

March 24, 1936.

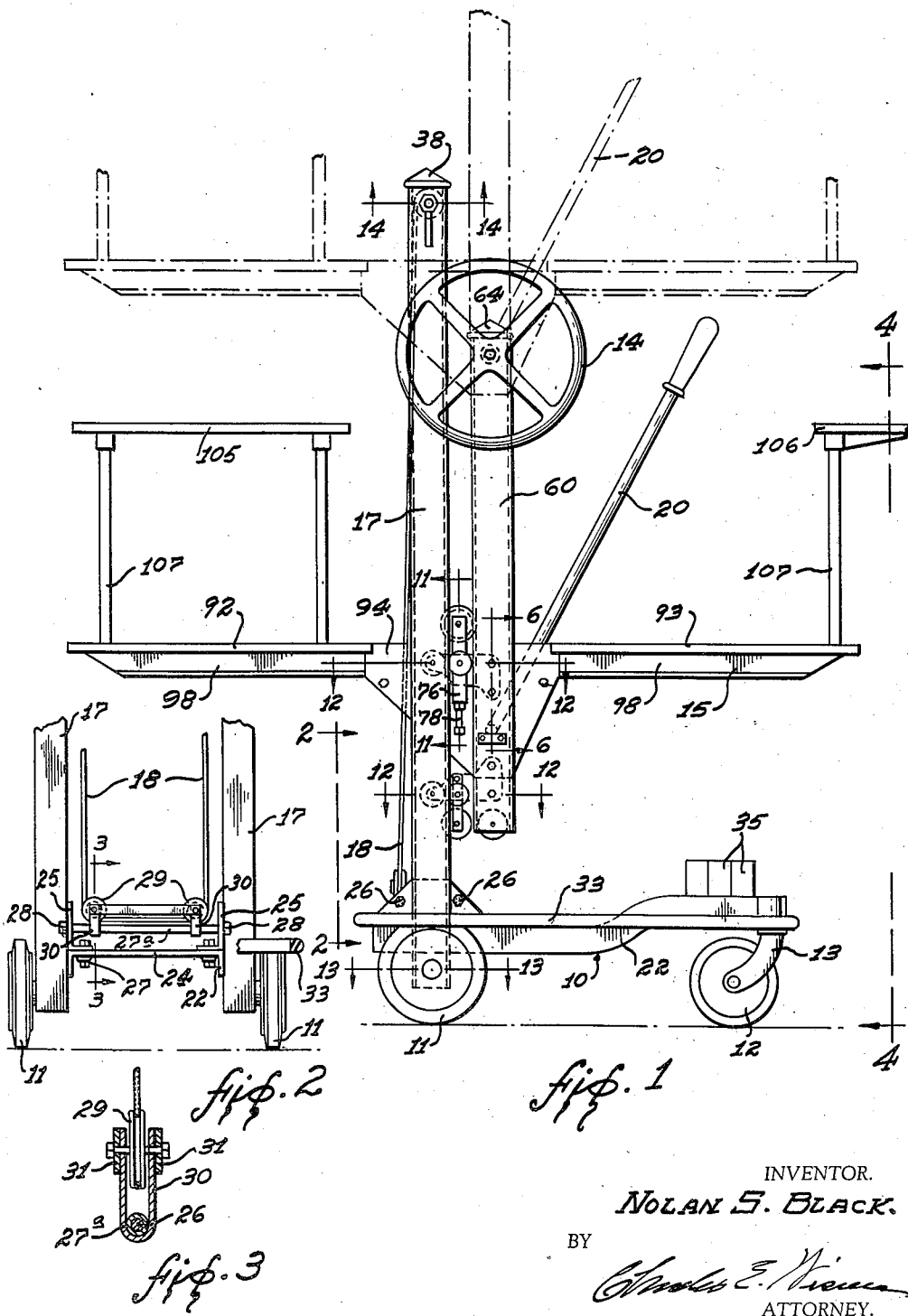
N. S. BLACK

2,035,294

PORTABLE HOISTING MACHINE

Filed Dec. 15, 1933

6 Sheets-Sheet 1



March 24, 1936.

