April 5, 1960 L. C. KENWORTHY 2,931,644

WORK SUPPORTING STAND

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Fig. 1

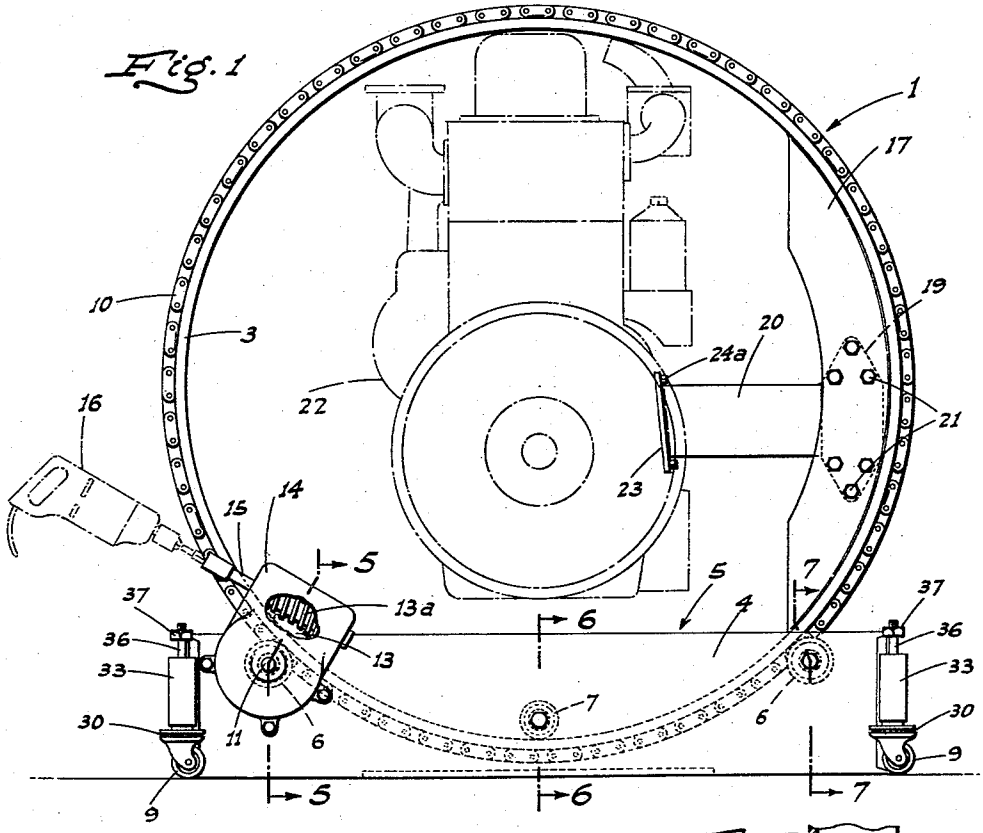


Fig. 7

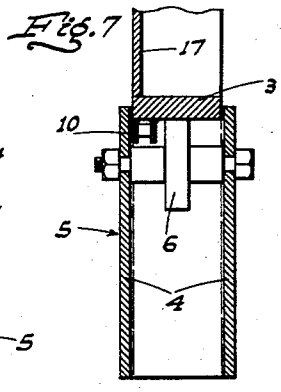


Fig. 6

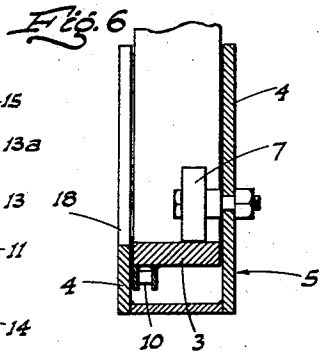
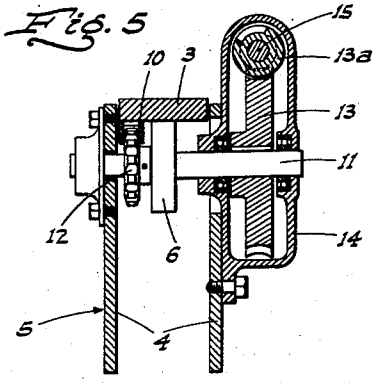


