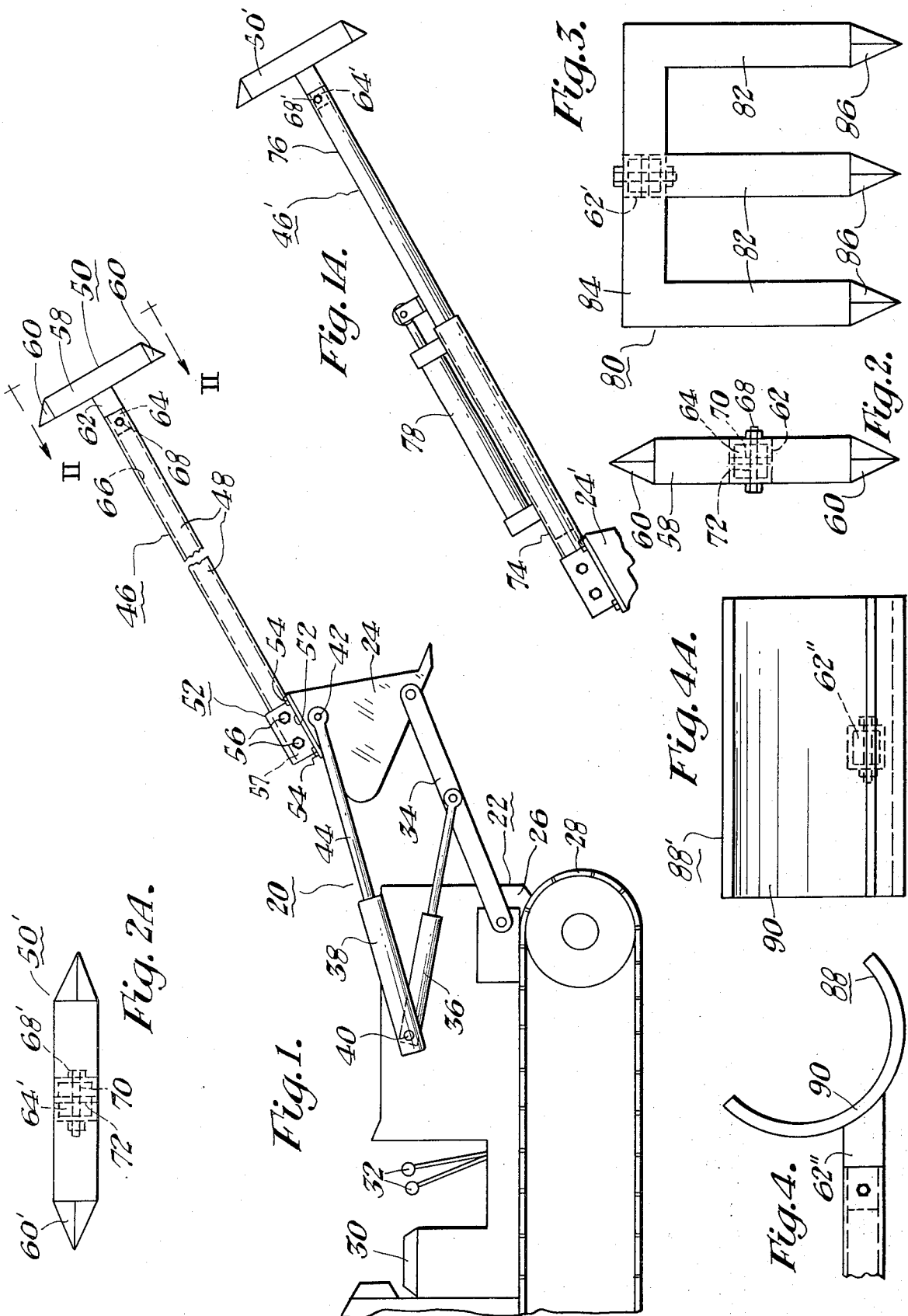
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[57] **ABSTRACT**

A demolition machine comprising a high-lift machine, a bucket or support pivotally mounted on a boom structure of said high-lift machine, means on said high-lift machine for elevating and tilting said bucket or support, a boom structure rigidly secured to said bucket or support and extending forwardly of said high-lift machine, and a wrecking implement rigidly secured to the outward end of said boom structure for elevating and tilting with said bucket or support.