N. S. BLACK

2,035,294

PORTABLE HOISTING MACHINE

Filed Dec. 15, 1933

6 Sheets-Sheet 2

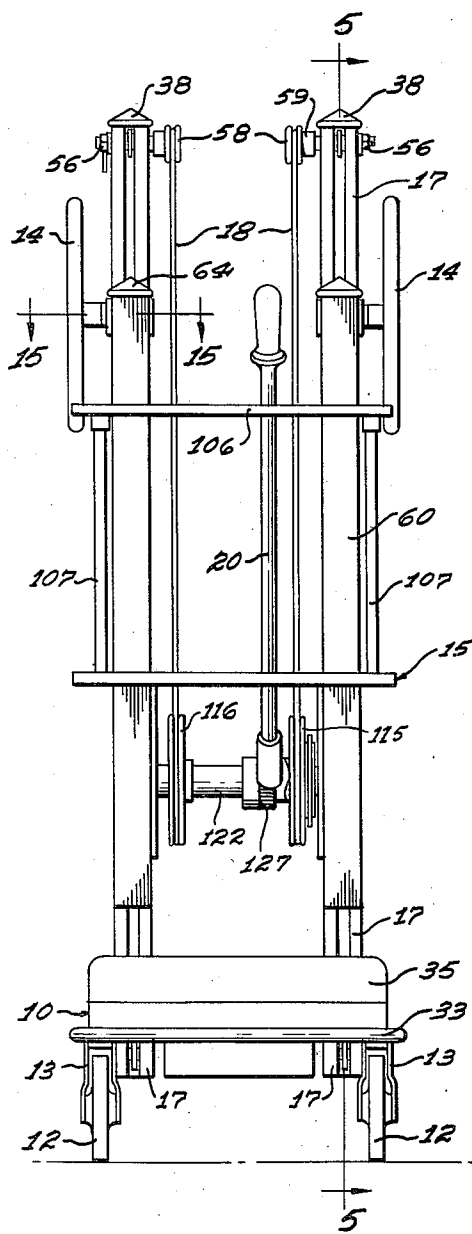


fig. 4

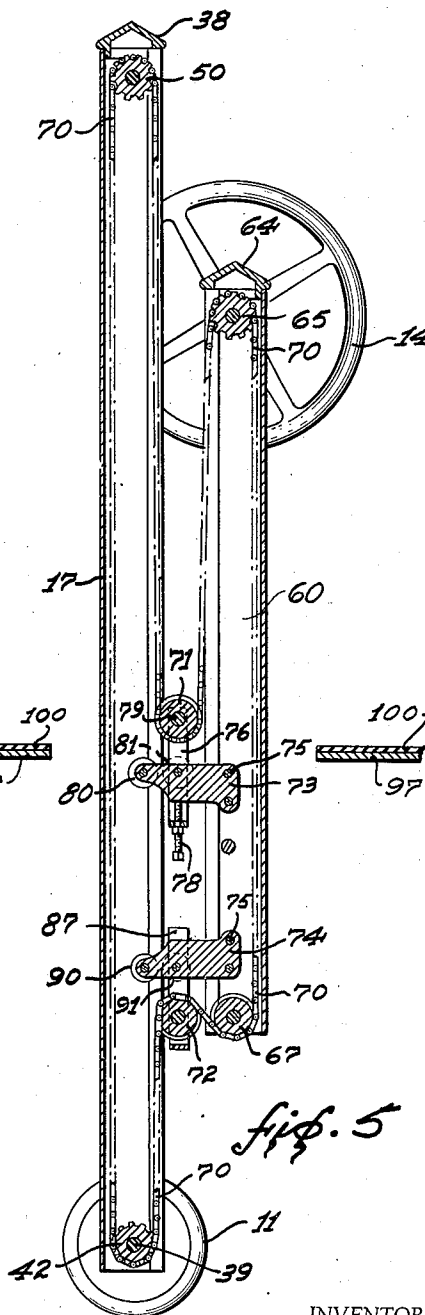


fig. 5

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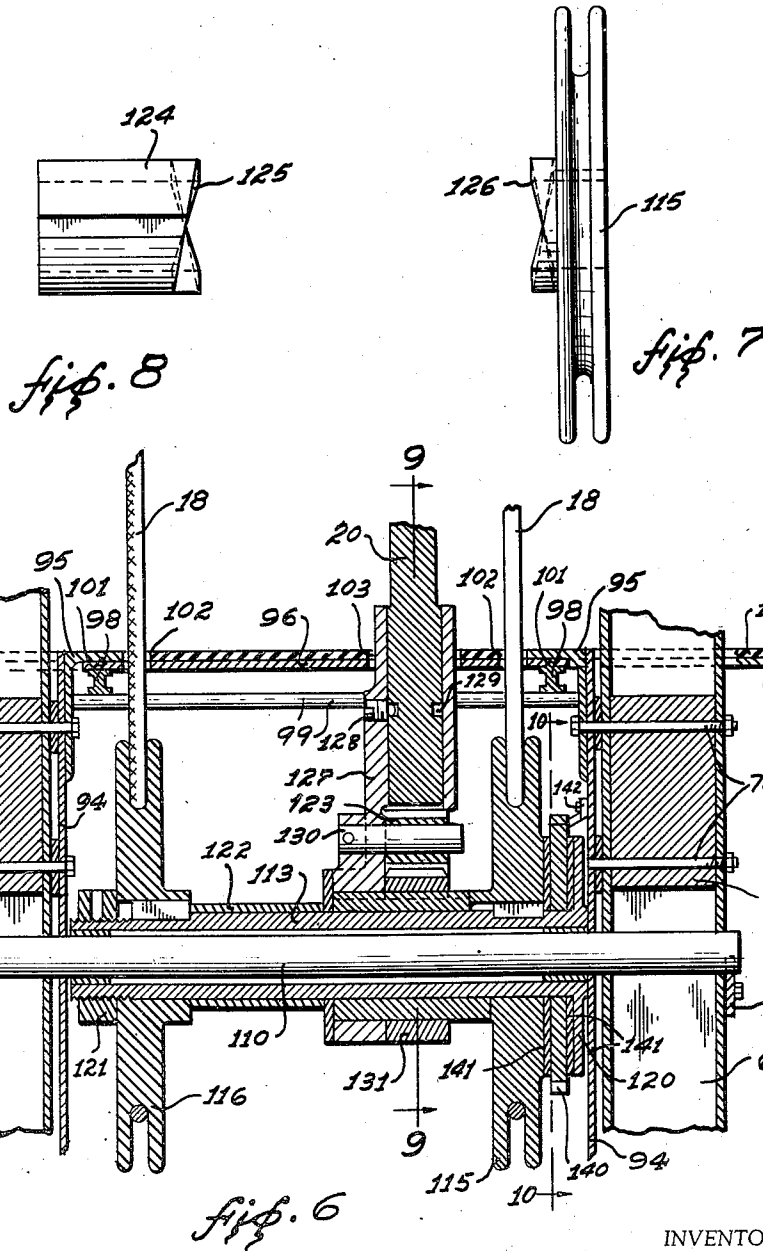
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PORTABLE HOISTING MACHINE

