May 20, 1952 J. D. A. MORROW 2,597,086

TIMBER SETTING MACHINE

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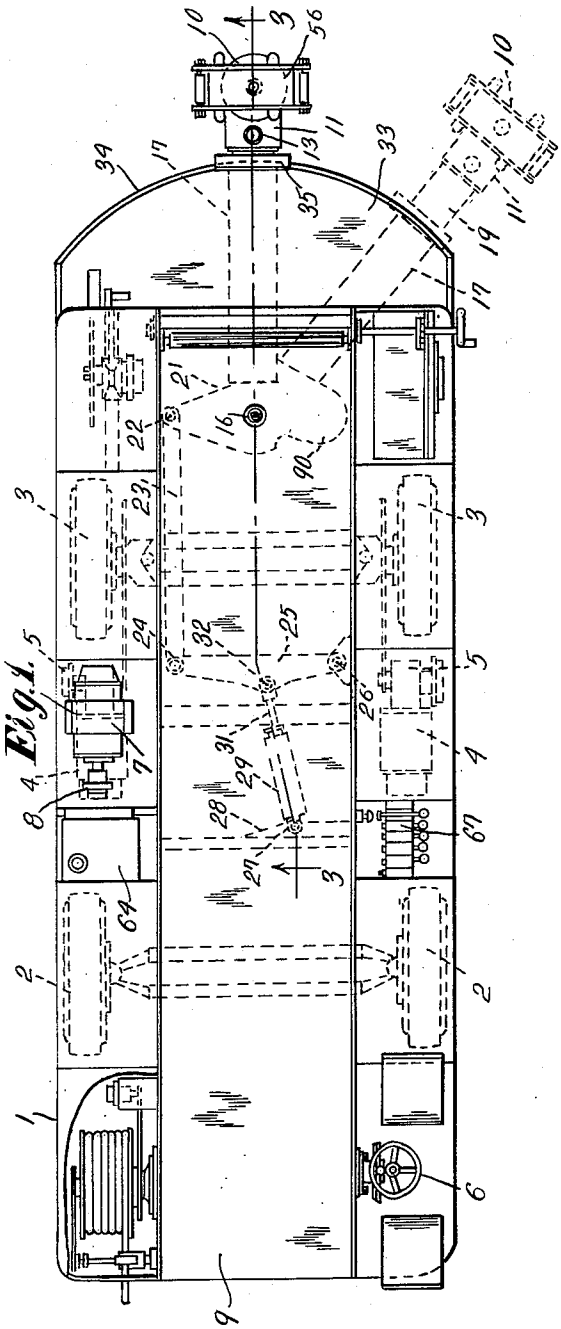


Fig. 1.

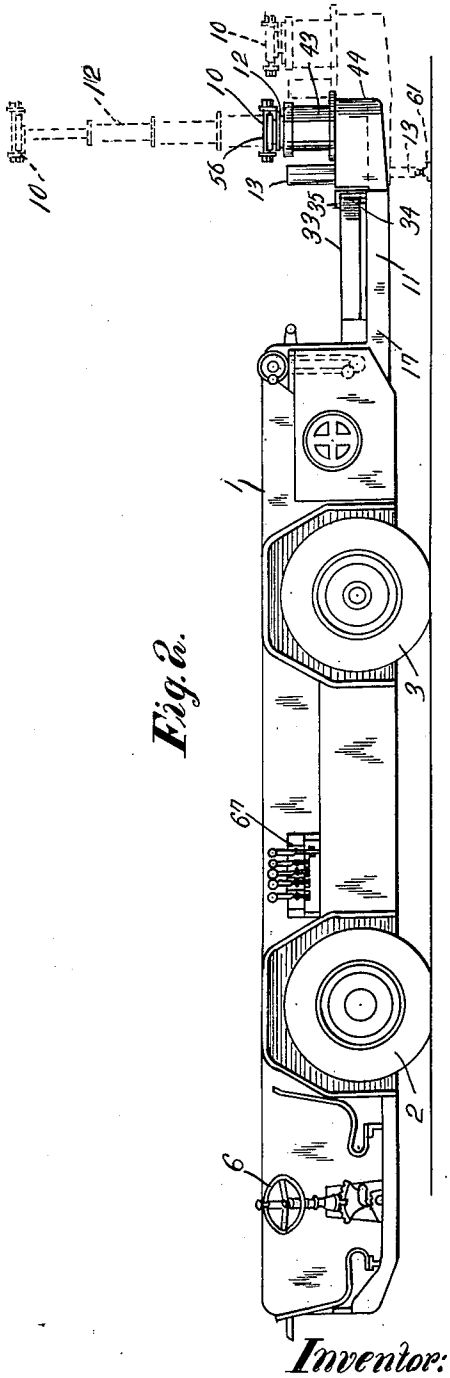


Fig. 2.