Fig. 5



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Fig. 2

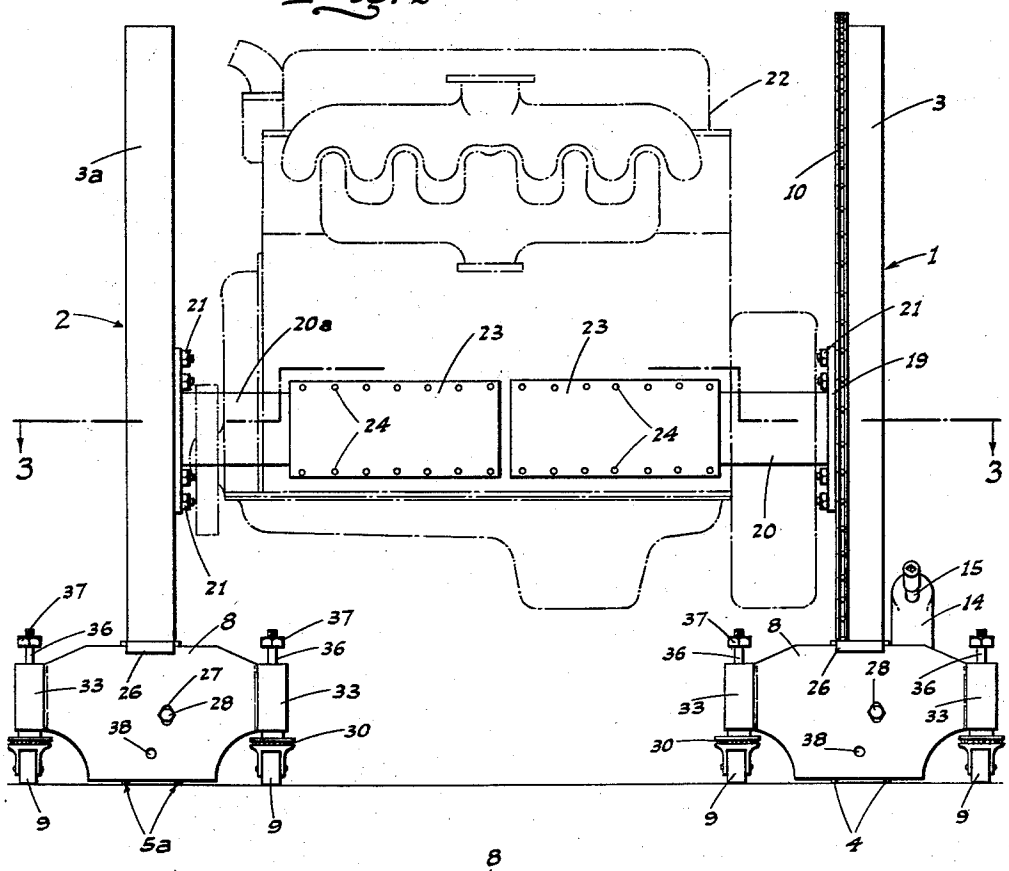
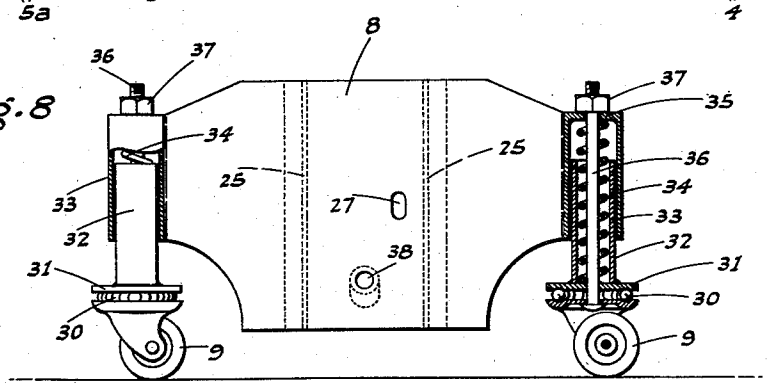