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6 Sheets-Sheet 3



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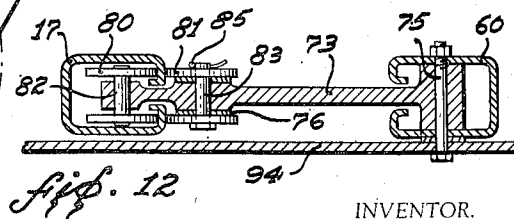
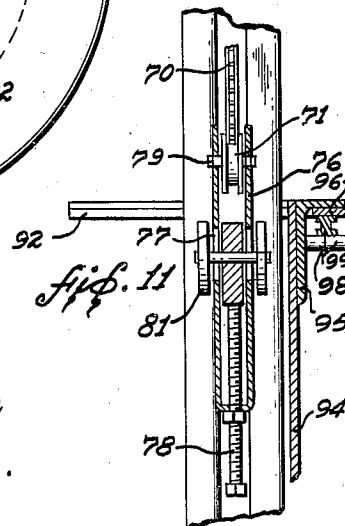
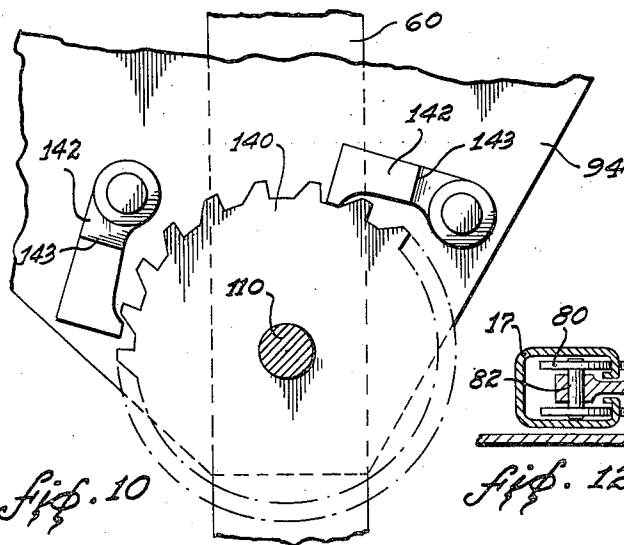
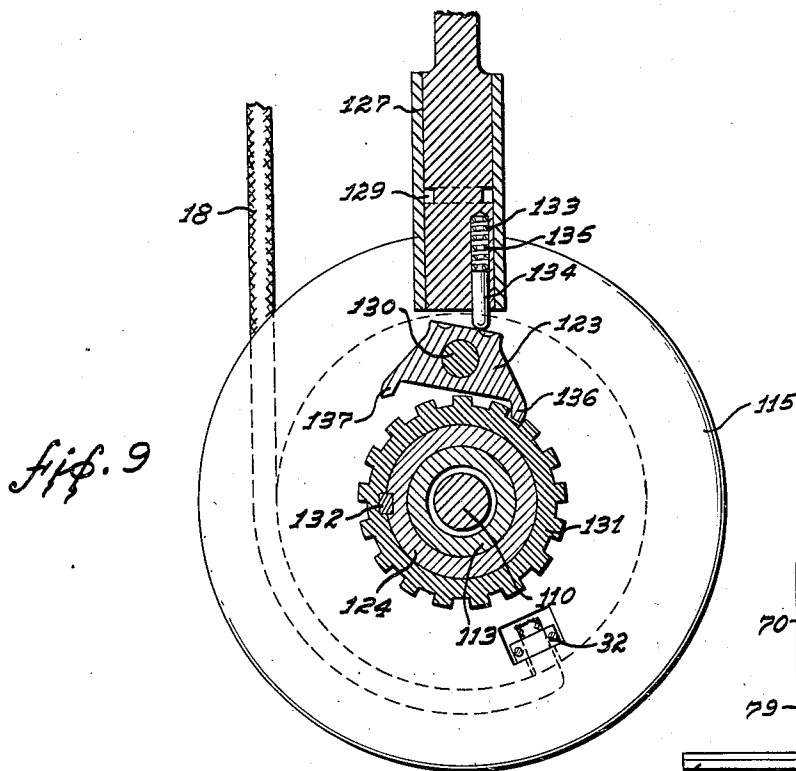
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PORTABLE HOISTING MACHINE