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Fig. 3.

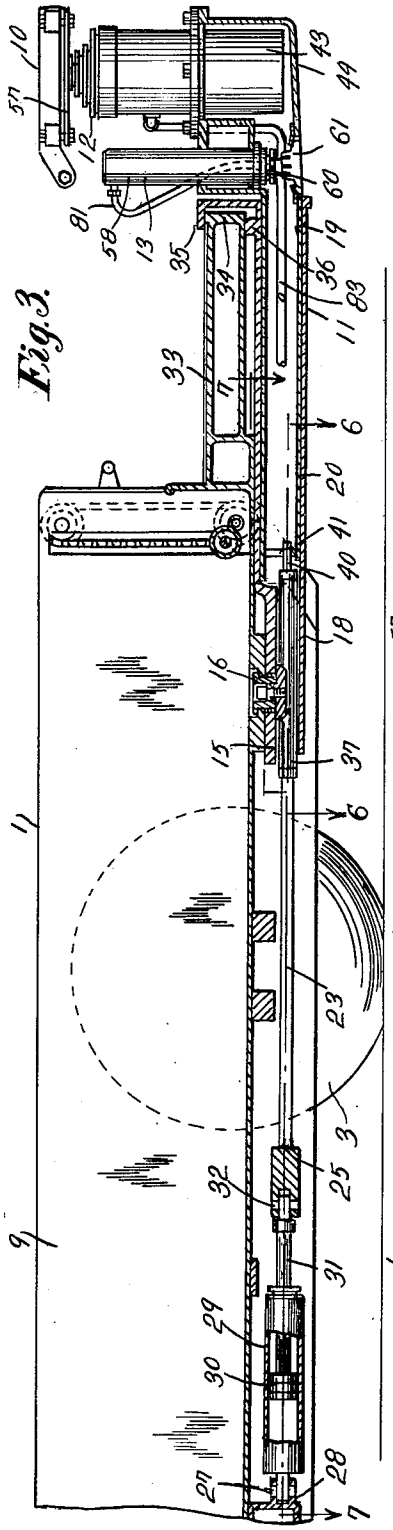


Fig. 5.

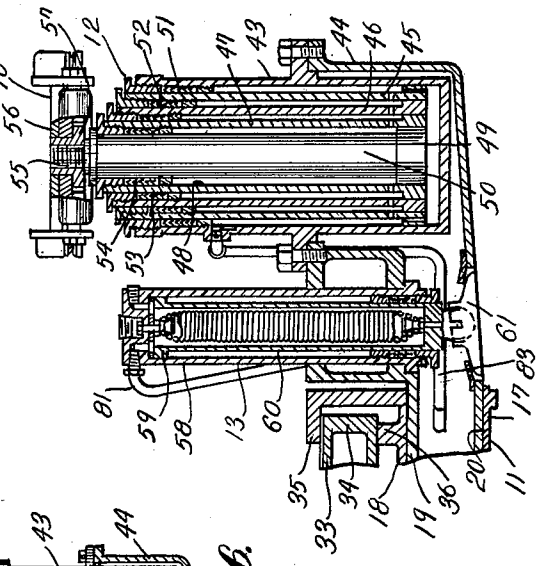


Fig. 4.

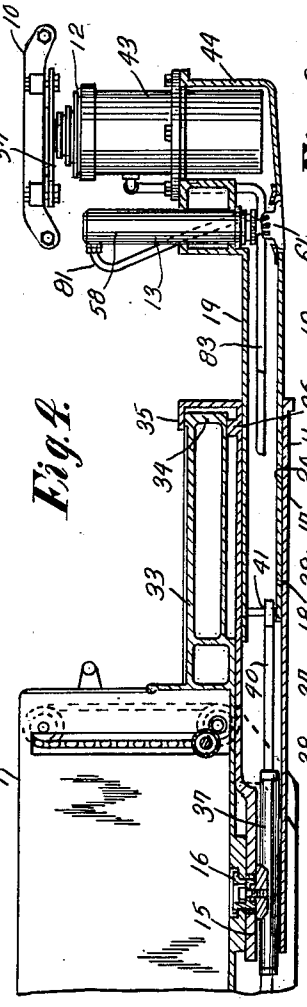
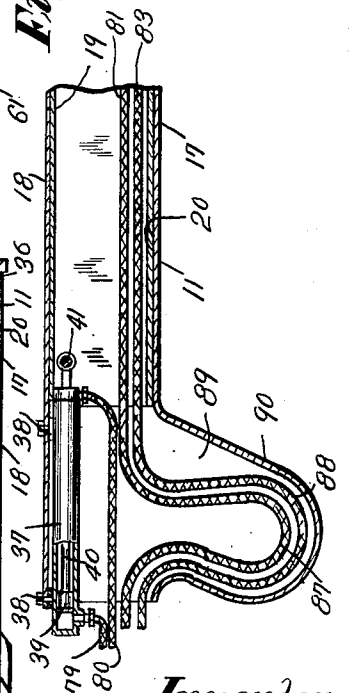