6 Claims, 7 Drawing Figures





DEMOLITION MACHINE

The present invention relates to a demolition machine and the like and more particularly to a highly maneuverable machine of the character described useful in various demolition operations wherein space is at a premium.

With the advent of the model cities program, older buildings within the inner city and elsewhere are being demolished at increasing rates. For such wrecking operations within densely constructed areas it is difficult if not impossible to operate and maneuver wrecking cranes and other conventional wrecking equipment. Where such dense areas are accessible to conventional wrecking equipment, quite often the closeness of adjacent building structures renders the wrecking operation extremely time-consuming if not impossible without damage to adjacent building structures. Clearly a smaller and much more maneuverable wrecking machine is needed, particularly for wrecking operations involving smaller, multiple storey buildings.

Somewhat ancillary to their lack of maneuverability, conventional wrecking machines entail the additional disadvantage of being unable to concentrate the application of wrecking or demolition forces. The size of conventional machines necessitate in many cases the application of demolition forces over relatively large areas. The resulting demolition of large sections of the building structure result in personnel hazard and frequent damage to adjacent building structures. At the same time, the falling of massive portions of the building structure frequently damage otherwise salvageable building material beyond redemption. On the other hand, the massive but slowly repetitive motions of conventional demolition equipment do not in most cases compensate for their disadvantages by accelerating the wrecking operation.

My present invention provides a solution to these problems while preserving whatever advantages attend the use of conventional demolition equipment for wrecking smaller or lower multiple-storey buildings. Thus, I provide a demolition machine which is small in physical size and therefore highly maneuverable but yet is capable of supplying concentrated demolition forces from a variety of directions. The overall size and configuration of my demolition or wrecking machine permits maneuverability for example within the confines imposed by narrow city streets. The wrecking implements provided for my machine are amenable to efficient use both for verticle and horizontal blows. The wrecking machine, particularly with certain configurations of my wrecking or demolition implement, is equally capable of punching, pushing and raking movements. The considerable maneuverability and high repetitive rate of my novel wrecking machine allow demolition of lower-storey buildings within a short period of time in contrast to larger and more cumbersome conventional equipment.

Although my wrecking or demolition machine is capable of considerable overhead reach, it is otherwise operable from a position close to street level. At the same time, the demolition machine and its implement or accessory are readily maneuverable so that very little time is lost when shifting the locus of operations from a position near the base of a building being demolished to a position at the top of the building and vice versa.

Most importantly my demolition machine can be constructed with relative ease through structural modification of conventional excavating equipment, such as a high-lift machine.

I am aware, of course, of other attempts to modify existing excavation equipment such as high-lifts, bulldozers and the like, as typified by the U.S. Pat. Nos. to Jordan 2,613,912; Breyer 2,840,932; Winget 2,999,697; Sides 3,041,811; and Longely 3,155,328.

The Jordan, Winget and Breyer patents disclose accessories attachable to the blade of a bulldozer. While suitable for their intended purposes, the Jordan and Breyer attachment are not readily maneuverable particularly for overhead or elevated operations. The Sides reference discloses accessory attachable directly to a farm type tractor which is likewise inappropriate for demolition operations. Longely on the other hand shows an implement pivoted directly from the boom of a power shovel. Here again there is no demolition capability particularly for overhead operations. In the prior art as typified by these patents there is no disclosure of a highly maneuverable demolition machine and demolition implement capable of both repeated and concentrated blows, which are prerequisite characteristics in rapid demolition operations.

I overcome these disadvantages of the prior art and accomplish the beneficial results alluded to previously by providing a demolition machine comprising a high-lift machine, a bucket or support pivotally mounted on a boom structure of said high-lift machine, means on said high-lift machine for elevating and tilting said bucket or support, a boom structure rigidly secured to said bucket or support and extending forwardly of said bucket or support and of said high-lift machine, and a wrecking implement rigidly secured to the outward end of said boom structure for elevating and tilting movements with said bucket or support.

