

April 28, 1959

R. W. DODGE

2,883,772

MATERIALS HANDLING MACHINE

Filed July 2, 1953

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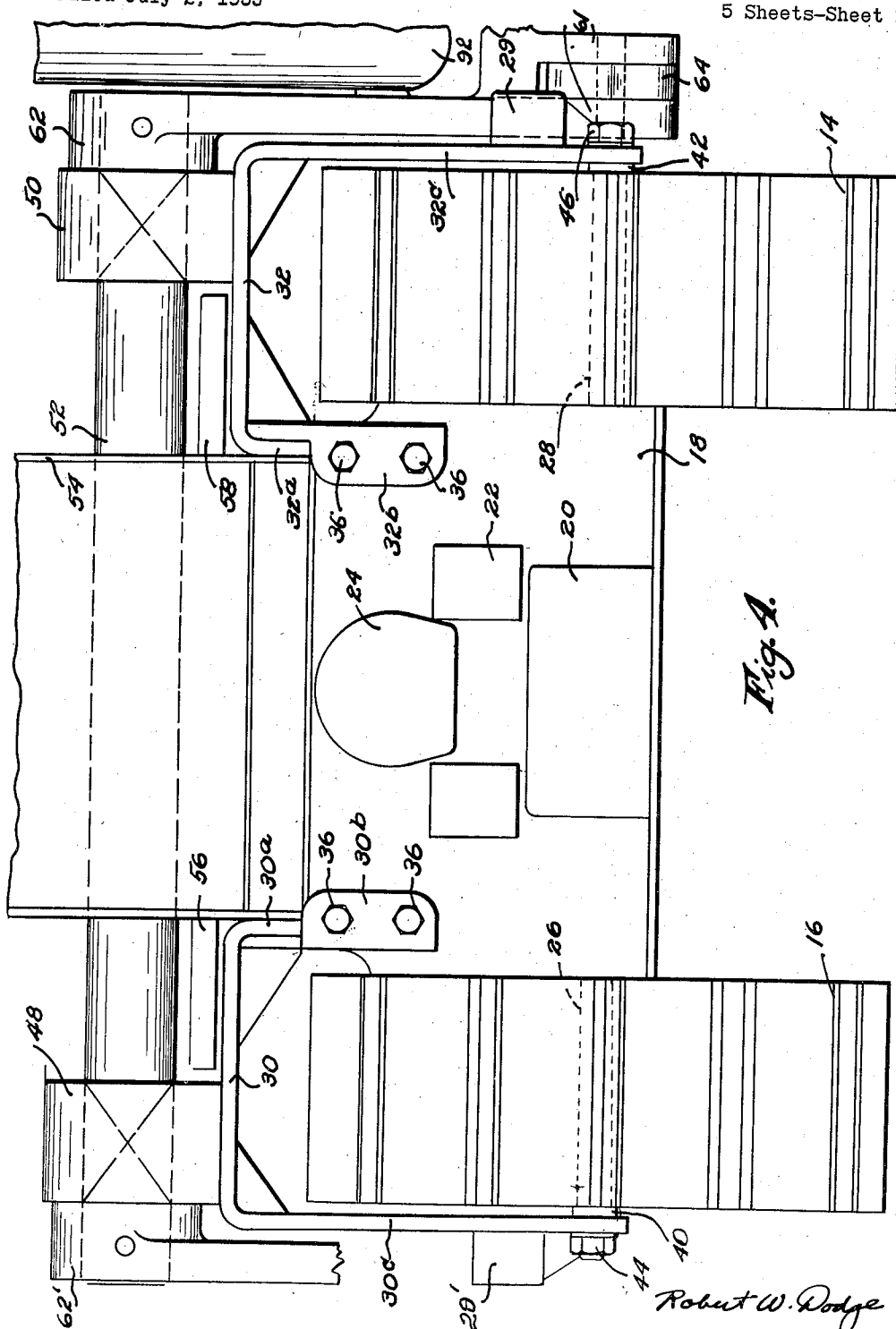


Fig. A.