Fig. 8



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WORK SUPPORTING STAND

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Fig. 3

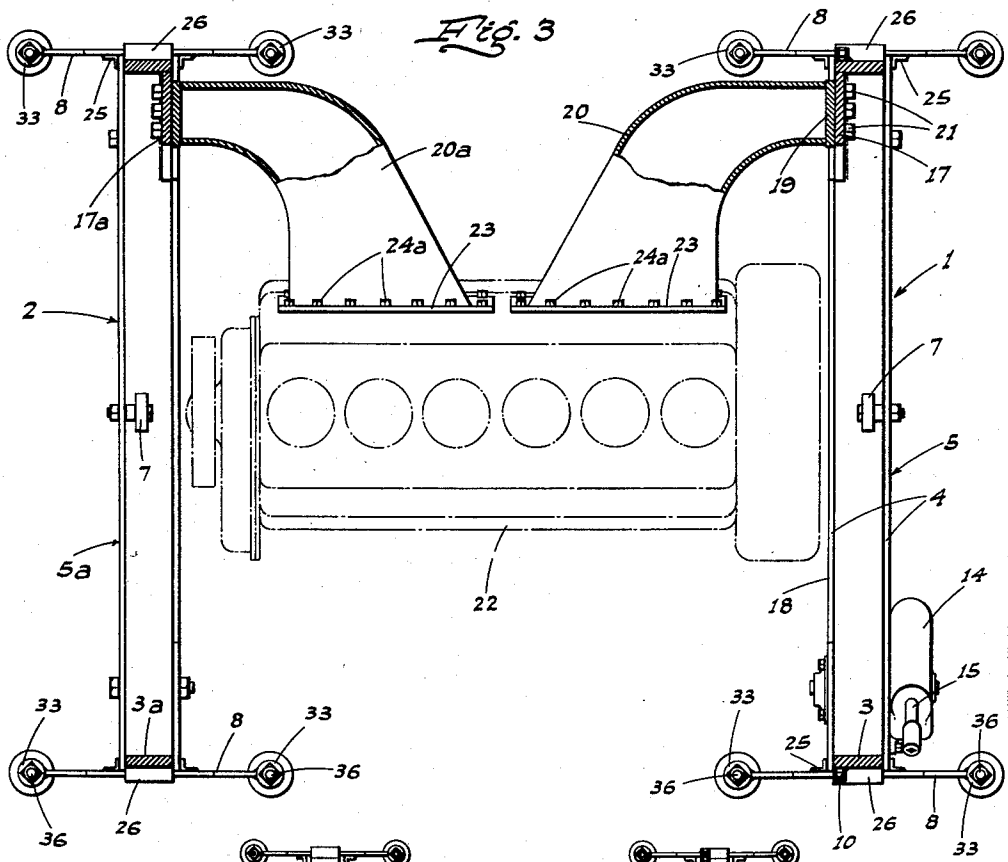
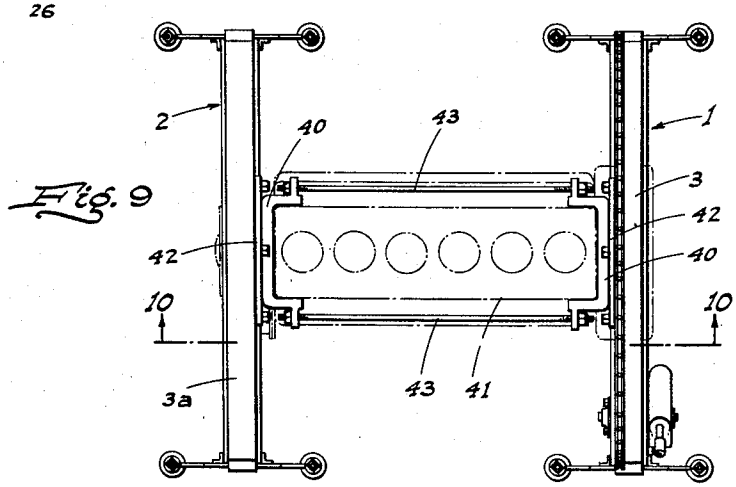