I also desirably provide a similar demolition machine wherein said boom structure is extensible and includes a pair of telescoping boom sections, and means for longitudinally moving one of said boom sections relative to the other of said sections.

I also desirably provide a similar demolition machine wherein said wrecking implement is double ended and extends transversely of said boom structure end.

I also desirably provide a similar demolition machine wherein a number of wrecking implements of differing configurations are provided for said demolition machine, each of said implements having a similarly shaped supporting shaft, and means for detachable joining a selected one of said implements through its supporting shaft to said boom structure for interchangeability.

I also desirably provide a similar demolition machine wherein said wrecking implement is joined to said boom structure outward end by symmetrical insert and recess portions on said implement and said boom structure, and means are provided for so joining said implement to said boom structure, said insert and recess portions and said joining means being shaped such that said implement can be mounted in positions generally at right angles to one another on said boom structure.

I also desirably provide a similar demolition machine wherein said wrecking implement includes a plurality of pointed members spacedly joined to a cross-piece supporting member forming part of said implement.

During the foregoing discussion, various objects, features and advantages of the invention have been set forth. These and other objects, features and advantages of the invention, together with structural details thereof, will be elaborated upon during the forthcoming description of certain presently preferred methods of practicing the invention.

In the accompanying drawings I have shown certain presently preferred embodiments of the invention and have illustrated certain presently preferred methods of practicing the same, wherein:

FIG. 1 is a side elevational view of one form of demolition machine arranged in accordance with my invention and provided with a unique wrecking arrangement;

FIG. 1A is a partial elevational view of the apparatus shown in FIG. 1 but illustrating a modified boom structure;

FIG. 2 is a partial elevational view of the apparatus shown in FIG. 1 and taken generally from reference line II—II thereof;

FIG. 2A is a similar view illustrating an alternative position of the demolition tool;

FIG. 3 is a similar view of an alternative wrecking implement;

FIG. 4 is a side elevational view of still another wrecking and scooping accessory for my novel demolition machine; and

FIG. 4A is an end elevational view of the accessory as shown in FIG. 4.

Turning now in detail to FIGS. 1 and 2 of the drawings, my novel demolition machine 20 includes in this example a high-lift type excavating machine 22 of more or less conventional construction presently to be described. Thus, the high-lift 22 includes in this example a chassis 26 having catapillar treads 28, an operator seat 30, and the usual controls 32. The bucket 24 can be mounted upon a pair of parallel booms 34 one of which is shown in FIG. 1. The booms 34 are connected individually to operating cylinders 36 for elevating or raising and lowering the booms 34 and the bucket 24. The booms 34 are pivoted at their ends to the high-lift chassis 26 and to the bucket 24.

The bucket 24 can be tilted or pivoted relative its supporting booms 34 by one or more additional cylinders 38, which like the boom cylinders 36 are pivoted adjacent their blank ends to the high-lift chassis 26 as denoted by reference numeral 40. The distal ends 42 of piston rods 44 are pivotally connected to the high-lift bucket 24. As is well known, the bucket 24 can be elevated and/or tilted relative to the high-lift machine 22 by operating a suitable one or both of the cylinders 36, 38. These motions are outlined very briefly in connection with the conventional maneuverability of the high-lift machine 22 for a better understanding of the facility with which the demolition machine 20 of the invention can be operated.

As better shown in FIG. 1 a demolition accessory 46 is rigidly secured to the high-lift bucket 24 for movement therewith. The demolition accessory includes an elongated boom 48 detachably secured at its inward end to the bucket 24 and having a wrecking implement or demolition tool 50 mounted on its outward ends. Desirably, the boom structure 48, which can be of any suitable length depending upon a specific application of the invention, is rigidly yet detachably joined to the

bucket 24 or to a suitable support (not shown) coupled, in place of the bucket 24, to the high-lift boom structure 34 and cylinders 38. In furtherance of this purpose, and in the illustrated example, a boom mounting bracket 52 is secured to the bucket 24 or other suitable support by fastening means such as mounting bolts 54. The mounting bracket 52 includes a socket member 57 which closely receives the adjacent end portion of the wrecking boom 48 and which thereby supports the boom in cantilever fashion from one side (in this case the upper side) of the bucket 24. When thus inserted the boom 48 can be secured to the mounting bracket 52 by a pair of securance bolts 56 or other suitable fastening arrangement such as a quick-detach pin (not shown).