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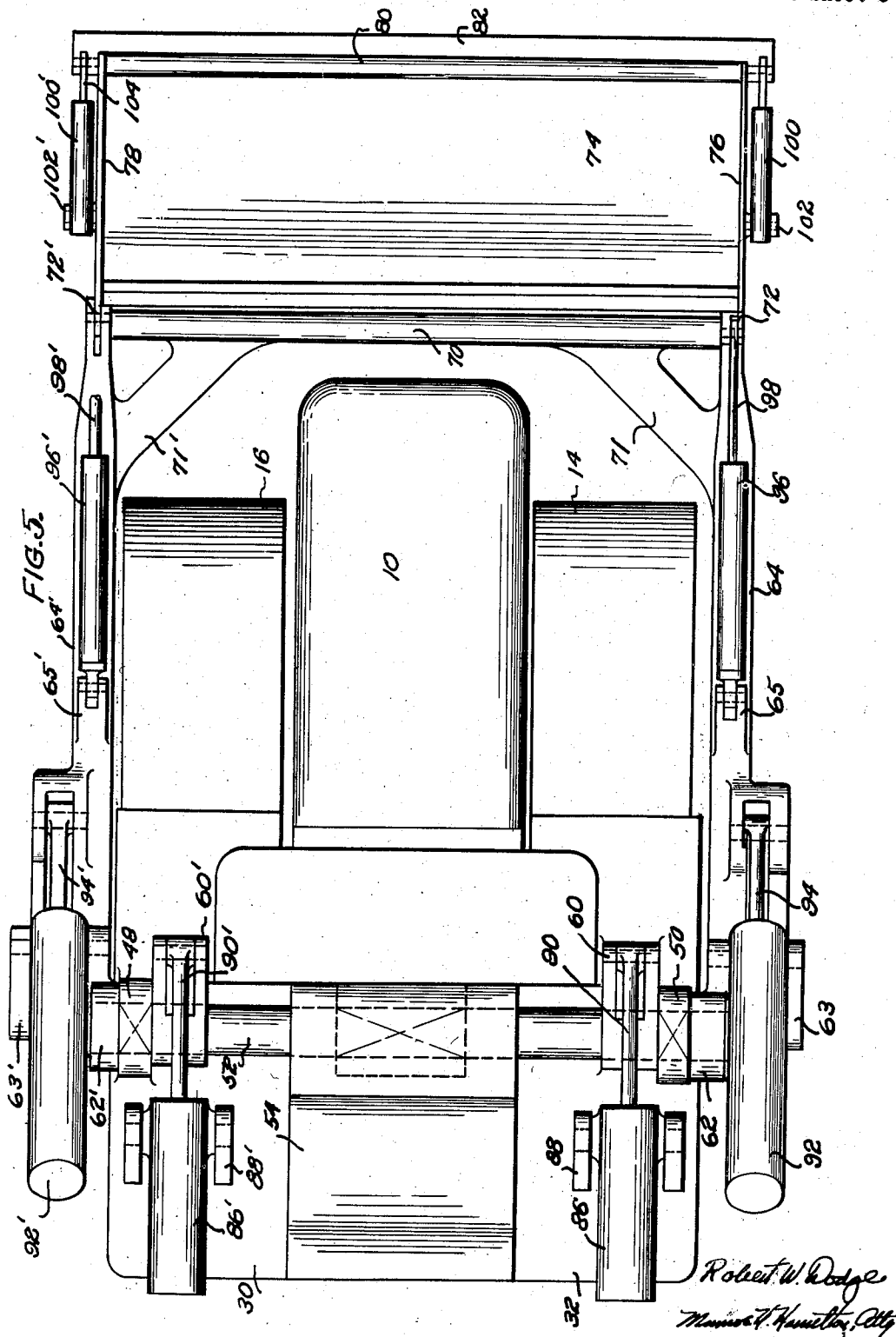
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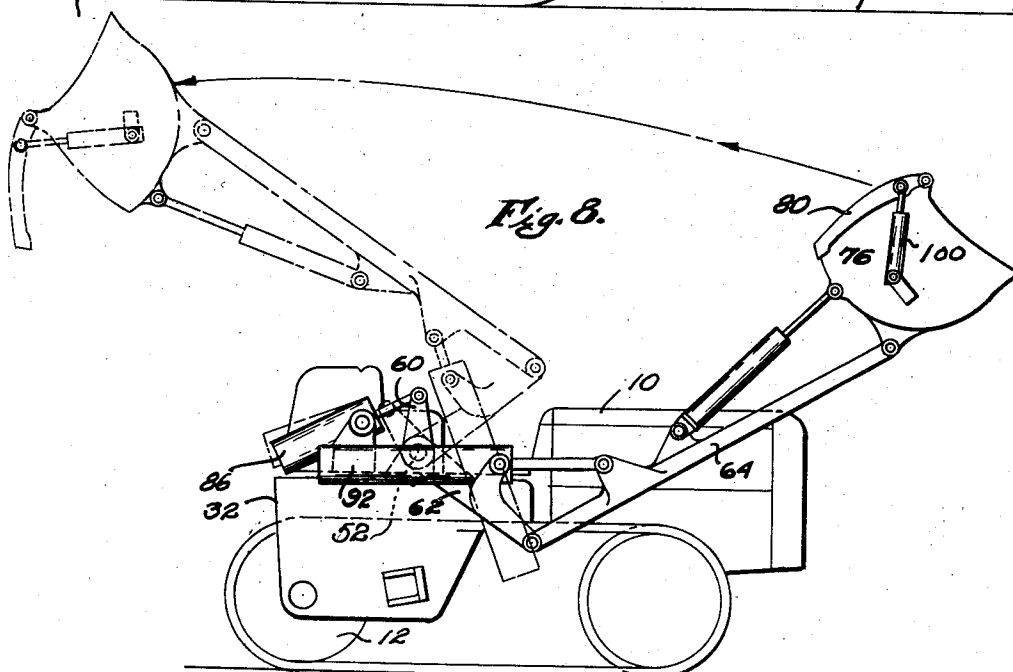