Fig. 9



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Fig. 4

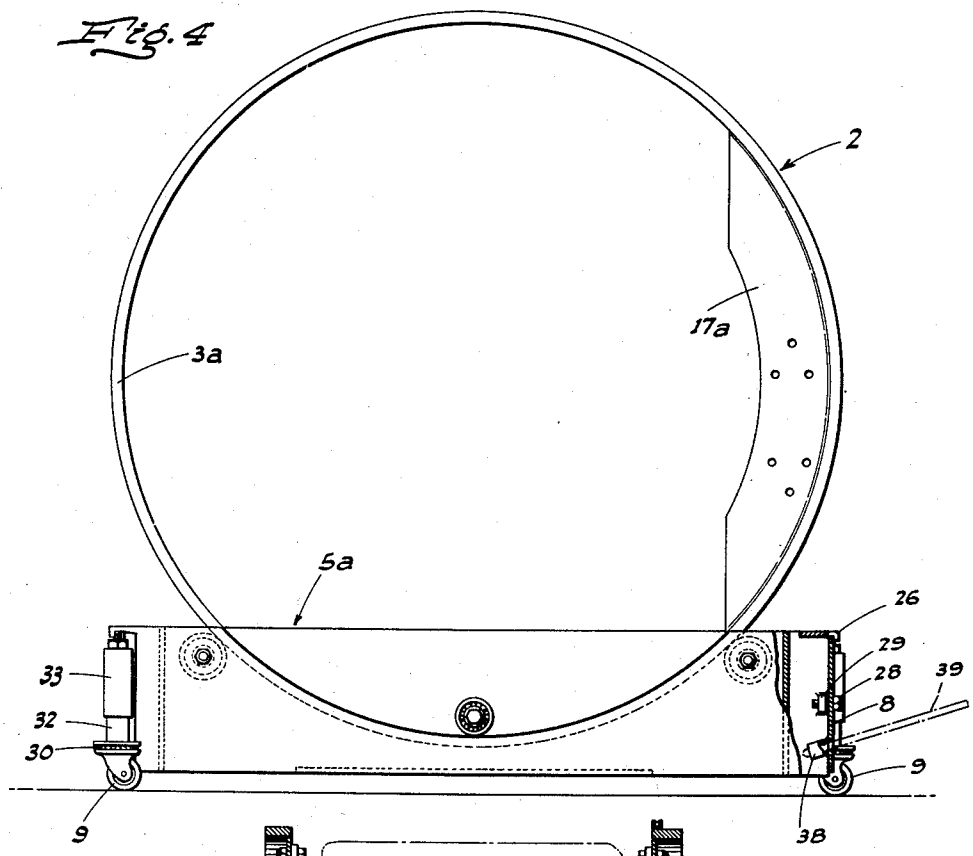
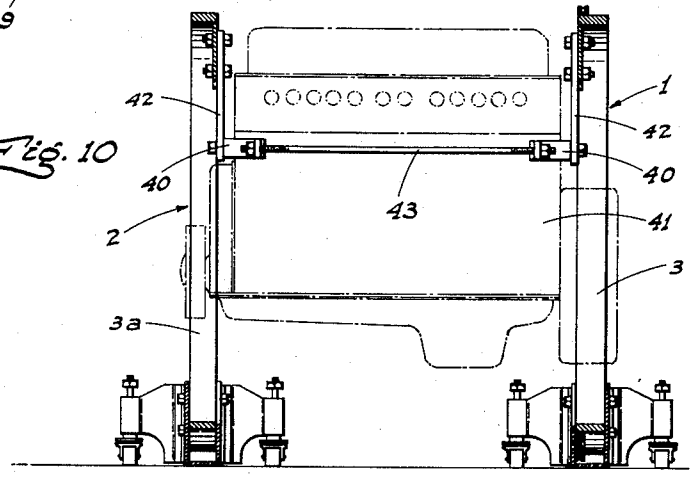


Fig. 10



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United States Patent Office 2,931,644 Patented Apr. 5, 1960

2,931,644

WORK SUPPORTING STAND

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Application November 19, 1957, Serial No. 697,384

2 Claims. (Cl. 269—112)

This invention relates to a mobile stand for supporting a heavy work unit, such as a tractor engine, after such unit has been removed from its chassis, so as to enable a repair or similar job to be performed on the work.