Fig. 6.



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Fig. 7.

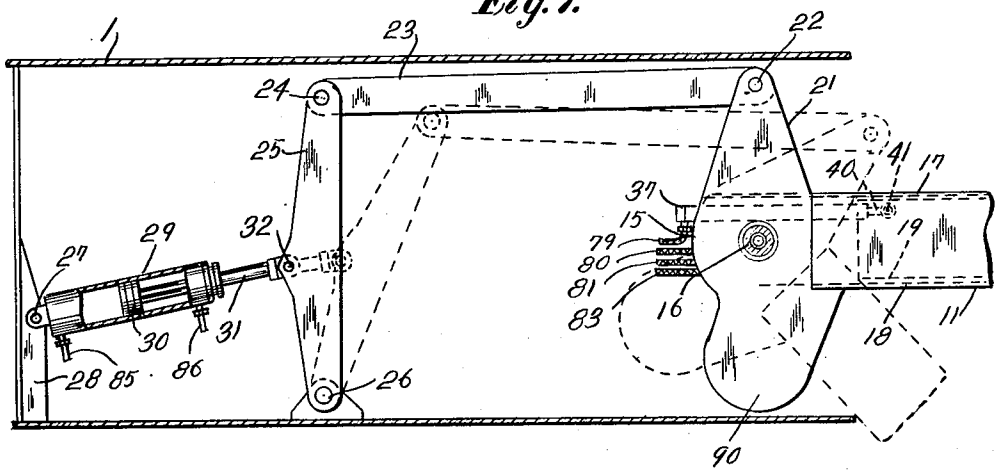
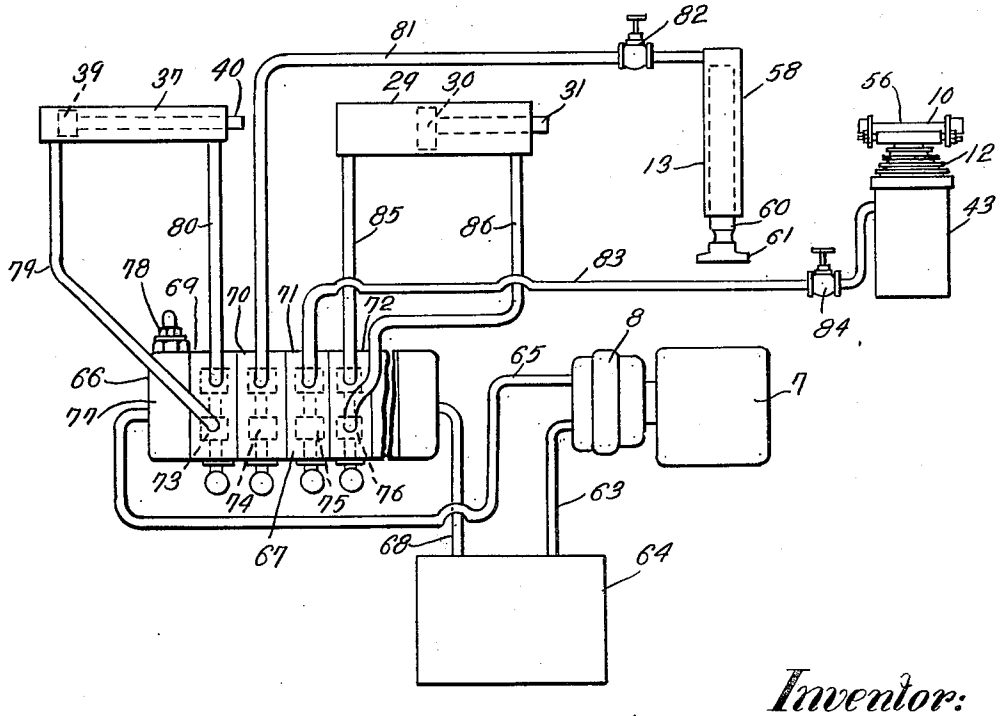


Fig. 8.