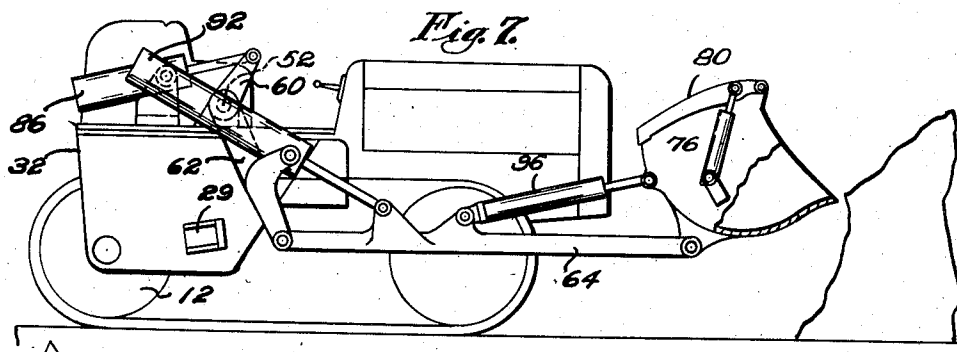
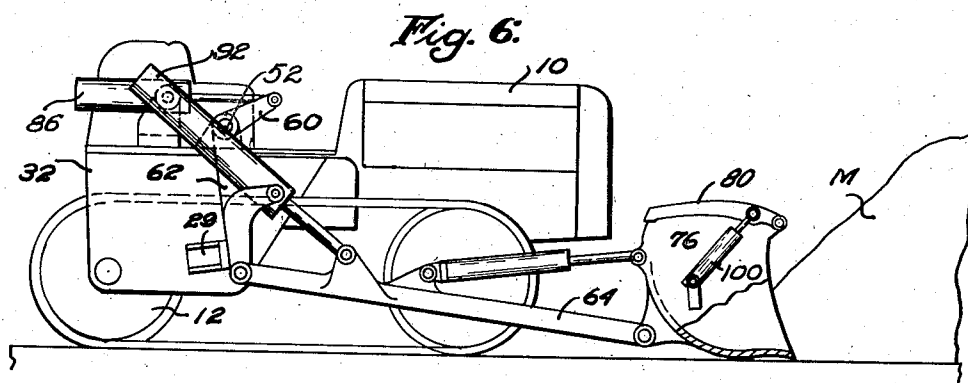
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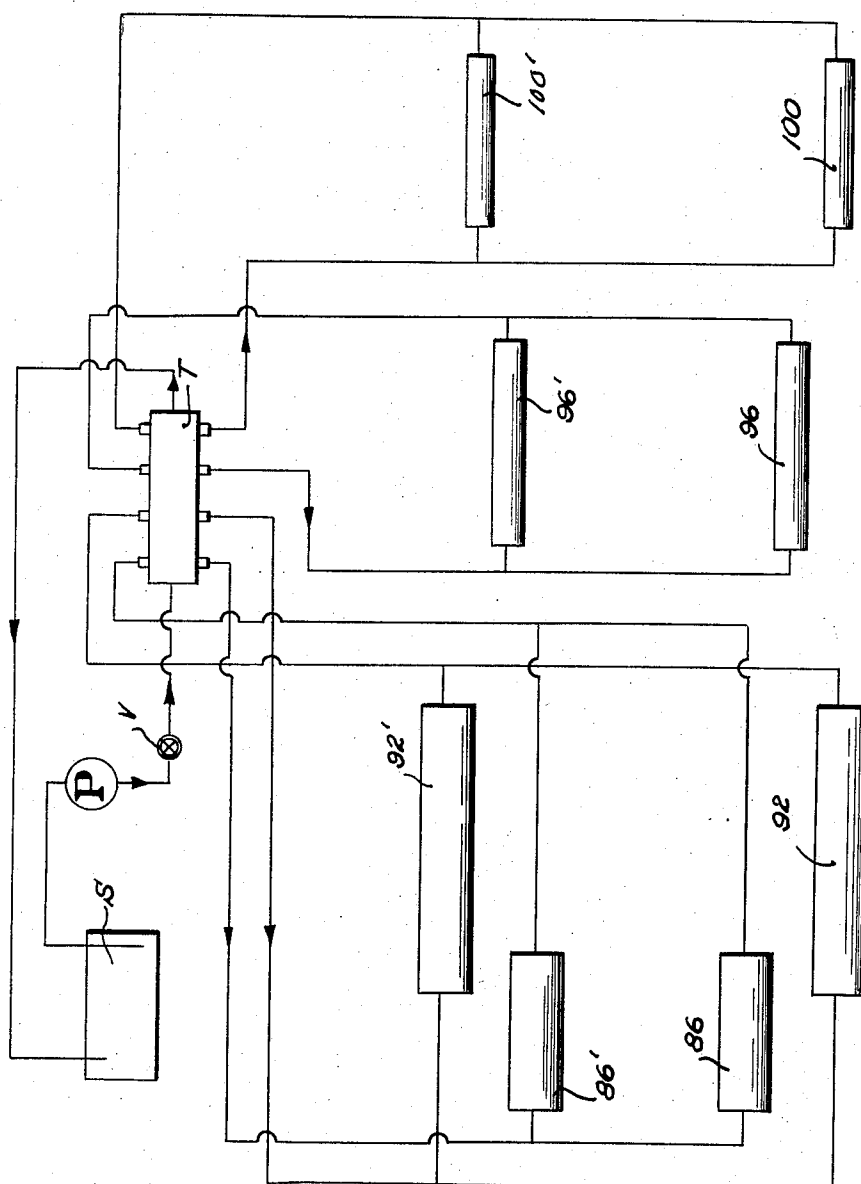