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6 Sheets-Sheet 4



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PORTABLE HOISTING MACHINE

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6 Sheets-Sheet 5

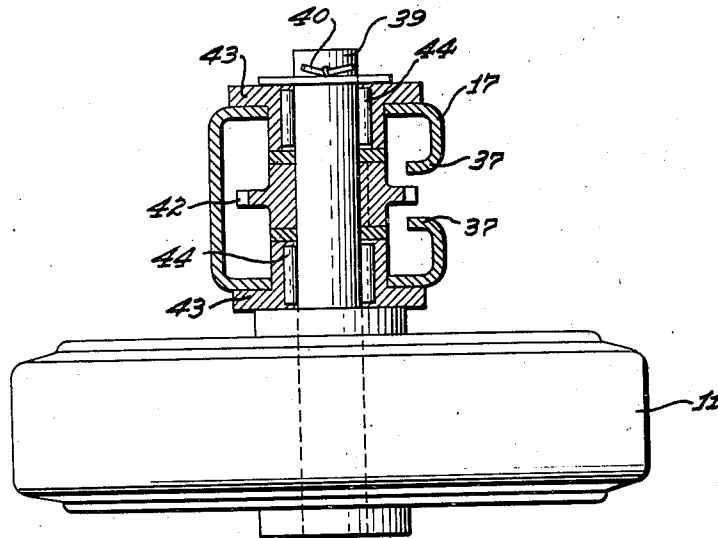


fig. 13

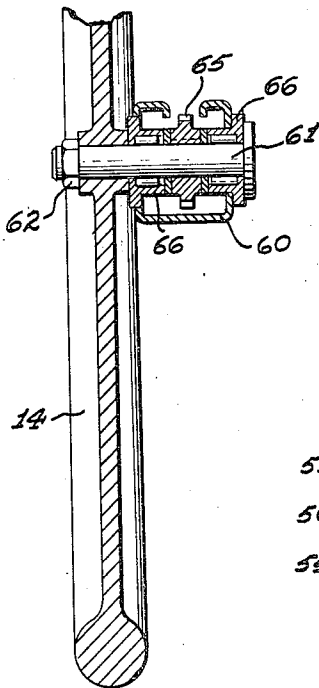


fig. 15

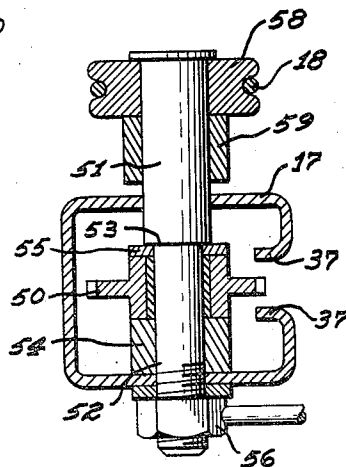


fig. 14

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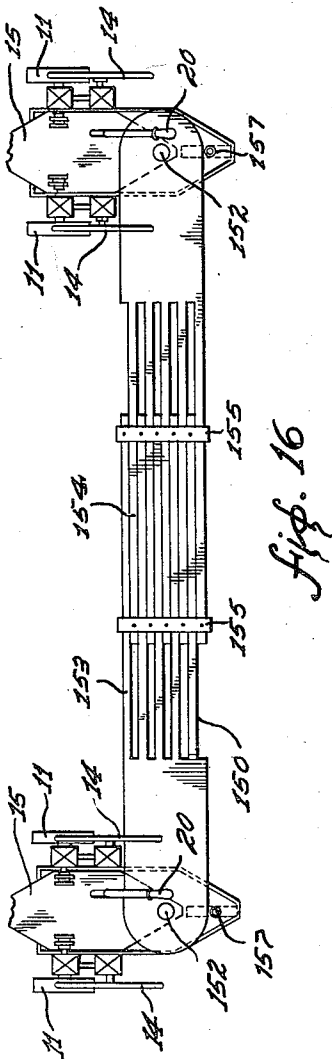
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PORTABLE HOISTING MACHINE

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6 Sheets-Sheet 6



UNITED STATES PATENT OFFICE

2,035,294

PORTABLE HOISTING MACHINE

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Application December 15, 1933, Serial No. 702,477

7 Claims. (Cl. 304—9)

This invention relates in general to hoisting machines and more particularly to portable hoisting machines.

One of the objects of the invention is to provide a new and novel machine for supporting workmen, such as decorators and others, the nature of whose work necessitates a frequent changing of position as the work progresses.

Another object of the invention is to provide a portable machine having a workman's supporting platform and to provide a new and improved arrangement of the operating and control means for raising and lowering the platform.

More specifically it is an object of the invention to provide a machine which includes a vehicle and a vertically adjustable workman's supporting platform carried thereby, the mechanism for driving the vehicle and the mechanism for moving the platform vertically being so arranged in relation to one another in the machine as to permit both their hand controls to be movable with the platform so that a workman may adjust his position vertically and horizontally, if desired, while on the platform.

Another object of the invention is to provide a machine of the above mentioned character which is more safe for workmen than the use of ladders and scaffolds, which saves the time used in climbing up and down ladders and moving scaffolds and consequently one which serves to increase the work output of a workman and improves his efficiency in general.

These objects and the several novel features of the invention are hereinafter more fully described and claimed and the preferred form of construction by which these objects are attained is shown in the accompanying drawings in which—

Fig. 1 is a view in side elevation of a machine embodying my invention.

Fig. 2 is a fragmentary end view of Fig. 1 taken in the direction of the arrows 2—2.

Fig. 3 is a view shown in cross section taken on the line 3—3 of Fig. 2.

