Jan. 19, 1937. R. E. LJUNGKULL 2,068,554

MAST FOR EXCAVATING MACHINES

Original Filed April 23, 1934

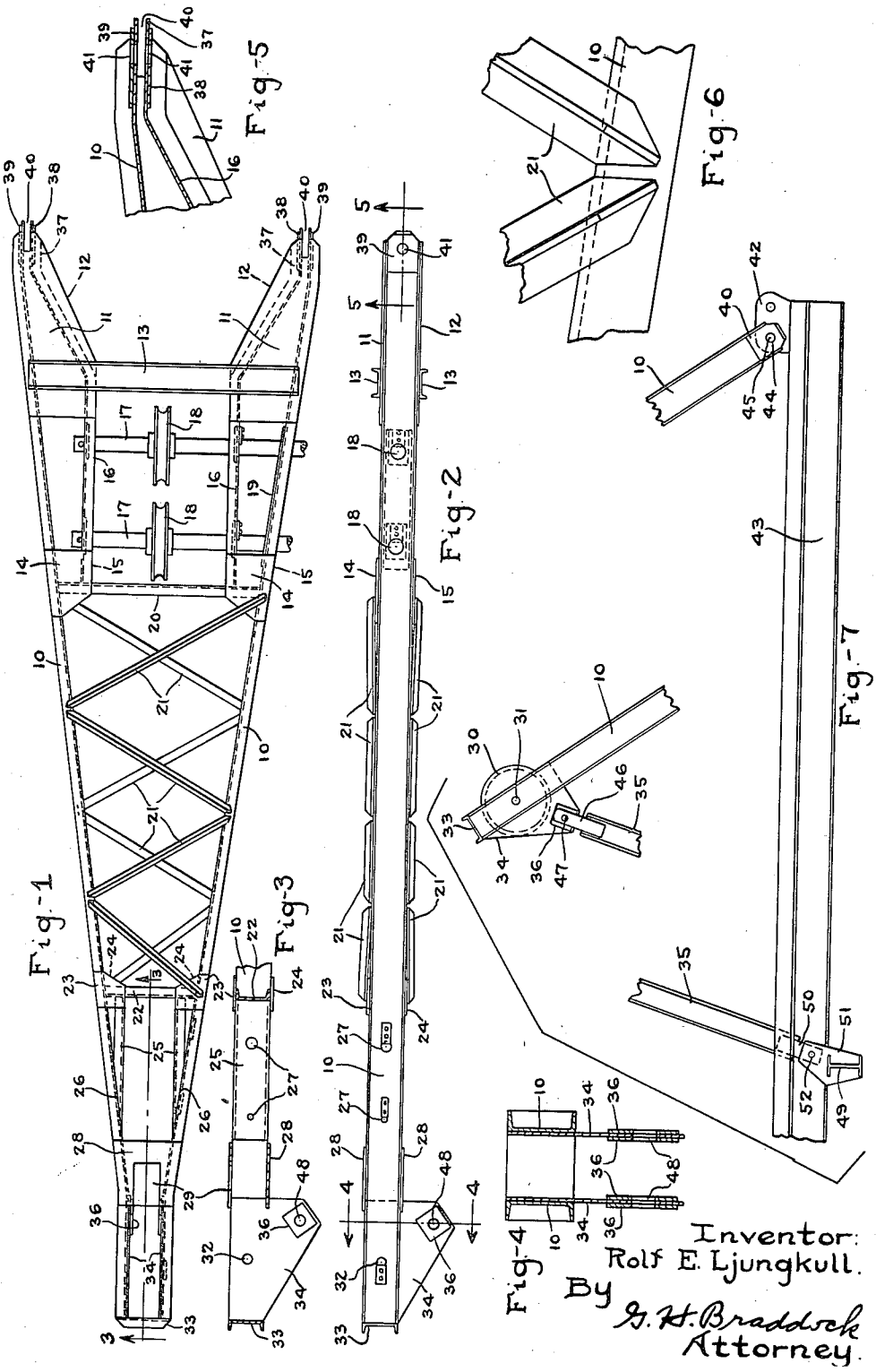


Fig-1

Fig-2

Fig-3

Fig-4

Fig-5

Fig-6

Fig-7

Inventor:
Rolf E. Ljungkull.
By G. H. Braddock
Attorney.