Fig. 9.

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MATERIALS HANDLING MACHINE

Robert W. Dodge, Wenham, Mass.

Application July 2, 1953, Serial No. 365,725

7 Claims. (Cl. 37—117.5)

This invention relates to an improved materials handling apparatus and more particularly to a machine for performing operations which are customarily carried out by means of earth moving equipment, such as bull dozers, loaders, shovels, and the like.

Among the various classes of earth moving equipment now commonly employed, there are two types of machines—the so-called "bull dozer" type and the "loader" type—each of which depend upon the same general form of tractor body. On this tractor body there is adjustably mounted special materials handling elements. In the case of the bull dozer, a heavy blade with a special cutting edge is provided and heavily reinforced and braced against shock and stresses, whereas the loader is equipped with a shovel or bucket which is usually carried on a conventional boom or lifting arm structure.

It has been found that there are many situations where it would be desirable to have available a machine capable of functioning both as a bull dozer and a loader. However, the conventional bull dozer is not provided with means for properly performing a loading operation. In the case of the conventional loaders, it is found that standard types of boom and lifting arm structures when subjected to the stresses and shocks developed in a bull dozing operation quickly become damaged and soon break down entirely.

It is an object of the present invention to deal with the problem indicated and to devise a materials handling apparatus which can function either as a bull dozer or a loader without damage to the mechanism employed. It is also an object of the invention to provide a combined bull dozer shovel machine in which novel handling operations can be carried out and the normal range of operation of a loader is substantially extended. Still another object is to devise a structure which can readily be combined with standard types of tractor bodies without altering or modifying existing parts of such vehicles in any significant manner. Still another object of the invention is to devise a combined bull dozer or loader mechanism in which the stresses developing out of loading or bull dozing operations may be more satisfactorily distributed throughout the tractor body and its rear driving wheels, and these combined operations can be conveniently carried out without loss of maneuverability, or visibility, on the part of the machine operator.

These and other objects and novel features will be more fully understood and appreciated from the following description of a preferred embodiment of the invention selected for purposes of illustration and shown in the accompanying drawings, in which

Fig. 1 is a side elevational view of a tractor member on which is mounted the materials handling apparatus of the invention;

Fig. 2 is a detail perspective view of one of the mounting frame pieces employed in securing the materials handling apparatus of the invention on a tractor body;

Fig. 3 is a cross-section taken on the line 3—3 of Fig. 1;

Fig. 4 is a rear elevational view of a tractor equipped

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with the materials handling apparatus of the invention and particularly illustrating one arrangement of mounting frame pieces on a typical tractor body;

Fig. 5 is a plan view of a tractor body with the apparatus of the invention mounted thereon, and showing in further detail the dual pivoted lever mechanism for controlling the position of a blade carrying shovel unit;

Fig. 6 is another elevational view of the tractor arrangement of the invention shown carrying out a loading operation;

Fig. 7 is a view similar to Fig. 6, but showing the pivoted lever mechanism in another lifting position;

Fig. 8 is another view similar to Figs. 6 and 7, and illustrating the pivoted lever mechanism in a progressively higher loading or dumping position and also indicating in broken lines an extreme rearward position into which the lever mechanism may be moved for dumping purposes; and

Fig. 9 is a diagrammatic view illustrating one form of hydraulic control apparatus for manipulating the pivoted lever mechanism.

The materials handling structure illustrated in the drawings noted comprises one preferred embodiment of the invention and is, in general, based upon the novel concept of a blade carrying shovel or bucket which can be used either as an hydraulically controlled bull dozer or shovel.

The invention also depends upon the further novel concept of a stop-supported or braced lever mechanism by means of which loading may be carried out and yet relatively heavy shock forces and other stresses, such as developed in bull dozing operations, may be transmitted to special stop means to substantially eliminate any bending forces in the lever mechanism and to avoid excessively loading the hydraulically controlled units.

In order to unite the two concepts of a blade carrying shovel and a stop-supported lever mechanism in proper working relationship to one another, I have further devised a special organization of parts with a tractor body wherein a main connecting shaft and relatively heavy mounting frame pieces are secured to the tractor body at points well above the axes of the rear driving wheels of the tractor. I am thereby enabled to suspend two separated lever assemblies on the ends of the connecting shaft and to solidly lock together the two lever assemblies. In addition I am enabled to locate rigidly held stop members on lower sections of the frame pieces at points substantially on the same level with, or slightly above, the horizontal axes of the rear wheels of the tractor in which positions the stops can exercise their most efficient resistance to rearwardly transmitted forces from the bucket when the latter is operating in a bull dozer loader position.

From the foregoing it will be observed that the apparatus of the invention may be conveniently thought of as being made up of four principal parts, including the blade carrying shovel; two stop-supported lever assemblies for positioning the shovel; a mounting frame and connecting shaft for uniting and reinforcing the lever assemblies; and, finally, an hydraulically controlled mechanism for moving these parts into desired positions of adjustment.