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UNITED STATES PATENT OFFICE

2,597,086

TIMBER SETTING MACHINE

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Application May 10, 1947, Serial No. 747,221

9 Claims. (Cl. 214—95)

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This invention relates to timber setting machines and more particularly to an improved adjustable supporting structure for the timber receiving support or saddle of such a machine.

In timber setting machines of known types, there is usually provided a portable body which carries, at one end, a timber receiving support or saddle, and mechanism is usually mounted on the body for adjusting the timber receiving support or saddle upwardly relative to the body to bring a timber supported thereby up against the mine or tunnel roof and to hold it there during setting of the timber. In order to reduce the necessity of frequent maneuvering of the machine during positioning of a timber with respect to the place where it is to be set, it is desirable to provide for horizontal adjustment of the timber receiving support or saddle both laterally and longitudinally relative to the machine body so that a timber may be properly positioned and quickly set in place at various locations against the mine or tunnel roof. The present invention contemplates an improvement over such known types of timber setting machines in that improved supporting means is provided by means of which an extremely wide range of horizontal adjustment of the timber receiving support with respect to the machine body is afforded. The improved structure of the present invention accordingly provides not only for a wide range of upward adjustment of the timber receiving support or saddle but also a wide range of horizontal adjustment of the timber receiving support, both longitudinally and laterally, relative to the machine body so that the timber receiving support may be located at any desired position between the sides of the machine body at one end of the latter, but also may be positioned laterally a substantial distance beyond the sides of the machine body. Such wide range of adjustment of the timber receiving support is attained while the overall dimensions of the machine are maintained at a minimum so that the machine may readily operate in the closely restricted quarters of an underground mine or tunnel.

An object of the present invention is to provide an improved timber setting machine. Another object is to provide an improved timber setting machine having improved adjustable supporting means for the timber receiving support or saddle so that a timber may be set in place at various locations against the mine or tunnel roof without the necessity of frequent maneuvering of the machine as a whole. Yet another object is to provide an improved timber setting machine having

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an improved adjustable supporting structure for the timber receiving support for adjusting the latter not only arcuately but translationally relative to the machine body. A further object is to provide an improved timber setting machine having and improved extensible arm or boom structure pivotally mounted on the machine body to swing horizontally, and carrying elevating means for the timber receiving support. A still further object is to provide an improved adjustable supporting structure for the timber receiving support of a timber setting machine for adjusting the support vertically, rectilinearly and arcuately relative to the machine body. Still another object is to provide an improved horizontally swingable, extensible arm or boom structure for the elevating mechanism of the timber receiving support whereby the elevating mechanism may be adjusted not only arcuately but translationally relative to the machine body to vary the horizontal position of the timber receiving support. A further object is to provide an improved timber setting machine having a novel combination and arrangement of parts. These and other objects and advantages of the invention will, however, hereinafter more fully appear in the course of the ensuing description and as more particularly pointed out in the appended claims.

In the accompanying drawings there is shown for purposes of illustration one form which the invention may assume in practice.

In these drawings:

Fig. 1 is a top plan view of a timber setting machine in which a preferred form of the invention is embodied, one lateral position of the timber receiving support being shown in dotted lines.

Fig. 2 is a side elevational view of the machine shown in Fig. 1, with the timber receiving support shown in different positions as indicated in full and dotted lines.

Fig. 3 is an enlarged view in longitudinal vertical section, with parts shown in full, taken substantially on line 3—3 of Fig. 1.

Fig. 4 is a longitudinal vertical sectional view taken on the plane of Fig. 3, showing the jack supporting arm or boom in fully extended position.

Fig. 5 is an enlarged sectional view taken on the plane of Fig. 3, showing details of the elevating and floor jacks, with the same in collapsed position.

Fig. 6 is a horizontal sectional view taken substantially on line 6—6 of Fig. 3.

Fig. 7 is a horizontal sectional view taken substantially on line 7—7 of Fig. 3.

Fig. 8 is a diagrammatic view illustrating the fluid system.

In the illustrated embodiment of the invention, as shown in the drawings, the improved adjustable supporting structure for the timber receiving support or saddle is, for illustrative purposes, shown embodied in a timber setting machine of the same general type as that disclosed in an application to L. G. Felderman and A. S. Knoizen, Serial No. 746,832, filed May 8, 1947, although it will be evident that the invention may be embodied in machines of other types.