The wrecking implement 50 can be similarly joined to the outward end of the boom structure 48. The wrecking implement 50 in this example includes a mid section 58 or relatively heavy bar stock and is pointed at each of its ends to facilitate its penetration of a wall or other section of the building being demolished. The points 60 of the demolition tool 50 can be formed by pointing the bar section 58 or alternatively bits formed from a hardened steel alloy can be welded or otherwise secured to the ends respectively of the bar section 58.

The wrecking implement 50 is further provided with a supporting stub shaft 62 joined transversely to the bar section 58. An outer end portion 64 of the stub shaft 62 is necked down for close fitting insertion into an inner channel 66 of the boom structure 48. In furtherance of this purpose the boom 48 can be formed from a length of heavy steel tubing having a square cross section as evident from FIG. 3. With the implement shaft 62 thus inserted, a retaining bolt 68 is inserted into aligned apertures in the necked-down stub shaft portion 64 and in the outward end of the boom structure 48 respectively.

With the wrecking implement 50 positioned as shown in FIGS. 1 and 2 the wrecking implement is admirably positioned for rendering, through a more or less vertical arc, blows of concentrated demolition forces in wrecking operations. This can be accomplished simply and at a high repetitive rates by suitably positioning the highly maneuverable high-lift machine 22 with respect to the building being demolished and by raising and lowering or elevating its bucket 24 at the desired rate.

In many wrecking operations, the application of substantially horizontal or sidewise blows is needed. The demolition machine 20 of the invention is admirably suited for this function also. By locking the left caterpillar tread horizontal blows from the right, through a more or less horizontal arc, can be delivered to a building structure by impact with the flat or vertical side of the demolition tool 50. Similarly by locking the right caterpillar tread 28 blows from the left can be delivered. In either case the entire demolition machine 20 is pivoted about one of its treads to swing the high-lift bucket 24, or similarly mounted support, and the boom structure 48 rigidly mounted thereon.

On the other hand concentrated blows in a substantially horizontal direction can be similarly delivered from the left and from the right with the modified position of the wrecking implement 50' shown in FIG. 2A. The wrecking implement 50' is provided with a substantially square, necked-down shaft portion 64' and

intersecting bolt holes 70, 72 such that the wrecking implement 50' can be mounted either in a vertical position (FIG. 2) or a horizontal position (FIG. 2A) relative to the outward end of the boom structure 48.

It will also be apparent that the demolition machine 20 (FIG. 1) can be employed in pushing and raking or pulling motions by moving the high-lift machine 22 forward or backward respectively. Similar and forceful motions are applied to the wrecking implement or demolition tool 50 or 50', owing to its rigid mounting on the high-lift bucket 24 or the like. It will also be understood that either downward or upward blows can be delivered in the vertical direction, owing to the double ended configuration of the wrecking implement or demolition tool 50 and the ability of the bucket tilt cylinders 38 to tilt the bucket 24 and the demolition structure 46 rigidly secured thereto rapidly in either the up or down direction. Naturally, this tilt capability exists irrespective of the elevated position of the bucket elevating boom arrangement 34. Thus, the bucket 24 can be lowered for demolition blows with the wrecking implement 50 at or near grade level, or the bucket can be raised toward its most elevated position for demolition blows of the demolition tool 50 at an elevation considerably above grade level. In any of these positions of the high lift bucket 24, the demolition tool 50 can be swung through a vertical arc by tilting the bucket 24 or through a lateral arc by pivoting the entire high lift machine 22, as aforesaid.

A modified form 46' of the demolition structure is illustrated in FIG. 1A of the drawings. In this arrangement the boom structure 48' includes a pair of telescoping boom sections 74, 76 with one of the sections, for example the boom section 74, being rigidly secured to the bucket or support 24'. The other boom section, for example the section 76, is slidably mounted therein and has a demolition tool or wrecking implement 50' secured to the outward end thereof, for example in the manner described previously. A boom cylinder 78 is secured to the telescoping boom sections 74, 76 as shown for extending and contracting the boom assembly 48'. The extensible boom assembly 48' of FIG. 1A obviously increases the reach and maneuverability of the demolition machine 20.