Considering first in detail the mounting frame and connecting shaft, attention is directed to Figs. 1 to 5, inclusive of the drawings, wherein numeral 10 denotes a tractor of the conventional type having a pair of rear driving wheels, as 12, which engage with and drive tracks 14 and 16. In Fig. 4 I have further illustrated a typical structure with which my invention may be employed, although not necessarily being limited thereto. In the structure shown the tractor 10 is provided with a rear body portion 18 which includes a very heavy metal housing usually consisting of a metal casting, for example. In this housing are formed openings, as 20, 22

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and 24, for receiving various types of machine attachments well known to the art. In this housing 18 is contained the driving mechanism for the tractor which is not shown in the drawings as it forms no part of the present invention. However, in Fig. 4 there has been shown the driving shafts 26 and 28 which carry the wheels 12.

In accordance with the invention I provide a pair of mounting frame pieces which can be conveniently secured to the housing 18, or other parts, for example by bolts, welding, or other fastening means. These mounting frame pieces are denoted by the numerals 30 and 32 and comprise U-shaped members, best shown in Fig. 2. Inner legs 30a and 32a of U-shaped members 30 and 32, respectively, are adapted to be solidly secured to respective opposite sides of the housing 18, as by means of bolts 34. Also, these inner legs 30a and 32a are provided with right-angularly bent frame extensions 30b and 32b which are adapted to lie against the rearmost face of the casting body 18 and to be solidly secured by bolts 36, as illustrated in Fig. 4.

When thus secured to the casting 18, the two U-shaped members are of a size such that the respective outer legs thereof—30c and 32c—overlie and extend beyond the respective tracks 16 and 14 in spaced relationship therewith. Each of these outer legs 30c and 32c have downwardly extended portions through which are located openings, as 38 (Fig. 2). The openings 38 of members 30c and 32c are adapted to receive therethrough respective shouldered stub shafts 40 and 42 which are threaded on to shafts 26 and 28, or otherwise attached thereto. Nuts 44 and 46, for example, may also be threaded on to outer ends of the respective stub shafts 40 and 42 to solidly secure the lower sections of these frame pieces upon the shafts 26 and 28.

It will be apparent that these supporting frame pieces are very rigidly secured to the tractor housing 18 and provide two supporting platforms which are located well above the tops of the tracks 16 and 14. On these supporting platforms are mounted large bearing members 48 and 50, and rotatably received through these bearing members is a main connecting shaft 52, as shown in Figs. 4 and 5. This shaft 52 extends transversely across the entire tractor body and has its outer ends projecting well beyond the frame pieces 30 and 32, as indicated in Fig. 4. At its intermediate portions the connecting shaft 52 may, for example, pass directly through the cab seat 54 which is normally occupied by the operator of the machine. If desired, fenders such as are sometimes employed in tractor bodies, and indicated in the drawings by numerals 56 and 58, may be left in place so that they overlie, or are mounted above, the frame pieces 30 and 32, as suggested in Fig. 4, or the fenders may be completely removed.

Considering next the pivoted lever mechanism of the invention, I have provided two separated lever assemblies which are suspended from opposite ends of the connecting shaft 52 in the manner illustrated in Fig. 5. Included in these two lever assemblies are shaft controlling levers 60 and 60'; holding arms 62 and 62'; and pusher arms 64 and 64'. The shaft controlling levers 60 and 60' are fixed to the shaft 52 at two points intermediate the shaft extremities, as may be best seen in Fig. 5. Holding arms 62 and 62' are fixed to the ends of shaft 52 in an overhanging position such as that shown in Fig. 4 where it will be noted that depending portions of these arms are arranged to occur in spaced-apart relation to the respective frame pieces 30 and 32. Thus the lower extremities of these holding arms extend well outside of the tracks 16 and 14 at all points therealong. The lower ends of the arms 62 and 62' are also formed with bifurcated portions, as 61 (Fig. 4) between which portions is pivotally pinned the reduced ends of respective pusher arms 64 and 64'.

In accordance with the invention I provide on the

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frame pieces 30 and 32 respective stop elements 29 and 29' which may, for example, consist of heavy angle pieces welded, bolted or otherwise fastened to adjacent surfaces of the respective frame pieces. These stop members are located near, or slightly above, the level of the horizontal axes of the rear driving wheels, as may be best shown in Fig. 1, and in this lowered position the stop members are adapted to receive thereagainst the lower ends of respective holding arms 62 and 62', also illustrated best in Fig. 1. By means of this arrangement it will readily be seen that forces transmitted through the pusher arms 64 will be received against the stop members and, in turn, transmitted to the rear axles of the driving wheels with very little opportunity for bending forces to develop in either the holding arms or the pusher arms. The operation of these stop members will be further discussed at a later point in the specification.

It is pointed out that the holding arms 62 and 62' are formed with special bearing portions 63 and 63' preferably constructed as integral parts of these arms. Similarly, the pusher arms 64 and 64' are constructed with bearing portions 65 and 65'. The bearings 63 and 63' and 65 and 65' comprise pivotal supports for portions of the hydraulic control elements hereinafter described.