A major object of the invention is to provide a stand for the purpose so constructed that the supported work may be rotated in a horizontal plane through a full 360 degree arc so as to present any desired face or part of the work to a mechanic standing on the floor adjacent the stand.

Another object of the invention is to construct the stand so that the weight of the work will be substantially centered in the axial plane of rotation so that a minimum of strain is placed on the rotation control mechanism of the stand, and the stand as a whole may be made lighter than would otherwise be possible.

A further object of the invention is to construct the stand so that the rotatable work supporting members thereof, and the mounts for such members, form units entirely independent of each other, and the work itself—which is disposed between said members—forms the connection between the units. This enables the members to be rotated in unison while the turning mechanism is applied to one only of the members. This independent feature also enables work of different lengths to be mounted in the stand without any change in the basic structure of the units being necessary.

A still further object of the invention is to provide each unit with caster wheels so mounted that while the unit may be readily moved about the floor when light or unloaded, the frame of said unit when loaded will flatly engage and be supported by the floor without any added load being then carried by the casters. By reason of this feature, the loaded stand will be supported in a stable manner without any tendency to move about the floor while operations are being carried out on the work. Also, the need of making the caster wheels and their mounts very heavy, to sustain the heavy load carried by the stand, is avoided.

An additional object of the invention is to provide a practical, reliable, and durable work supporting stand, and one which will be exceedingly effective for the purpose for which it is designed.

These objects are accomplished by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings:

Fig. 1 is an end elevation of the work supporting stand, partly broken away and indicating—in broken lines—a tractor engine in a supported position on the stand.

Fig. 2 is a front elevation of the stand, showing the position of a supported engine in broken lines.

Fig. 3 is a sectional plan view of the stand taken on line 3—3 of Fig. 2.

Fig. 4 is an inside elevation of one end unit of the stand, partly broken out, and with the corresponding engine supporting arm removed.

Fig. 5 is a fragmentary enlarged vertical section taken on line 5—5 of Fig. 1.

Fig. 6 is a similar view taken on line 6—6 of Fig. 1.

Fig. 7 is a like view taken on line 7—7 of Fig. 1.

Fig. 8 is an enlarged front end view of one of the caster wheel mounting plates of a transverse frame member of the stand, partly broken away and in section, and detached from said frame member.

Fig. 9 is a top plan view of the stand on a reduced scale and illustrating a modified form of engine or other work engaging and supporting members.

Fig. 10 is a transverse vertical section on line 10—10 of Fig. 9.

Referring now more particularly to the drawings, and to the characters of reference marked thereon, the improved engine or other work supporting stand comprises a pair of separate end units 1 and 2. The unit 1 includes a relatively large circular band 3 disposed with its axis in a horizontal plane and projecting at the bottom between the spaced plates 4 of a supporting frame 5 which extends transversely of the axis of the band and is substantially as long as the diameter of the band.

The band 3 is turnably supported in the frame 5 by spaced rollers 6 supported by, and disposed between, the plates 4, and on which the band rests, as shown in Fig. 7, and is retained against upward movement by another roller 7 supported by one of the plates 4 and disposed to bear on the upper or radially inner surface of the band, as shown in Fig. 6.

The frames 5 include relatively wide end plates 8 which extend lengthwise of the axis of the band and at their ends support caster wheels 9. The plates 8 are removably mounted on the frame 5, and the caster wheels are yieldably mounted in the plates 8 by means which will be described hereinafter.

Secured on and extending about the band 3 at one side edge thereof, so as to be clear of the rollers 6, is a helical gear 10 which, for economy of manufacture, is in the form of a sprocket engaging chain, as shown. The shaft 11 of one of the rollers 6 is provided with a pinion sprocket 12 which engages the gear chain 10 (see Fig. 5).

A worm wheel 13 is fixed on shaft 11 and is engaged by a worm 13a; the worm and worm wheel being enclosed in a housing 14 bolted to the outer end plate 4. The worm shaft 15 projects from the housing 14 to a position where it is convenient for detachable engagement by a power hand tool for rotating the worm, as indicated at 16.