Patented Jan. 19, 1937 2,068,554

UNITED STATES PATENT OFFICE

2,068,554

MAST FOR EXCAVATING MACHINES

Rolf E. Ljungkull, St. Paul, Minn., assignor to American Hoist and Derrick Company, St. Paul, Minn., a corporation of Delaware

Original application April 23, 1934, Serial No. 721,983. Divided and this application December 31, 1934, Serial No. 759,958

3 Claims. (Cl. 189—16)

This application is a division of my pending application Serial No. 721,983, for Excavating machines, filed April 23, 1934.

The invention relates to a mast for excavating or like machines, and the general object of the invention is to provide a mast wherein will be incorporated various improved features and characteristics of construction novel both as individual entities of the mast and in combination with each other.

A further object is to provide mast construction which will include a new and improved arrangement or means for mounting a mast upon the platform of an excavating or like machine.

And a further object is to provide mast construction which will include a new and improved arrangement or means for connecting a mast to a back brace therefor mounted upon the platform of an excavating or like machine.

With the above objects in view, as well as others which will appear as the specification proceeds, the invention comprises the construction, arrangement and combination of parts as now to be fully described and as hereinafter to be specifically claimed, it being understood that the disclosure herein is merely illustrative and intended in no way in a limiting sense, changes in details of construction and arrangement of parts being permissible so long as within the spirit of the invention and the scope of the claims which follow.

In the accompanying drawing forming a part of this specification,

Fig. 1 is a top plan view of a mast in which the features of the invention are incorporated;

Fig. 2 is a side elevational view of the mast of Fig. 1;

Fig. 3 is a fragmentary sectional view, taken on line 3—3 in Fig. 1, detailing features of the upper part of the mast;

Fig. 4 is an enlarged sectional view, taken on line 4—4 in Fig. 2, detailing features of the upper or mast portion of the connection between the mast and a back brace;

Fig. 5 is an enlarged sectional view, taken on line 5—5 in Fig. 2, detailing features of the mounting for the mast upon a platform;

Fig. 6 is a view detailing the manner of attaching T-bars of the mast to channel pieces thereof; and

Fig. 7 is an elevational view, partially broken away, of an assembly including the mast, a back brace associated therewith, and a platform upon which the mast and back brace are supported.

With respect to the drawing and the numerals of reference thereon, the mast includes longitudinally extending channel pieces 10, 10 having their flanges projecting outwardly of the mast. Said channel pieces 10 are at the opposite sides of the mast and converge upwardly, and a plurality of strengthening and reinforcing elements interconnect the channel pieces.

The mast includes plates 11 welded to the opposite upper flanges of the channel pieces 10, 10 at the bottoms of said flanges, and plates 12 welded to the opposite lower flanges of said channel pieces at the bottoms of said flanges. The plates 11, 11 and 12, 12, respectively, extend inwardly of the mast toward each other. Upper and lower transverse channel bars 13 have their opposite end portions welded to the outer surfaces of the plates 11, 11 and 12, 12, respectively. The mast also includes plates 14, above the plates 11 and spaced therefrom, welded to the opposite upper flanges of the channel pieces, and plates 15, above the plates 12 and opposite the plates 14, welded to the opposite lower flanges of the channel pieces. The plates 14, 14 and 15, 15, respectively, likewise extend inwardly of the mast toward each other.

Oppositely disposed channel pieces 16, 16 are situated between the channel pieces 10, 10, in spaced relation to each other and to said channel pieces 10, 10 at the elevation of the plates 11, 12, 14 and 15, and have their flanges projecting inwardly. The upper parts of the webs of the channel pieces 16, 16 are parallel, and lower parts of said channel pieces 16, 16 diverge downwardly and terminate in close proximity to the channel pieces 10, 10. All of the channel pieces 10, 10, 16 and 16 are in a single plane passing longitudnially through the mast. The opposite flanges of the channel pieces 16 are welded to all of the plates 11, 12, 14 and 15. Said channel pieces 16 include suitable bearings for shafts 17 of sheaves 18. The shafts 17 may also be mounted in one or both channel pieces 10, and in a plate, or plates, 19 welded to the webs of either or both channel pieces 10.