Fig. 4 is an end view shown in elevation of the machine taken in the direction of the arrows 4—4 of Fig. 1.

Fig. 5 is a view partly in cross section and partly in elevation taken on the line 5—5 of Fig. 4.

Fig. 6 is an enlarged view shown in cross section of the hoisting clutch mechanism taken on the line 6—6 of Fig. 1.

Fig. 7 is a part of the clutch mechanism of Fig. 6 shown in elevation removed from the clutch.

Fig. 8 is a cooperating part of the clutch part shown in Fig. 7.

Fig. 9 is a view shown partly in cross section and partly in elevation taken on the line 9—9 of Fig. 6.

Fig. 10 is a view shown partly in cross section and partly in elevation of mechanism for preventing retrograde rotation of one of the clutch members, taken on the line 10—10 of Fig. 6.

Fig. 11 is a view shown in cross section taken on the line 11—11 of Fig. 1.

Fig. 12 is a view shown in cross section taken on the line 12—12 of Fig. 1.

Fig. 13 is a view shown partly in cross section and partly in elevation of one of the driven wheels taken on the line 13—13 of Fig. 1.

Fig. 14 is a view shown in cross section taken on the line 14—14 of Fig. 1.

Fig. 15 is a view shown in cross section taken on the line 15—15 of Fig. 4.

Fig. 16 is a plan view in elevation of another form of my invention, in which two machines are utilized.

Fig. 17 is a side view in elevation of the apparatus of Fig. 16 showing the machine in a different position.

In the drawings there is shown my machine which comprises in general a vehicle, a hoisting device and a workman's supporting platform, the platform and hoisting device, for moving the same vertically, being carried by the vehicle. The vehicle includes a frame 10 supported on wheels 11 and 12, the wheels 11 in this instance being the driven wheels, driven through mechanism operable by actuating the hand wheels 14. The workman's supporting platform, designated in general by the numeral 15, is suspended from a pair of spaced upright posts 17 by the cable 18 of a windlass operable through a clutch mechanism by the hand lever 20. The drive mechanism of the vehicle and the hoisting mechanism for the platform are so arranged as to permit the hand operable wheels 14 and the hoisting lever 20 to move with the platform so that a workman may adjust his position vertically and horizontally to his work, as desired, while on the platform.

There is a drive mechanism for each of the drive wheels 11, separately operable through actuation of its corresponding hand wheel 14. The other two wheels 12 are pivoted to the frame 10 by forks 13. By having the drive wheels 11 separately driven and the wheels 12 pivoted to the frame, it will be seen that the machine may be steered by operating one or the other of the hand wheels. Thus, a workman, while on the platform 15 may cause the machine to travel about a room, for example while painting near the ceiling, lower

the platform and repeat the operation of traveling around the walls of the room until the work can be completed from the floor.

Referring now more in detail to the drawings, the frame 10, in this instance, is a casting having the side rails 22 and the cross connecting members 24, one of the cross members being shown in Fig. 2. Brackets 25 are welded or otherwise suitably secured, one to each upright post 17, and the posts are separately fixed by these brackets to the frame 10 by the bolts 27. The drive wheels 11 are separately journaled, one in the lower end of each upright post, the detail structure being shown in Fig. 13 and hereinafter described.

A pair of spaced tie rods connect the brackets 25, and in this instance consist of rods 26 extending through tubes 27^a. The rods 26 extend through openings provided in the brackets 25 and are threaded on both ends to receive nuts 28. Two of the sheaves, designated by the numeral 29, of the windlass or hoisting mechanism are anchored to one of the tie rods and the cable 18 extends around these sheaves. The sheaves 29 are journaled in yokes 30 which straddle one of the tie rods as shown in Figs. 2 and 3. Tie bars 31 connecting the yokes 30 serve to maintain the sheaves in spaced relation.

The windlass or hoisting mechanism includes a pair of drums 115 and 116 rotatable through clutch mechanism operable by the hand lever 20, an enlarged view of which is shown in Fig. 6. The ends of the cable 18 are tied to the drums, as at 32, so that when the drums are rotated to raise the platform, the drums climb the end portions of the cable. A sheave 58 is supported in the upper end of each post 17 and over these sheaves extend the cable 12, the intermediate portion of the cable being anchored by the sheave 29 to the tie rods 27^a as heretofore described. It will be understood that the cable 12 does not rotate about the sheaves 29 and the upper sheaves 58 but that the sheave 29 anchors the cable intermediate its ends and the sheaves 58 constitute the upper suspension points, sheaves being preferable so that the tension on the two end portions of the cable will at all times be equalized.

A bumper 33 extends around the frame 10 to prevent the engagement of the frame metallic parts with furniture. This bumper may be fixed by brackets (not shown) to the frame in any suitable manner.

The machine is preferably weighted at the end near the pivoted wheels 12 to balance the machine when a single workman is on the far end of the platform. This may be accomplished by providing a weight or, as shown, a series of suitable weights 35 supported on the frame 10 near the wheels 12.

The upright posts 17 are hollow and substantially square in cross section and it will be seen by reference to Fig. 13, that one face of the post has intumed edges 37 providing an opening throughout its length. Caps 38 close the top of the posts. The shaft 39 of the drive wheels 11 extend through the posts 17 and are held from lateral movement by cotter pins 40. A gear 42 is keyed or otherwise suitably secured to each of the shafts 39 within the posts 17. Bearing retainers 43, one journaled in each side of the posts 17, support the shafts of the wheels 11 in roller bearings 44. Washers 45 are provided between the bearing retainer 43 and the gear 42.