Transversely disposed through the forward extremities of the arms 64 and 64' is a connecting rod 70 which serves to solidly lock together these two arms and which also presents at opposite ends thereof bearing pins 72 and 72'. The connecting rod 70 is preferably braced by means of corner braces 71 and 71' to impart further rigidity to the entire lever mechanism.

Pivotally mounted on the pins 72 and 72' is a materials handling unit which comprises a blade carrying bucket or shovel body made up of an intermediate body portion 74 and two end walls 76 and 78 having a shape such as that suggested in Fig. 1.

It will be observed that this bucket member is open at its top and front sides. A bull dozer blade 80 is mounted in the bucket in the position shown in the drawings and such that the blade may be moved to close or cover the above noted openings at either the top or front sides of the bucket. The blade 80 is formed with a reinforced bottom cutting edge 82 and is also preferably constructed with a curved rear surface shaped to coincide with correspondingly curved forward edges of the walls 76 and 78 so that when the blade 80 is in a position such as that indicated in Fig. 1, for example, these forward edges of the sides 76 and 78 will bear against the blade and provide a strong reinforcing effect all the way around the blade edges to thereby permit the blade to function as a normal bull dozer blade would.

The hydraulic control mechanism for operating this lever mechanism and blade carrying bucket is also of a dual nature and includes a series of hydraulic cylinders pivotally supported at various points in the apparatus described. Thus, the control levers 60 and 60' are operated in response to a pair of hydraulic cylinders 86 and 86', which are pivotally supported in respective pairs of bearing members 88 and 88'. These hydraulic cylinders are operatively connected to the levers through respective connecting rods 90 and 90'. The bearings for pivotally supporting these cylinders 86 and 86' are preferably supported on the frame pieces 30 and 32, as best shown in Fig. 4.

A second pair of hydraulic cylinders noted by the numerals 92 and 92' are pivotally supported in respective bearings 63 and 63', already described as being a part of the holding arms 62 and 62'. These cylinders are operatively connected to the respective arms 64 and 64' by means of connecting rods 94 and 94'.

A third pair of hydraulic cylinders are comprised by cylinders 96 and 96' which are pivotally supported in the bearing portions 65 and 65', respectively, above noted. Connecting rods 98 and 98' operatively connect the cylinders 96 and 96' with rear portions of the bucket end-

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walls 76 and 78 as best shown in Fig. 1. A final set of hydraulic cylinders consisting of the cylinders 100 and 100' are pivotally mounted in bearings 102 and 102' on opposite outer surfaces of the walls 76 and 78. Connecting rods 104 and 104' connect the cylinders 100 and 100' to the blade 80 in the manner illustrated in Fig. 5. In Fig. 9 I have illustrated diagrammatically the several hydraulic cylinders, together with their connecting flow lines for hydraulic fluid. A pump P forces fluid from a sump S through a control valve V to a selector valve T in whatever sequence desired to operate the respective cylinders.

An outstanding feature of the apparatus now described is the unique organization of the stop controlled lever assemblies and mounting frame pieces whereby the two holding arms of the lever mechanism may be readily and positively located in cooperating relationship with their respective stop members and in a rigidly abutting manner to provide for operating the machine as a bull dozer. Such an abutting position of the holding arms with respect to the stop members 29 and 29' has been shown in Fig. 1 and therefore this figure may be considered as being representative of the machine occurring in a position to function as a bull dozer.

As will be seen from an inspection of Fig. 1, the blade member 80 is in a lowered position and its heavy cutting edge 82 is adapted to comprise the normal reinforced edge found in most bull dozer blades. Since the blade is completely received upon the forward edges of the bucket member a very rigid reinforcing effect is developed which enables the blade to be of relatively lighter weight than standard blades and to nevertheless constitute a blade mass of considerable magnitude and well adapted to performing a large number of common bull dozing operations.

It is pointed out that forces originating at the lower reinforcing edge of the blade 80 will be transmitted through the pusher arms 64, 64' and will become centered in the pivots of the respective holding arms 62, 62'. The stresses thus developing in the holding arms are, however, almost entirely taken up by the stop members 29 and these stresses are, in turn, distributed rearwardly against the portions of the frame pieces which are mounted on the axles of the rear driving wheels 12. Since a large part of the weight of the tractor body is concentrated on these wheel axles, these members are well adapted to take the thrust transmitted from the bucket and, in effect, do so substantially in the manner achieved in ordinary bull dozer vehicles. It is further pointed out that the axis of pivoting of the pusher arms 64, 64' in their respective holding arms 62, 62' lies in a horizontal plane which passes rearwardly through the axes of rotation of the rear driving wheels. Therefore, there is little, if any, opportunity for bending forces to develop at any point in the lever assemblies. Moreover, the arrangement disclosed applies the transmitted forces against the stop members in a manner such that there is a tendency for these forces to develop a vertically downward force component on the rear wheel axles, thus tending to cause these rear wheels to very firmly engage against the underlying surface on which they are supported. Still further it is pointed out that by suspending the lever assemblies from a connecting shaft which is located well above the wheel axles, all of the lever and operating cylinder components above the bottom pivots of the holding arms are almost entirely protected from stresses or shock forces of any type.