The use of a worm is advantageous in that it not only provides maximum power, but prevents any tendency of the band to rotate of itself and enables the band to be held stationary in any set position.

The band 3 is provided with a chordal web 17 projecting radially inward from the axially inner edge of the band, as shown in Fig. 6; the adjacent or inner plate 4 of the frame 5 being cut away, as shown at 18 in Fig. 6, so as to expose the entire web at any rotated position of the band.

The web 17 is formed with a plurality of bolt holes so that the base flange 19 of a work supporting adapter arm 20 of suitable form may be removably secured thereto by bolts 21. This arm, of whatever shape, turns radially inward of the band 3 some distance axially beyond the same, as shown in Fig. 3.

At its radially inner end the arm 20 is formed with a work-engaging adapter element. In the present instance for supporting a heavy tractor engine such as that indi-

cated at 22, the adapter is in the form of a rectangular plate 23 adapted to surround one of the correspondingly shaped inspection holes in the side wall of the crankcase of the engine, after the cover plate has been removed from over such opening. The adapter plate 23 is provided with a peripheral row of bolt holes 24 positioned to register with the tapped holes in the crankcase wall about said opening, so that the plate 23 may be secured to said wall by cap screws 24*a*.

The unit 2 is identical with unit 1 in its general features, and comprises an upstanding circular band 3*a* turnably mounted in the caster-wheel supported frame 5*a*. The bands 3 and 3*a* are the same size, so that their axes lie in a common horizontal plane. The band 3*a* is also provided with a chordal web 17*a* to which another engine engaging adapter arm 20*a*—in this case identical with the arm 20—is removably bolted. The unit 2 however lacks the gear about the periphery of band 3*a*, and the gear engaging means whereby the band is rotated.

The caster wheel units for the frames 5 and 5*a* are identical and interchangeable on the frames, and each is constructed as follows:

The mounting plate 8 of such unit abuts against the ends of the plates 4 of the frame 5 or 5*a*, being guidably retained by vertical guide elements 25 on the inner face of the plate 8 (see Fig. 3). Frames 5 and 5*a* are each formed at each end with a lip 26 to overhang the top of the plate 8 (see Figs. 2 and 4). Below said lip some distance the plate 8 is provided with a vertical slot 27 (see Fig. 8) to receive a cap screw 28 adapted to be threaded into a lug 29 projecting from one of the plates 4 and by means of which the plate 8 may be removably attached to the frame 5 or 5*a*.

Each caster wheel 9 is supported for vertical yielding movement relative to the plate 8 in the following manner:

The mount for the caster wheel 9 includes a vertical-axis, anti-friction thrust bearing 30, the upper plate 31 of which is rigid with an upstanding tubular member 32 which is slidably guided in a downwardly opening socket 33 secured on the end of plate 8.

A helical compression spring 34 is disposed in the member 32 and extends between the plate 31 and the upper closed end 35 of socket 33. A tie bolt 36 extends from the lower race of bearing 30 and slidably projects through the end 35 of socket 33; the bolt having a nut 37 on its upper end to limit expansion of the spring.

The springs are designed to withstand the unloaded weight of the work-engaging unit supported thereby so that such unit may then be easily moved about the floor of a repair shop. When, however, the unit becomes loaded the springs yield sufficiently to enable the straight lower edge of the heavy frame plates 4 to engage the floor, as shown in Fig. 1. The load is then taken by said plates rather than by the springs and casters, and the stand as a whole assumes a firm and relatively non-movable position on the floor, as is desirable to enable the load supporting bands to be readily turned about their horizontal axis, and repair jobs to be performed on the work, without any possible shifting of the stand on the floor accompanying such operations.

The jobs to be done on any particular engine may take a considerable time, and it may be desired to use the caster wheel units on other stands. When the frame plates 4 are engaged with the floor, it is then only necessary to remove the one cap screw 28 of each plate 8 and swing such plate out from under the lip 26. To assure that the plate will not so swing before the cap screw is removed, a downwardly sloping socket 38 is provided in the plate 8 below the cap screw, into which a steadying rod, indicated at 39, may be inserted (see Fig. 4).