The timber setting machine as shown herein comprises a portable body 1 mounted on rubber tired wheels 2, 2 and 3, 3 adapted to travel over the floor of a trackless mine or tunnel. The wheels 3, 3 are traction wheels and are driven by motors 4, 4 respectively individual thereto, through suitable transmission connections 5, 5. The wheels 2, 2 are steering wheels, and are suitably swiveled and provided with suitable steering gear controlled by a hand wheel 6 located at the operator's station at one side of the machine. A motor 7 drives a pump 8 to be later referred to. Extending longitudinally centrally of the machine body between the wheels is a load carrying compartment 9 which is adapted to carry a load of mine timbering elements, such as cross timbers and props. Arranged at one end of the machine body is a timber receiving support or saddle 10, positionable to receive a timber moved lengthwise from the body compartment 9. The improved adjustable supporting structure 1 includes a horizontally swingable arm or boom 11, herein arranged on the machine body beneath the load carrying compartment 9 and projecting outwardly beyond one end of the machine body and which carries, at its outer end, a vertical elevating jack 12 and a floor engaging jack 13. The timber receiving support or saddle 10 is carried by the elevating jack 12. When a mine timber is placed on the saddle 10, with the latter positioned as shown in Figs. 3 and 4, the jack 12 may be operated slightly to raise the saddle above the top of the machine body and the timber may then be turned with the saddle into a position crosswise of the machine body at one end of the latter. The jack 12 may then be operated to elevate the saddle to bring the timber up against the roof and to hold it there during setting of the uprights or props, or during insertion of the rib pins.

Now referring more specifically to the improved adjustable supporting structure, it will be noted that the swingable arm or boom 11 has an inner bearing portion 15 pivotally mounted on a vertical pivot pin 16 suitably secured to the machine body beneath the load carrying compartment, with the pivotal axis located midway between the sides of the machine. The arm or boom structure has a horizontal arm portion 17 projecting horizontally outwardly beyond one end of the machine body, and this arm portion is extensible and comprises an inner arm part 18 and an outer arm part 19 telescopically arranged at 20 within the inner arm part and guided for axial sliding adjustment so that the outer arm part may be slid rectilinearly relative to the inner arm part. The arm bearing portion 15 is preferably formed integral with the inner arm part 18, and the latter part has an integral right angle arm portion 21 pivotally connected at 22 to one end of a horizontal link 23, herein extending longitudinally of the machine body beneath the load carrying compartment, as shown in Figs. 3 and 7. This link is pivotally connected at its opposite end at 24 to a horizontal lever 25, the latter in turn pivotally mounted at 26 at one side of the machine body. Pivotally mounted at 27 on a cross plate 28 integral with the machine body is a horizontally swingable fluid cylinder 29 containing a reciprocable piston 30 having its piston rod 31 pivotally connected at 32 to the lever 25. Thus, when the piston 30 is moved under the influence of fluid pressure in the cylinder 29, the outwardly projecting arm 11 may be swung about its pivot through the lever 25, link 23 and arm portion 21 horizontally across one end of the machine body from one side of the machine body to the other. The machine body has a horizontal end-projection 33 provided with an arcuate end 34, and the inner arm part 18 has integral upper and lower projections 35 and 36 which respectively overlie and underlie the curved end 34 of the body projection 33 for guiding the arm during horizontal swinging thereof and to provide an outer arm support. Arranged longitudinally within the arm near the bearing portion 15 is a horizontal fluid cylinder 37 extending longitudinally of the arm portion 17 as clearly shown in Fig. 6. The cylinder 37 is secured at 38 to the inner arm part 18 and contains a reciprocable piston 39 having its piston rod 40 extending outwardly through one end of the cylinder and secured at 41 at its outer end to the outer arm part 19. Thus, when the piston 39 is moved under the influence of pressure fluid in the cylinder 37, the outer arm part 19 may be moved axially relative to the inner arm part to increase or decrease the length of the arm portion 17 as desired. When fluid is trapped in the cylinder 37, the outer arm part 19 is rigidly locked in axially adjusted position.