The apparatus of the invention, when so desired, may also be employed to carry out substantially all of the usual functions common to conventional loaders. In connection with this type of materials handling the blade 80, together with the supporting bucket, may be utilized in any one of a number of positions. Thus in a loading operation, such as that suggested in Fig. 6, for example, the two lever assemblies are adjusted through their respective hydraulic cylinders so that the bucket is brought into a position to scoop up material M from a pile with the

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blade 80 being swung back in a position in which it rests upon the upper edges of the bucket, as noted in Fig. 6. The lever mechanism is then actuated by hydraulic cylinders 86, 86' and cylinders 92, 92' to push the bucket ahead and simultaneously scoop up a desired quantity of material M. If desired the lifting action of the hydraulic cylinders 92, 92' on the arms 64, 64' may be carried out either independently or simultaneously with the scooping action.

In connection with that type of scooping operation in which the scoop is desired to be lifted, as well as advanced, an important feature of the invention may consist in the use of the heavy blade 80 as an aid to forcing material M into the bucket at some point in the loading operation. It is pointed out that by first raising the blade into an elevated position above the pile of material M shown in Fig. 6, for example, and then forcing the blade downwardly against material partly received in the bucket, a further transfer of material into the bucket may be realized, and also the material may be more solidly compacted and held in the bucket by crowding it between the blade and the bucket edges.

It should also be noted that the arrangement of a pivoted blade on the bucket in the manner disclosed makes it possible to pick up and firmly hold various other heavy bodies, such as beams and other structural pieces of cumbersome form and which normally require the services of a lifting crane or similar boom equipped machine.

Earth materials, or other bodies thus picked up in the bucket, may be raised to a desired height and then released into a dump truck or transferred to some desired point in front of the machine operator. In the case of the handling of structural pieces, however, a further advantage is realized in that the bucket may be rotated into a position in which the pusher arms 64, 64' lie either in a substantially upright position or in some desired inclined position. Thereafter by means of the particular jointed relationship of the levers the bucket may be moved either toward or away from the tractor while maintaining substantially the same position of uprightness or inclination, as the case may be.

It will readily be appreciated that this feature is of great advantage in carrying out an operation which involves not only raising a heavy structural piece but also adjusting it while in a raised position in order to obtain a correct location with respect to other pieces already installed.

Still another desirable position into which the bucket may be moved by reason of the particular lever assemblies and hydraulic cylinder mountings has been illustrated in Fig. 8, wherein it will be observed that the bucket member has been shown pivoted through a rearwardly directed arc until it is located in a point well in back of the tractor body in a position convenient for releasing scooped material into a vehicle, such as a dump truck, which is driven into close proximity with the rear of the tractor 10.

A novel feature of the cylinder and lever assembly structure of the invention, particularly making possible such a wide range of extensibility, is the arrangement of the cylinders 92, 92' in offset relation to the holding arms 62, 62' as provided by the specially formed bearing portions 63, 63' earlier described and which are located at points between the two extremities of these respective holding arm members. As will be noted from an inspection of Fig. 8, the cylinder 92, because of this particular mounting, is free to pivot in its bearing through a very wide arc such as is suggested by the broken line showing of this member in Fig. 8, and yet the entire lever assembly remains under the control of the shaft control levers 60, 60' and their respective hydraulic cylinders 86, 86'.

From the foregoing description it will be evident that

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I have disclosed a combined bull dozer-loader type of tractor unit which is capable of performing substantially all of the operations of a conventional bull dozer without being undesirably affected by shock forces and other stresses normally developing in the course of bull dozing or loading operations. At the same time all of the ordinary type of loading operations can quickly and conveniently be carried out and, in fact, the range of operation of normal loader vehicles has been substantially extended and desirable flexibility and adjustability features made available. The invention has preferably been embodied in a combined mounting frame and lever assembly organization which is particularly suited for attachment to standard types of tractor bodies without requiring change or alteration of these members in any material respect. This organization of parts is further distinguished by the fact that there is at all times in the operation of the mechanism, regardless of what position it is moved into, a much wider range of visibility on the part of an operator who is seated in the cab portion of the tractor body. This enables him to perform loading and bull dozing operations more quickly and more efficiently. The combination of the hinged blade permits a wide range of closure operations to be carried out in any one of a number of positions of adjustment.

It may be desired to mount other types of buckets or shovels, as well as other accessories, such as booms of special construction, on the pusher arm assembly. Likewise, it may be desired to use the bull dozer blade independently of a bucket, and a special bull dozer blade support or bracket may be provided for supporting the pusher arms 64.

While I have shown a preferred embodiment of the invention, it is understood that various changes and modifications may be resorted to in keeping with the scope of the appended claims.

Having thus described my invention, what I desire to claim as new is:

1. A materials handling machine comprising a tractor body having a shaft transversely supported at the upper side thereof, a bucket member having a blade supported thereon, a pivoted lever mechanism suspended at opposite ends of the said shaft for adjustably supporting the bucket on the tractor body, hydraulic control apparatus for moving the pivoted lever mechanism and bucket into varying positions of adjustment, and the bucket having the said blade pivotally supported between two sides thereof at the upper front edges of the sides in position to engage forward edges of the sides in abutting relationship with a rear surface of said blade.