In the top of each upright post 17 is supported

a gear 50, as shown in Fig. 14. The gears 50 are freely rotatable on shafts 51 journaled in the upper portion of the upright posts 17. The shafts 51, in this instance, are formed with a reduced diametrical portion 52 providing a shoulder 53 and between this shoulder and a spacer 54 the gear 50 is maintained in its proper position within the post. A washer 55 is provided between the shoulder 53 and the gear 50. The outer end of the shaft 52 is threaded to receive a nut 56 by means of which the gear 50 may be clamped between the shoulder 53 and spacer 54 so that it cannot rotate. This serves as a brake to prevent the machine moving after it has been positioned as desired. On the inner ends of the shafts 51 are the sheaves 58 of the windlass or hoisting mechanism over which the cable 18 extends. Spacers 59 are provided between the sheaves 58 and the upright posts 17.

A pair of upright posts 60 similar in form to the upright posts 17 are arranged to move with the platform and in the upper end of these posts are supported the hand wheels 14. As will be seen in Fig. 15, the hand wheels 14 are keyed to shafts 61 which extend through the upright posts 60 and are held thereon by nuts 62. The shafts 61 of the hand wheels 14 are mounted in roller bearings, the structure of which is similar to the mounting of the driven wheels shown in Fig. 13. A gear 65 is keyed or otherwise suitably fixed to rotate with the shaft 61 and is centrally located within the post 60 by the bearing retainers 66. These movable posts 60, like the stationary posts 17 are formed with intumed edges on one face extending throughout the length of the posts. Caps 64 are provided to close the tops of the posts 60.

Within the lower end of each post 60 there is mounted for rotation, a sheave or guide roller 67. Fig. 5 shows the drive mechanism for one of the wheels 11, the mechanism for the other drive wheel being the same in structure and operation. Chains 70 connect the hand wheels 14 and the drive wheels 11, and these chains extend around the gears 50 in the upper end of posts 17 and the sheaves 67 in the lower ends of posts 60.

In order that these drive mechanisms may be associated with the hoisting machine so that the hand wheels may travel with the platform, a pair of guide rollers 71 and 72 are provided around which the chain also travels. Brackets 73 and 74 are fixed to the upright posts 60 by bolts 75 and these bolts, as will be seen by reference to Fig. 6, also bolt the platform 15 to the posts 60. The upper brackets 73 have yokes 76 adjustably associated therewith for supporting the upper guide sheaves 71. The upper yokes 76 are provided with slots 77 and a screw 78 engaging the under side of the brackets 73 by which the chain may be loosened or tightened. The guide sheaves 71 are journaled in the upper portion of the yokes 76 freely rotatable on shafts 79. The brackets 73 also support two pairs of rollers 80 and 81, the rollers 80 being within the posts 17 engaging the inner wall of the split face while the rollers 81 engage the outer wall of the same face, as shown in Fig. 12. These rollers are mounted on shafts 82 and 83 the rollers 81 being retained on the shafts by cotter pins 85. The yokes 76 are arranged between the rollers 81 and the bracket 73.

Similarly the lower brackets 74 are provided with yokes 87 which support the lower guide roll-

ers 72 in the same manner as those above described except that no chain adjustment is associated with the lower sheave. The lower brackets support rollers 90 and 91, these rollers engaging the inner and outer wall of the upright posts 17 in the same manner as the rollers 80 and 81. These rigidly mounted spaced sets of rollers, engaging the upright posts 17 as a track, guide the cable suspended platform and serve to steady its motion when raised or lowered.

From the above description it will now be seen that as the platform 15 is raised or lowered the chains 70 do not travel about and drive the gears 42 of the drive wheels but rather the guide sheaves 71, 72 and 67 and the gear 41 rotate as the loop of the chain connecting them changes its vertical position. Thus the hand operated wheels 14 may be arranged to move with the platform as a unitary part of the structure so that workmen on the platform, regardless of its height from the floor, may move the entire machine as desired through operation of the hand wheels 14.

The platform designated in general by the numeral 15 comprises a central structure bolted, as heretofore mentioned, to the upright posts 60 and demountable extension platforms 92 and 93. The central platform structure comprises a pair of plates 94 to the upper edges of which is welded or otherwise suitably secured angle braces 95. A horizontally disposed plate 96 connects the said plates 94 and is welded or otherwise suitably secured preferably to the underside of the angle braces 95, as shown in Fig. 6. A strip of matting 95a, preferably of rubber to prevent a workman from slipping, is provided to cover the plate 6.

The demountable platforms 92 and 93 each comprise a plate 97 to the underside of which is fixed a pair of spaced I-beams 98. These I-beams project beyond the edge of the floor plates 97 and extend under the plate 96 and rest upon rods 99. The upper surfaces of the floor plates 96 and 97 are flush and these plates may be covered by strips of rubber matting 100 to prevent workmen from slipping. Protuberances 101 are formed on the upper surface of the I-beams 98 and the underside of the plate 96 is formed with indentations with which the protuberances register when the platforms are in proper location. Slotted openings 102 are provided in the plate 96 through which the cable 18 passes. A slotted opening 103 is also provided through which the handle 20 projects.