A transverse bar 20 at the elevation of the plates 14 and 15 has its opposite end portions welded to the webs of the channel pieces 10, 10, to the top ends of the channel pieces 16, 16, and to the inner surfaces of all of the plates 14, 14, 15 and 15. A series of obliquely disposed T-bars 21 at the upper and lower surfaces of the mast are welded to opposite flanges of the channel pieces 10, 10 at location directly above the channel bar 20, as best shown in Figs. 1 and 2, with the webs of said T-bars 21 extending outwardly

of the mast. At each of the upper and lower surfaces of the mast, alternate T-bars 21 are parallel with each other and adjacent T-bars 21 are in oblique relation to each other to all but meet, as best shown in Fig. 6, where said T-bars are welded to the flanges of the channel pieces 10. The T-bars 21 opposite each other, at the upper and lower surfaces of the mast, are in staggered relation, as shown quite plainly in Fig. 1, so that a lattice effect is the result.

A transverse channel bar 22 at location directly above the T-bars 21 has its opposite end portions welded to the channel pieces 10, 10. Plates 23 are welded to the opposite upper flanges of the channel pieces 10, 10 and to the T-bars 21 and the channel bar 22, and plates 24 are welded to the opposite lower flanges of said channel pieces 10, 10 and to said T-bars and channel bar 22. The plates 23, 23 and 24, 24 extend inwardly of the mast toward each other, and are disposed between the channel pieces 10, 10 and the upppermost T-bars 21.

Oppositely disposed channel pieces 25, 25 are situated between the channel pieces 10, 10 at location just above the channel bar 22 in spaced apart, parallel relation to each other. The flanges of the channel pieces 25 project outwardly. The upper parts of the webs and flanges of the channel pieces 25, 25 are welded to the channel pieces 10, 10, respectively, as at 26, and said channel pieces 25, 25 extend downwardly in oblique relation to said channel pieces 10, 10. The lower parts of the webs and flanges of the channel pieces 25, 25 are welded to the channel bar 22 and upper and lower plates 23 and 24. Said channel pieces 25, 25 are in the plane of the channel pieces 10, 10, 16 and 16. Suitable alining bearings 27 in the channel pieces 10, 10 and 25, 25 are for supporting sheaves carrying shafts (not shown).

Reinforcing plates 28, one at the upper and one at the lower side of the mast near the top thereof and directly above the channel pieces 25, 25, are welded to the opposite flanges of the channel pieces 10, 10. The upper reinforcing plate 28 is cut away as at 29 to clear the sheaves 30. A shaft 31 for said sheaves 30 is mounted in suitable bearings 32 in the channel pieces 10, 10 at location above and adjacent to the plates 28 and not far from the upper end of the mast.

A reinforcing channel bar 33 extends transversely of the top end of the mast and is welded to the ends of the channel pieces 10, 10. Spaced apart plates 34 are welded to the inner surfaces of the webs of the channel pieces 10, 10, and extend vertically downwardly toward a back brace 35, as will be more clear from Figs. 2, 3 and 4. Two smaller plates 36 are welded to each plate 34, said plates 36 in each instance being at the lower edge of and at the opposite sides of the plate 34 by which supported. Said plates 36, 34, 36 provide means upon the mast for attaching said mast and back brace to each other.

The downwardly divergent portions of the channel pieces 16, 16 merge at their lower ends into short bottom parts 37, 37 of said channel pieces 16, 16, including a bottom part 37 having its web arranged adjacent to and parallel with the body portion of the bottom part of each channel piece 10. A small plate 38 is welded to the inner surface of the web of each bottom part 37, and a small plate 39 is welded to the outer surface of the web of the bottom part of each channel piece 10, as shown very clearly in Fig. 5. Each bottom part 37 cooperates with the directly adjacent portion of the channel piece 10 to provide a bearing or supporting member 40 for the mast, the plates 38 and 39 in each instance constituting reinforcements of the bearing or supporting member. Openings 41 through the elements of the bearing or supporting members 40 provide opposed mounting surfaces of each bearing or supporting member, all of which mounting surfaces are in a line extending transversely of the mast, as well as in the plane of said mast.