This arrangement enables a repair shop to have several stands in operation at the same time, with the use of only a single set of the relatively expensive caster wheel units, which may be connected to any stand seated on the floor when it is desired to again render said stand mobile.

In operation, to mount an engine in the stand, such engine is first disconnected and removed from its chassis by means of an overhead or similar crane, and is then hung suspended at a convenient height while the two adapter arms 20 and 20*a* are bolted thereon. The unit 1 is then moved into position and the band 3 turned until the web 17 abuts against the base flange 19 of arm 20; the engine being raised or lowered as may be necessary to assure proper alinement. The adapter arm is then bolted to the web.

With the engine still held suspended, the unit 2 is then moved into position, and the arm 20*a* is bolted onto the web 17*a* of said unit. The engine is thus rigidly yet turnably supported by the stand-forming units, and the latter are then rigidly connected together by the engine itself. The crane tackle is then of course detached from the engine, and the unrestrained weight of the latter causes the frames 5 and 5*a* of the stand to lower to a floor engaging position, as previously described. The stand is designed so that the engine is then at a convenient height for operating thereon, and said engine may be turned—by manipulation of the worm 13*a*—to bring any desired part of the engine into the position most convenient to the mechanic. Due to the open-work nature of the stand, operations may be performed on both sides and ends of the engine simultaneously, should this be desired.

It should also be noted that the adapter arms are designed as to their extent radially of the bands 3 and 3*a*, so as to locate the weight mass of the engine as nearly as possible in the central axial plane of the rotatable stand bands. This makes it practicable to rotate the bands through a full 360 degrees if desired, with a minimum of strain on the control mechanism, and enables a lighter device as a whole to be used than would otherwise be possible.

As an example of other means to mount an engine in connection with and between the units 1 and 2, reference is made to Figs. 9 and 10. In this arrangement horizontal locator members 40, shaped to engage about the ends of an engine cylinder block 41, are bolted to heavy plates 42 which in turn are bolted to the webs of the bands 3 and 3*a* of units 1 and 2, as shown in Fig. 10. The members 40 are then pulled together, so as to clamp the engine firmly therebetween, by means of tension rods 43 extending between said members on opposite sides of the engine, as shown in Fig. 9.

It should be noted that while I have described the stand as being used for engine supporting purposes, it is also adapted for handling other heavy pieces of work, such as the track frames of endless track tractors, as well as parts of other machines on which repairs are to be performed. In such case, it will be obvious that adapter arms, or their equivalent, of a form different from those disclosed in the present drawings, would have to be provided, and this may well be true with certain engines as well.

From the foregoing description it will be readily seen that there has been produced such a device as will substantially fulfill the objects of the invention, as set forth herein.

While this specification sets forth in detail the present and preferred construction of such device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described the invention the following is claimed as new and useful, and upon which Letters Patent are desired:

1. A work supporting stand comprising a pair of upstanding end units between which the work is disposed, means on the units for supporting engagement with the work, said units each including a transverse bottom frame relatively narrow in a plane lengthwise of the stand and having ends, upstanding end plates wider than

the frame and mounted on said ends thereof transversely to the longitudinal axis of the frame, caster wheels vertically yieldably mounted on the ends of each end plate, and means removably mounting the end plates on the frame; such means including, for each end plate, a lip on the corresponding end of the frame and overhanging such plate in supporting relation, a removable bolt connecting said plate to the frame, and vertical guide elements on the laterally inner face of the end plate engaging the sides of the frame at said end thereof.

2. A work supporting stand comprising a pair of upstanding end units between which the work is disposed, means on the units for supporting engagement with the work, said units each including a transverse bottom frame relatively narrow in a plane lengthwise of the stand and having ends, upstanding end plates wider than the frame engaging said ends thereof and disposed transversely to the longitudinal axis of the frame, caster wheels vertically yieldably mounted on the end plate at the ends thereof, and means removably securing the end plates to

said frame ends; the lower edges of said end plates being above the lower edge of the frame.

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