The timber elevating jack 12 may assume various forms and is herein similar to that disclosed in the application above referred to, and comprises a vertical fluid cylinder 43 rigidly secured to an outer frame portion 44 integral with the outer end of the arm part 19 of the arm 11, as shown in Fig. 5. Contained in the vertical cylinder 43 is a series of piston and cylinder sections 45, 46 and 47, herein arranged in telescopic relation and each having a tubular piston rod portion. Reciprocable in the bore 48 of the inner section 47 is a piston 49 having a piston rod 50. The outer cylinder 43 and the sections 45, 46 and 47 respectively carry suitable packings 51, 52, 53 and 54, sealingly engaging the several piston rod peripheries to prevent leakage. The means for supplying fluid to and exhausting fluid from these several cylinders will later be fully explained. Secured at 55 to the upper end of the piston rod 50 of the inner piston 49 is the timber receiving support or saddle 10. This support or saddle has a timber receiving platform 56 which is resiliently and tiltably mounted on a lower support 57 so that the saddle may have limited endwise tilt relative to the jack to compensate for the unevenness of a roof against which a cross timber is to be placed. The timber receiving support or saddle 10 may be turned with the inner piston rod 50 about the vertical axis of the elevating jack 12 to locate the saddle in its various positions. The floor engaging jack 13 includes a vertical fluid cylinder 58, carried by the arm-frame portion 44 near the elevating jack and containing a reciprocable piston 59 having its piston rod 60 extending downwardly through the lower cylinder head and carrying a footpiece 61. The piston 59 may be

moved downwardly under the influence of pressure fluid in the cylinder 58 to move the footpiece 61 into firm engagement with the floor, thereby to provide a stable bottom support for the elevating jack during the timber setting operation. Since the specific structures of these jacks are fully described in the application above referred to and do not per se enter into the present invention, further description thereof herein is unnecessary other than to state that pressure fluid may be admitted to the jacks to elevate the saddle 10 and to bring the floor jack 13 down against the floor. As above mentioned, the elevating jack 12 may be extended to bring a timber elevated by the saddle up against the mine or tunnel roof and firmly to hold it there during setting of the timber. When the jack cylinders are suitably connected to discharge, the jacks will, of course, automatically collapse.

The fluid system may assume various forms but is herein similar to that described in the application mentioned above. The pump 8, driven by the motor 7, has, as shown diagrammatically in Fig. 8, its intake connected by a conduit 63 to a tank or reservoir 64, herein preferably containing a liquid. The pump discharge is connected by conduit 65 to the supply passage of a valve box 66 of a conventional valve mechanism 67. The discharge passage of the valve box is connected by a conduit 68 back to the tank. The valve box includes box-sections 69, 70, 71 and 72 having suitable bores containing conventional slide valves 73, 74, 75 and 76 respectively, of the balanced spool type, and respectively having suitable operating handles. A valve box section 77 contains a conventional automatic relief valve 78. The bore of the valve box section 69 is connected by conduits 79 and 80 to the opposite ends of the arm-extending-cylinder 37 so that fluid may be supplied to either end of the cylinder through the pressure conduit 65, while the other end is connected to discharge through the discharge conduit 68. When the valve is in neutral position, both conduits 79 and 80 are closed, trapping the liquid in the cylinder 37 to lock the piston 39 against movement, thereby firmly to hold the arm portion 17 in adjusted position. The bore of the valve box section 70 is connected by a conduit 81 to the upper end of the cylinder 58 of the floor engaging jack 13 so that when fluid is admitted to the cylinder, the jack piston 59 may be moved downwardly under the influence of pressure fluid to move the footpiece 61 into firm engagement with the floor. Conduit 81 has a hand valve 82 whereby the fluid may be trapped in or discharged from the floor jack cylinder. The valve box section 71 has its bore connected by a conduit 83 to the upper end of the fluid cylinder 43 of the elevating jack 12, and the conduit 83 has a hand valve 84 whereby fluid may be trapped in the jack cylinders or be discharged therefrom as desired. In lieu of the hand valves 82 and 84, the hand valve described in the application mentioned above may be employed, if desired. The valve box section 72 has its bore connected by conduits 85 and 86 to the opposite ends of the arm-swing cylinder 29 so that fluid may be supplied to either end of the cylinder to effect movement of the piston therein, thereby to swing the arm 11 horizontally in one direction or the other about its pivot. When the slide valve 76 is in neutral position, both conduits 85, 86 are closed, trapping the fluid in the cylinder 29 to lock the piston 30 against movement, thereby firmly to hold the arm 11 in position. The conduits 81 and 83 herein extend through the telescopically arranged hollow sections 18, 19 of the extensible arm structure as shown in Figs. 3 and 4, and these conduits have flexible loop or bight portions 87 and 88 arranged in a lateral recess 89 (see Fig. 6) formed in a lateral projection 90 of the inner arm part 18 near the bearing support 15, and these flexible conduit portions may extend outwardly through the open end of the arm and to the valve mechanism 67 in any suitable manner. The flexible bight portions of the conduits permit free horizontal swinging and extension and retraction of the arm without interference with the conduits, due to the arrangement provided. From the foregoing, it will be evident that the several slide valves 73, 74, 75 and 76 and valves 82 and 84 may be suitably operated to effect opposite horizontal swing and extension or retraction of the arm, to effect extension or collapse of the elevating and floor jacks 12 and 13 and to effect locking of the jacks in extended position, in an obvious manner.