A pair of shelves 105 and 106 are shown supported on the platform extensions 92 and 93. Legs 107 support the shelves and extend into openings provided in the platform. It will be seen that a number of such openings may be provided so that the shelves may be arranged either lengthwise of the platform, as shelf 105 is positioned, or crosswise of the platform, as shelf 106 is arranged. These shelves may be employed as a seat for a workman as well as to support materials and tools.

In Figs. 6 to 10, inclusive, there is shown a clutch mechanism and cooperating parts operable by the hand lever 20 to raise or lower the workman's supporting platform 15. The clutch mechanism is arranged to move with the platform and is supported on a shaft 110 which extends from one of the upright posts 60 to the other. The shaft 110 is supported in the posts 60 and fixed to the outer wall of each post is a key

111 engaging a keyway in the shaft to prevent lateral movement of the same.

A spool or spindle 113 is mounted for rotation on the shaft 110 and to this spool is keyed the sheaves 115 and 116 around which the cable 18 winds. The ends of the cable 12 are fixed to these sheaves 115 and 116 so that as the sheaves rotate the cable winds on the sheaves resulting in the raising of the platform. One end of the spool 113 is formed with a head 120, the other end being threaded to receive a nut 121. A tubular spacer 122 which slips over the spool 113 is provided and between the spool and the nut 121 the sheave 116 is maintained in proper position on the spool.

A tubular member 124 is arranged for rotation on the spindle 112 and is formed with a clutch engaging face 125. The sheave 115 is provided with a similar clutch engaging face 126 and when this face is engaged by the face 125 of the tubular member 124 the two are locked by friction.

The lower end of the handle 20 extends into a housing 127 and is prevented from axial movement by a set screw 128 extending into a circular slot 129 provided in the handle. A pawl 123 is pivotally fixed to the handle housing by a pin 130. A gear 131 is keyed to the clutch member 124, as at 132, Fig. 9, and this gear is rotated by the engagement therewith of the pawl 123 when the handle is operated back and forth.

An axial bore 133 is provided off center in the lower end of the hand lever 20 to receive a pin 134. A coil spring 135 urges the pin 134 against the pawl 123. The upper surface of the pawl 123 against which the pin 134 bears, is provided with two indentations 136 and 137 in either of which the pin may be located by turning the handle 20. When the pin is at one side of the pawl, as shown in Fig. 9, the tooth 136 of the pawl is urged into engagement with the gear 131. In this position the gear 131 is rotatable in a clockwise direction by moving the handle 20 back and forth and the platform lowered. By rotating the handle 20 the pin 134 may be brought into position to urge the tooth 137 into engagement with the gear 131. When this is done, movement of the handle will cause counter clockwise rotation of the gear 131 and sheave 115 upon which the cable 18 will be wound resulting in raising the platform.

To prevent retrograde movement of the sheaves 115 and 116 a gear 140 is provided between the sheave 115 and the head 120 of the spool 113. Leather washers 141 are provided, one between the head 120 of the spool and the other between the sheave 115 and the gear. When the clutch member 124 engages the cooperating clutch face of the sheave 115, the sheave is moved axially on the spindle and clamps the gear 140 between the yieldable leather washers so that it rotates with the sheave. Pawls 142 pivotally supported on the plates 92 of the platform engage the gear 140 and thus prevent retrograde movement of the gear and consequently of the sheave. As shown, these pawls are off-set as at 143 to bring the tooth 144 thereof in alignment with the gear. Two pawls are employed in this instance and, as is well known, by the use of two with a gear the number of teeth in the gear may be half as many as would be necessary if only one pawl were used.

The complete operation of the machine is as follows: When the hand wheels 14 are rotated the gear 65 rotates to drive the wheels 11 through the chain 70. By rotating both of the hand

wheels 14 together the machine may be caused to move forwardly or backwardly in a straight line if desired. By moving only one or the other of the hand wheels 14 it will be understood that only one of the wheels 11 will be driven which tends to turn the machine so that a workman, while on the platform, may steer as well as operate the machine through rotation of these hand wheels.

When it is desired to raise the platform the pawl 123 is arranged, if need be, by rotating the handle 20 until the tooth 136 of the pawl engages the gear 131. Upon the first movement of the handle the clutch member 124, which is keyed to the gear 131, urges the sheave 115 toward the gear 140. This movement is comparatively small, it will be understood, until such time as the sheave 115 and gear 140 are locked to the clutch member 124. Continued back and forth movement of the hand lever 20, after the sheave is locked to the clutch member 124, causes the cable 18 to be wound upon the sheaves 115 and 116. When the platform has been raised to the desired height the pawl 142 engaging the gear 140 will prevent retrograde movement of the clutch parts.

When it is desired to lower the platform this can be done in either of two ways. If it is desired to lower the platform to its lowest point this may be accomplished by releasing the clutch engagement between the clutch member 124 and the sheave 115 which will permit the platform to descend by its own weight and slowly by reason of the frictional engagement between the leather washers. The platform may also be lowered by operation of the hand lever 20. To lower the platform the handle 20 is rotated until the pin 134 carried thereby urges the tooth 137 of the pawl 123 into engagement with the gear 131. With the pawl 123 in this position movement of the hand lever 20 will rotate the gear 131 and consequently the sheaves 115 and 116 in a counter clockwise direction resulting in the descent of the platform.