2. A materials handling machine comprising a tractor body having a shaft transversely supported at the upper side thereof, a bucket member having a blade supported thereon, a pivoted lever mechanism suspended at opposite ends of the said shaft for adjustably supporting the bucket on the tractor body a hydraulic control apparatus for moving the pivoted lever mechanism and bucket into varying positions of adjustment, the said bucket being formed with openings on two sides thereof, said blade being pivotally received at upper front portions of the bucket, and means for pivoting the blade into positions of closure with respect to either of the said openings.

3. A materials handling machine comprising a tractor body having a shaft transversely supported at the upper side thereof, a bucket member having a blade supported thereon, a pivoted lever mechanism suspended at opposite ends of the said shaft for adjustably supporting the bucket on the tractor body, hydraulic control apparatus for moving the pivoted lever mechanism and bucket into varying positions of adjustment, said bucket member being open at its top and its front side, said blade being pivotally mounted on the bucket and adapted to be swung into a position of closure with respect to the top opening of the bucket.

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4. A machine of the class described comprising a tractor body having a shaft transversely disposed at the upper rear portion thereof, a blade carrying shovel unit, a pivoted lever mechanism secured at opposite ends of the shaft for adjustably supporting the blade carrying shovel unit on the tractor body, hydraulic control apparatus for moving the pivoted lever mechanism and shovel unit into desired positions of adjustment, stop means fixed on the tractor body for rigidly holding the pivoted lever mechanism in one position of adjustment, said tractor body further including a pair of rear driving wheels, said pivoted lever mechanism presenting a pair of spaced-apart push lever elements, said push lever elements, when the pivoted lever mechanism is in engagement with the said stop means, being adapted to move into a substantially horizontally extending position such that the longitudinal axes of the push lever elements lie in close proximity to a horizontal plane passing through the axes of the said driving wheels.

5. A machine of the class described comprising a tractor body having a pair of rear driving wheels, a shaft transversely mounted at the upper side of the tractor body above the axes of the said driving wheels, a materials handling unit, a pivoted lever mechanism supported on the said shaft for adjustably holding the unit on the tractor body, hydraulic control apparatus for moving the pivoted lever mechanism through varying positions of adjustment, said pivoted lever mechanism including a pair of depending arms fixed at opposite ends of the said shaft, each of the holding arms normally projecting downwardly below the shaft and having pivotally supported at their lower extremities respective push lever elements which extend forwardly along two opposite sides of the tractor body, said push lever elements being connected to the materials handling unit, stop means solidly mounted on two sides of the tractor body for receiving the depending arms in a rearmost braced position, said hydraulic control apparatus including a pair of hydraulic control elements which are pivotally supported on respective depending arms and being operatively connected to respective push lever elements, said push lever elements being responsive to movement of the said hydraulic control elements to move into horizontally extending positions such that their longitudinal axes lie in a horizontal plane passing substantially through the axes of the said driving wheels when the depending arms are received against the stop means.

6. A materials handling machine comprising a tractor body having a shaft transversely supported at the upper side thereof, a bucket member having a blade supported thereon and swingable into a bulldozing position in which the blade is received against edge portions of the bucket and reinforced thereby, a pivoted lever mechanism suspended at opposite ends of said shaft for adjustably supporting the bucket on the tractor body, a hydraulically controlled apparatus for moving the pivoted lever mechanism and bucket into varying positions of adjustment, said bucket being open at its upper side and said hydraulic control apparatus including means for swinging the said blade into a position to close the opening at the upper side of the bucket whereby material may be held in the bucket when the latter member is in a rearwardly position.

7. A materials handling machine comprising a tractor body having a shaft transversely supported at the upper side thereof, a bucket member having a blade supported thereon and swingable into a bulldozing position in which the blade is received against edge portions of the bucket and reinforced thereby, a pivoted lever mechanism suspended at opposite ends of said shaft for adjustably supporting the bucket on the tractor body, and hydraulic control apparatus for moving the pivoted lever mechanism and bucket into varying positions of adjustment, said blade consisting of a concave bulldozer member and said hydraulic control apparatus including means for moving

the bulldozer member from a bulldozer position at one side of the bucket to a closure position at the other side of the bucket, and means for swinging the bucket and blade in a closing position through an arc of travel extending from in front of the tractor body upwardly and rearwardly to a point in back of the tractor body.

References Cited in the file of this patent

UNITED STATES PATENTS

2,249,356	Goodman	July 15, 1941	10
2,303,379	Mork	Dec. 1, 1942	
2,313,534	Gledhill	Mar. 9, 1943	

2,377,112
2,413,096
2,455,474
2,519,974
2,530,414
2,538,000
2,644,251
2,645,369

Strank	May 29, 1945
Parker	Dec. 24, 1946
Drott et al.	Dec. 7, 1948
Mork	Aug. 22, 1950
Wells	Nov. 21, 1950
Hoar et al.	Jan. 16, 1951
Smith	July 7, 1953
Allan	July 14, 1953

FOREIGN PATENTS

France	Mar. 21, 1949
France	Jan. 21, 1953
Great Britain	Nov. 28, 1951

950,541
1,025,035
662,087