As has been explained, in a timber setting machine of the character disclosed, it is ofttimes desirable to adjust the timber receiving support or saddle 10 horizontally through a relatively wide range both longitudinally and laterally relative to the machine body to eliminate the necessity of frequent maneuvering of the machine during proper placing of a timber with respect to the roof, and, in this improved construction, such positioning may be effected by supplying fluid under pressure to the fluid cylinder 37 to extend or retract the arm 11 and by supplying fluid under pressure to the arm-swing cylinder 29 to swing the arm horizontally about its pivot across one end of the machine from one side of the machine body to the other. By proper control of the arm extension and swing cylinders, the arm 11 may be adjusted to move the jacks and the timber receiving support in a horizontal direction both translationally longitudinally and arcuately laterally with respect to the machine body, and by extending the arm structure its full length, the timber receiving support may be located at a substantial distance beyond the sides of the machine body, as indicated in dotted lines in Fig. 1. The outermost longitudinal adjusted position of the timber receiving support is indicated in dotted lines in Fig. 2, with the improved arm structure fully extended. When the timber receiving support 10 is in the full line position shown in Figs. 1 and 2 and a timber is suitably positioned thereon, the slide valve 75 may be operated to supply fluid under pressure to the cylinder 43 of the elevating jack 12 to move the jack sections 45, 46, 47 and 50 upwardly to elevate the saddle 10 to bring the cross timber supported thereby up against the roof, and the extended position of the elevating jacks is indicated in dotted lines in Fig. 2. When the cross timber is suitably positioned against the roof, the hand valve 84 may be closed to trap the fluid in the elevating jack to hold the timber in firm engagement with the roof. As the timber is raised against the roof by the elevating jack, the slide valve 74 may be operated to supply fluid under pressure to the upper end of the cylinder 58 of the floor engaging jack to lower the footpiece 61 into firm engagement with the floor, thereby to provide a stable bottom support for the elevating jack during setting of the timber. When the footpiece is suitably positioned in contact with the floor, the hand valve 82 may be closed to lock the floor jack in extended position.

The elevating jack 12 holds the cross timber firmly up against the roof during setting of the uprights or props, or during insertion of the rib pins. It will be evident that the horizontally extensible arm 11 and timber elevating jack 12 may be located at any position across one end of the machine body and at either side of the machine body, and the timber receiving support may be located laterally beyond the sides of the machine body, thereby reducing the necessity of frequent maneuvering of the machine during placing of cross timbers at various locations against the roof.

As a result of this invention, an improved timber setting machine is provided having improved adjustable supporting structure for the timber receiving support whereby a timber may be quickly and easily set in position at various locations against the roof of a mine or tunnel. By the provision of the horizontally swingable and axially extensible supporting arm structure, a relatively wide range of adjustment for the timber receiving support is accorded whereby a timber may be set up against the roof at either side of the machine or at any desired position across one end of the machine body between the sides thereof. By arranging the extensible arm structure in the manner disclosed and by the provision of the structure for extending and retracting the same, not only is a wide range of adjustment provided but also an extremely sturdy and compact construction is attained. The machine is extremely low in height, well adapted for use in underground mines or tunnels having low headroom. Other manners of use and advantages of the improved timber setting machine will be clearly apparent to those skilled in the art.

While there is in this application specifically described one form which the invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a timber setting machine, the combination comprising a portable body, a timber-receiving saddle arranged at one end of said body and having a support adapted to receive a mine timber, elevating means for said saddle for raising the latter vertically along a rectilinear path into a position above said body to bring a timber thereon up against the mine roof, and an adjustable supporting structure carried by said body and projecting outwardly beyond said end of said body for supporting said elevating means, said supporting structure adjustable relative to said body to move said elevating means both laterally from one side of said body to the other and translationally in a general longitudinal direction inwardly and outwardly horizontally with respect to said body, to locate said saddle in the desired horizontal position relative to said body prior to the elevation of said saddle.