Referring now to Figs 16 and 17, these views show an apparatus, which might be termed a traveling scaffold, comprising two of the heretofore described machines between which extends a platform 150. This apparatus is particularly suitable for use in rooms such as school rooms and others in which the furniture is not readily movable. In such rooms, with the present apparatus, the two machines may be operated in the aisles with the connecting platform 150 raised to pass over the furniture.

The machines used in the apparatus of Figs. 16 and 17 are substantially the same in structure and operation as the machine hereinbefore described in detail so that a repetition of their description is not deemed necessary. The machines have the hand wheels 14 by which the workmen may cause the entire machine to move and the hand levers 20 by operation of which the platform 15 may be raised or lowered. As in the previously described machine, the hoisting mechanism for raising or lowering the platform and the drive mechanism for moving the machine are relatively arranged so as to provide for the movement of the hand wheels and hand lever with the platform so that the workmen may operate these mechanisms while on the platform.

The ends of the extension platform 150 are pivotally supported on the platform 15 of the machine, as at 152. These pivotal connections permit the machines to be swung around, for ex-

ample, from the position shown in Fig. 17 to that shown in Fig. 16 so as to carry the platform 150 sideways.

Preferably the connecting platform 150 is of the type which is adjustable in length. Any suitable adjustable platform may be used, the one shown being a well known type comprising sections 153 and 154 arranged in slidable relation. Straps 155 fixed to the adjacent ends of the platform sections support the platform sections.

As heretofore described, the machines have separately operated drive mechanisms for each of the wheels 11, so that by operating only one of the hand wheels 14 of a machine the machine may be made to turn. In this instance only one wheel is shown pivoted to the other end of the frame, as at 157, but two may be used if desired. When one, or even both of the machines are turned for example from the position shown in Fig. 17 to that in Fig. 16, the machines will not exert a pull on each other, but rather the platform 150 will be elongated to compensate for such movement.

The position of the machine relative to the platform 150, as shown in Fig. 17, permits the entire apparatus to pass lengthwise through an ordinary sized doorway. The machines may be turned to the position shown in Fig. 16 and adjusted, by means of the adjustable platform 150, in proper spaced relation to permit one machine to pass down each aisle.

From the foregoing description it will now be understood that I have provided a new and novel machine for supporting and conveying workmen. By the arrangement of the mechanism for driving the machine as a vehicle and the mechanism for raising and lowering the platform, a workman while on the platform may raise or lower the same or may move the entire machine to change his horizontal position relative to his work. It will be appreciated that the drive mechanism and its arrangement in the machine is such that the hand wheels may be carried with the platform when it is moved vertically without such vertical movement affecting the drive wheels.

Having thus fully described my invention, its utility and mode of operation, what I claim and desire to secure by Letters Patent of the United States is—

1. In a device of the character described, a vehicle having a pair of pivotable wheels and a pair of driven wheels, a platform carried by said vehicle, a separate drive mechanism for each driven wheel including separate hand operated means movable with the platform, hoisting mechanism for moving the platform vertically, and hand operated means movable with the platform for operating said hoisting mechanism.

2. In a device of the character described, a wheel supported frame, a pair of upright posts fixed to the base, gear means for two of said wheels, a vertically movable platform suspended from said upright posts, gear means carried by the platform, a pair of chains connecting said gear means one for each drive wheel, hand operated means carried by the platform operable to drive said wheels by the chains, a pair of spaced guide sheaves for each chain carried by the platform around which the chains travel when the hand wheels are actuated, and means carried by the platform for vertically moving the platform.

3. In a hoisting device, a pair of spaced hollow upright posts, a movable workman's supporting platform arranged for vertical movement be-

tween said posts, a windlass carried by the platform, including a cable suspending said platform from the upright posts, spaced guide rollers carried by said platform engaging the upright posts, said rollers engaging the inner and outer faces of the posts, and hand operated means carried by the platform for operating said hoist.

4. Scaffold apparatus comprising a pair of spaced machines each having a vertically movable load supporting means, hand operated means for each machine movable with said supporting means as a unitary structure for moving the same vertically, hand operated means for each machine, movable with the platforms operable for moving the machine, and an extension platform between the vertically movable load supporting means of the machines.

5. Scaffold apparatus comprising a pair of spaced machines each having a vertically movable load supporting means, hand operated means for each machine movable with said supporting means as a unitary structure for moving the same vertically, hand operated means for each machine, movable with the platforms operable for moving the machine, and an adjustable platform

supported by said load supporting means pivoted at its ends thereto.

6. In a device of the character described, a vehicle including a frame, a pair of driven wheels and a freely turnable roller means supporting the frame, a separate drive mechanism for each driven wheel, a vertically movable platform carried by the vehicle, a control means movable with the platform for each drive mechanism, a hoisting mechanism for varying the vertical position of the platform, and a control means for the hoisting mechanism movable with the platform.

7. In a device of the character described, a vehicle including a frame, a pair of driven wheels and a caster wheel supporting the frame, an upwardly extending member carried by the frame, a platform supported by the upwardly extending member, mechanism carried by the platform and controllable by an operator thereon to vary the vertical position of the platform, and separate driving mechanism for each driven wheel carried by the platform and operable by an operator thereon for moving and guiding the vehicle in any direction over a floor surface.

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