Raking operations with my demolition machine 20 can be facilitated with the forked demolition tool or wrecking implement 80 of FIG. 3. In this arrangement the implement 80 includes a number of studs or pointed members 82 welded or otherwise secured to a cross piece 84 forming part of the implement 80. Each of the studs is provided with one or more points 86, and the cross piece 84 is welded or otherwise secured to a supporting stub shaft 62' which desirably is made similar to the shaft 62 of the demolition implement 50 for interchangeable and selective mounting of the implements 50, 80 on the outward end of the boom assembly 48 or 48'. Like the wrecking implement 50 or 50', the implement 80 can be mounted in a generally vertical position as shown in FIG. 3 relative to the boom structure 46 or alternatively the tool 80 can be mounted in a position substantially at right angles to that illustrated, after the manner of FIG. 2A.

It will be understood that a greater or lesser number of the pointed members 82 shown in FIG. 3 can be utilized depending upon the application of the invention. The wrecking implement 80 of FIG. 3 also can be utilized for impact demolition operations for delivering

concentrated demolition forces at a number of closely spaced locations.

For handling large type steel beams and other elongated pieces of building material a wrecking implement 88 as shown in FIGS. 4, 4A can be utilized. The wrecking implement 88 includes a semi-cylindrical scoop 90 secured to a supporting stub shaft 62'', as by welding or the like. The shaft 62'' desirably is shaped similarly to the supporting shaft 62 of the wrecking implement 50 and the supporting shaft 62' of the wrecking implement 80 for interchangeability.

From the foregoing it will be seen that a novel and efficient demolition machine has been described herein. The machine is surprisingly maneuverable and is operable at high repetition rates.

The descriptive and illustrative materials employed herein are utilized for purposes of exemplifying the invention and not in limitation thereof. Accordingly, numerous modifications of the invention will occur to those skilled in the art without departing from the spirit and scope of the invention. Moreover, it is to be understood that certain features of the invention can be used to advantage without a corresponding use of other features thereof.

I claim:

1. Demolition apparatus comprising a high-lift machine, a bucket or other implement pivotally mounted on a boom arrangement of said high-lift machine, means on said high-lift machine for elevating and tilting said bucket or implement, a boom structure rigidly but detachably secured solely to substantially flat surface means of said bucket or implement and extending in cantilevered fashion forwardly of said bucket or implement and of said high-lift machine, and a wrecking tool rigidly secured to the outward end of said boom structure for elevating and tilting movements of said boom structure and said tool with said bucket or implement.

2. The combination according to claim 1 wherein said boom structure is extensible and includes a pair of telescoping boom sections, and means for longitudinally moving one of said boom sections relative to the other of said sections.

3. The combination according to claim 1 wherein a number of wrecking tools of differing configurations are provided for said demolition apparatus, each of said tools having a similarly shaped supporting shaft, and means for detachably joining a selected one of said tools through its shaft to said boom structure for interchangeability.

4. The combination according to claim 1 wherein said wrecking tool is joined to said boom structure outward end by symmetrical insert and recess portions on said implement and said boom structure, and means are provided for so joining said tool to said boom structure, said insert and recess portions and said joining means being shaped such that said tool can be mounted in positions generally at right angles to one another on said boom structure.

5. The combination according to claim 1 wherein said wrecking tool includes a plurality of pointed members spacedly joined to a cross-piece supporting member forming part of said tool.

6. The combination according to claim 1 wherein said flat surface means of the bucket or implement include a socket member substantially permanently secured to said bucket or implement so that said socket

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member undergoes all movements imparted to said bucket or implement by said boom arrangement, said socket member being shaped to receive detachably the adjacent end portion of said boom structure, and fastening means for detachably securing said boom struc-

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ture end portion within said socket member, said socket member being shaped for closely receiving said adjacent boom structure end portion and for supporting said boom structure in cantilevered fashion.

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