2. In a timber setting machine, the combination comprising a portable body, a horizontal extensible arm structure pivotally mounted at its inner end on said body to swing horizontally relative thereto about an upright axis disposed at the longitudinal center of said body, from one side of said body to the other, a timber-receiving saddle disposed at one end of said body and having a support adapted to receive a mine timber, an elevating mechanism carried at the outer end of said arm structure at said end of said body and by which said saddle is carried, said elevating mechanism being operable to elevate said saddle to bring a timber thereon up against the mine roof, and means for extending and retracting said arm to change its effective length thereby to vary the horizontal position of said elevating mechanism relative to said body, to move said saddle into the desired horizontal position prior to elevation thereof.

3. In a timber setting machine, the combination comprising a portable body, a timber-receiving saddle disposed at one end of said body and having a support adapted to receive a mine timber, an elevating mechanism by which said saddle is carried for raising said saddle vertically along a rectilinear path to bring a timber thereon up against the mine roof and for lowering said saddle after the timber has been set against the roof, and an adjustable supporting structure carried by said body and projecting outwardly beyond said end of said body and by which said elevating mechanism is carried, said supporting structure being adjustable to move said elevating mechanism in a horizontal direction both laterally from one side of said body to the other and generally longitudinally relative to said body while said supporting structure may remain stationary as regards lateral movements to locate said saddle in the desired horizontal position relative to said body prior to raising of said saddle.

4. In a timber setting machine, the combination comprising a portable body, an extensible and retractable arm structure pivotally mounted at its inner end on said body to swing horizontally relative thereto with its outer end moving across one end of said body from one side thereof to the other, means for extending and retracting said arm structure to vary its effective length, and an extensible elevating jack carried at the outer end of said arm structure beyond said end of said body for elevating a mine timber up against the mine roof, said arm structure being swingable horizontally and extendable to vary the horizontal position of said jack, both laterally and generally longitudinally with respect to said body, prior to the elevating of the mine timber.

5. In a timber setting machine, the combination comprising a portable body, a timber-receiving saddle disposed at one end of said body and having a support adapted to receive a mine timber, and an adjustable supporting structure carried by said body and projecting outwardly from said end of said body for adjusting said saddle in a horizontal direction, both laterally along an arcuate path from one side of said body to the other and along a straight path generally longitudinally relative to said body, and said supporting structure including elevating means for elevating said saddle vertically along a rectilinear path relative to said body to bring a timber thereon up against the mine roof in any of the horizontally adjusted positions of said saddle relative to said body.

6. In a timber setting machine, the combination comprising a portable body, a timber-receiving saddle disposed at one end of said body and having a support adapted to receive a mine timber, and a horizontal arm pivotally mounted at its inner end on said body and means for confining said arm to swinging movement in horizontal planes to move its outer end in a curved path from one side of said body to the other, said

arm extensible and retractable to vary its effective length, an elevating structure carried at the outer end of said arm for elevating said saddle a substantial distance above the top of said body to bring a timber thereon up against the mine roof, and means for extending said arm to vary its effective length to move said elevating structure horizontally relative to said body, to locate said saddle in the desired horizontal position prior to elevation thereof.

7. In a timber setting machine of the character set forth in claim 6 wherein said arm is extensible horizontally to project said elevating structure and said saddle a substantial distance laterally beyond the sides of said body.

8. In a timber setting machine, the combination comprising a portable body, an elongated horizontal extensible arm pivotally mounted at its inner end on the lower portion of said body and projecting outwardly beyond one end of said body, means for swinging said arm horizontally about its pivot to move its outer end arcuately across said end of said body from one side thereof to the other and for holding said arm in its adjusted position, means for extending and retracting the outer portion of said arm to vary the effective length of said arm and for holding the same in its adjusted position, an extensible vertical jack mounted at the outer end of said arm, and a timber-receiving saddle carried by said jack and having a platform adapted to receive a cross mine timber, said arm being swingable and extensible to move said jack both laterally and in a general longitudinal direction relative to said body to vary the location of said saddle, and said jack being operable to elevate said saddle vertically relative to said arm and to said body to bring a timber on said platform up against a mine roof.

9. In a timber setting machine, the combination comprising a portable body, a timber-receiving saddle arranged adjacent to said body, elevating means for said saddle for raising the latter vertically into a position above said body to bring a timber thereon up against the mine roof, and an adjustable supporting structure carried by said body and projecting outwardly beyond said body for supporting said elevating means, said supporting structure being adjustable relative to said body to move said elevating means both laterally and in any laterally adjusted position of said supporting structure inwardly and outwardly with respect to said body all while the latter remains stationary, to locate said saddle in the desired position relative to said body prior to the elevation of said saddle.

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