Each of spaced apart bearing blocks 42, but one being shown, welded to a platform 43, as, for example, a revolvable platform of an excavating or like machine, includes an opening 44 for mounting the mast upon said platform. The openings 44 lie in a line extending transversely of the platform. The mast is mounted upon the bearing blocks 42 by means of pins 45, one for each bearing block on the platform and each bearing or supporting member on the mast, which pins are retained in the openings 41 of the bearing or supporting members 40 and the openings 44 of the bearing blocks 42 in any convenient and suitable manner. Each bearing block 42 is between opposed mounting surfaces of a bearing or supporting member 40.

The back brace may be of any ordinary or preferred construction. As disclosed, said back brace includes integral plates 46 at its upper portion, but one plate 46 being shown, there being a plate or plates 46 adjacent each set of plates 36, 34, 36 as best disclosed in Fig. 7. The mast and back brace are connected to each other by pins 47, there being one pin 47 in openings 48 through each set of plates 34, 36, 46.

The lower portion of the back brace 35 is supported by a transverse I-beam 49 welded to a lower portion of the platform 43. As disclosed, said lower portion of the back brace extends downwardly through the platform and integrally supports one or more plates 50. The transverse I-beam 49 supports one or more upwardly extending plates 51, and the lower end of the back brace is connected to the transverse I-beam 49 by one or more pins 52 inserted through the plates 50 and 51.

Both the mast and the back brace lie in a vertical plane passed longitudinally through the platform, the mast slanting downwardly at desired angle from rear toward front or boom end of the platform, and the back brace slanting downwardly at desired angle from front toward rear of said platform. The upper portions of the mast and back brace are connected together at location above the platform, rearwardly of the location where said mast is mounted upon the platform, and forwardly of the location where said back brace is mounted upon said platform.

What is claimed is:

1. Mast structure comprising spaced apart, longitudinally extending, downwardly diverging side frame members each consisting of a channel piece, reinforcing members between said side frame members, spaced apart sheave supporting members each consisting of a channel piece between lower portions of said side frame members and in spaced relation thereto, lower portions of said channel piece sheave supporting members continuing downwardly from upper, parallel portions thereof at an angle of greater divergence than that of said side frame members to meet the side frame members at their lower ends, and plates secured to the flanges of said sheave supporting members and side frame members, re-

spectively, and a sheave supporting member and a side frame member at each side of the mast structure providing means for mounting the mast structure.

2. Mast structure comprising spaced apart, longitudinally extending, downwardly diverging side frame members each consisting of a channel piece, reinforcing members between said side frame members, spaced apart sheave supporting members each consisting of a channel piece between lower portions of said side frame members and in spaced relation thereto, upper portions of said channel piece sheave supporting members being parallel and lower portions thereof diverging downwardly at an angle of greater divergence than that of said side frame members to meet the side frame members at their lower ends, and a member securing all of said sheave supporting members and side frame members to each other, said member and said sheave supporting members bracing said side frame members and cooperating in the structure to provide an efficient sheave support.

3. Mast structure comprising spaced apart, longitudinally extending, downwardly diverging side frame members each consisting of a channel piece, upper portions of said side frame members being in spaced apart, parallel relation, spaced apart, parallel sheave supporting members between diverging portions of said side frame members and adjacent said upper, parallel portions of the side frame members, said sheave supporting members having their upper ends secured to portions of said side frame members situated below and adjacent to said upper, parallel portions of the side frame members, a bracing member secured to lower portions of said sheave supporting members and to said side frame members and connecting the sheave supporting members and side frame members to each other at each side, respectively, of the mast structure, said upper, parallel portions of the side frame members constituting a sheave support, and reinforcing plates at the upper and lower surfaces of the mast structure securing portions of the side frame members at the opposite sides of the mast structure and between said parallel sheave supporting members and said upper, parallel portions of the side frame members to each other.

ROLF E. LJUNGKULL.