This invention relates to improvements in a mobile hoisting apparatus.

The general object of the invention is to provide a travelling, self-propelled, hoisting apparatus particularly adapted to elevate concrete to be poured in building wall forms.

Another object of the invention is to provide an apparatus of the class described including a mast which is mounted in a novel manner for universal movement.

A further object of the invention is to provide an apparatus of the class described including a mast which is of novel construction and is composed of a plurality of separable sections.

Other objects and the advantages of this invention will be apparent from the following description taken in connection with the accompanying drawings, wherein:

Fig. 1 is an end view of my improved mobile hoisting apparatus;

Fig. 2 is a fragmentary section taken on line 2—2 of Fig. 1 with the power plant omitted;

Fig. 3 is a top plan view of the apparatus shown in Fig. 1 with the gasoline tank and supports omitted;

Fig. 4 is a fragmentary side elevation of the hoisting apparatus;

Fig. 5 is a fragmentary section taken on line 5—5 of Fig. 3;

Fig. 6 is a fragmentary section taken on line 6—6 of Fig. 5 with the power plant omitted;

Fig. 7 is a fragmentary view of the side of the apparatus opposite to that shown in Fig. 4;

Fig. 8 is a fragmentary section taken on line 8—8 of Fig. 5 with the power plant omitted;

Fig. 9 is an enlarged fragmentary elevation partly in section of the mast and hoisting cart;

Fig. 10 is a section taken on line 10—10 of Fig. 9;

Fig. 11 is an enlarged fragmentary elevation, partly in section, of the top section of the mast;

Fig. 12 is a bottom plan view of the top section shown in Fig. 11;

Fig. 13 is an enlarged fragmentary elevation of the mast at a joint showing it partly disassembled and with the clamping collar in section and the guide rail removed; and

Fig. 14 is a fragmentary enlarged section taken on line 14—14 of Fig. 4.

Referring to the drawings by reference characters I have indicated my improved hoisting apparatus generally at 10. As shown the device 10 includes a triangularly shaped channel iron frame 12 having a plank deck 13 thereon. One side of the triangular frame 12 forms the front of the apparatus and the juncture of the other side and the hypotenuse of the triangle forms the rear of the apparatus.

At the front and adjacent each side thereof the frame 12 has a set of three depending bearing members 14 thereon on each set of which a shaft 15 is mounted and which supports wheels 16.

At the rear the apparatus includes a vertical bearing member 17 positioned between the frame flanges, a rearwardly extending upper plate 18 and a rearwardly extending lower plate 19. Below the bearing 17 I provide a caster device 20 which includes an inverted U-shaped frame 21 having a shaft 22 mounted therein on which a wheel 23 is mounted. The caster frame 21 includes an upwardly extending pivot rod 24 which is positioned in the bearing 17. The wheel 23 is thus shiftable mounted and is disposed adjacent to the intersection of the hypotenuse side of the frame and one other side of the frame.

The frame 21 includes a rearwardly extending portion 24' which is suitably apertured to receive a removable pin 25 positioned in suitable aligned apertures in the plates 18 and 19 to retain the caster device 20 in a fixed position. The device 26 has a ball-like handle member 26 thereon for guiding the caster when the pin 25 is removed.

Intermediate the length of the apparatus 10 the frame 12 includes a pair of spaced transverse channel iron 27 on which, adjacent the hypotenuse side of the frame, I provide a base member 28 having a cover member 29 thereon (see Fig. 20). The base 28 and the cover 29 have opposed hemispherical recesses 30 to form the socket portion of a ball and socket joint. Positioned in the recess 30 of the base 28 I provide a ball member 31 having a flattened upper surface on which a vertical standard 32 is positioned. The standard 32 has a cylindrical vertical aperture 33 therein and opening through the upper end has an enlarged bore 34 in which a length of tubing 35 is positioned and secured as by welding.

The ball member 31 includes a pin portion 36 extending upwardly from the flattened portion and is positioned in the standard aperture 33.

The ball member and the standard are secured together as by welding.

Adjacent the lower end the standard 32 has an elongated aperture 37 therein on the side towards the front of the device. On each side of the aperture 37 the standard includes bracket members 38 which support shafts 39 and 40 having wire rope pulleys 41 and 42 thereon.

The tubing 35 is adapted to support a mast 43 which is made up of a plurality of separable sec-
tions 44 and a crown member 45. Each of the mast sections 44 comprises a length of tubing 46 split lengthwise as at 47. (See Figs. 9 and 10.) At the lower end each of the sections 44 has a length of smaller size tubing 48 split as at 43 and welded therewith with a predetermined length thereof protruding from the end of the tubing 46. Opposite the splits 47 and 48 each of the mast sections includes a key member 49 protruding downwardly from the lower end of the tubing 46. (See Figs. 9 and 13.)

At the upper end each of the mast sections has a clamping collar 50 therein which is secured to the tubing 43 as by welding. On each side of the tubing split 47 the collar 50 includes outwardly extending ears 51 each of which has an aperture 52 therein. Above the aperture 52 one of the ears 51 has an aperture 53 therein and the other ear has an aligned threaded aperture 54 thereto. Positioned in the apertures 52 and 54 I provide a bolt member 55 having an enlarged head 56 thereon. Opposite the ears 52 between the tubing 45 has a recess 58 therein opening through the upper end of the tubing to receive the key member 49 of the mast section thereabove. Opposite the split 47 each of the mast sections has a guide rail 59 thereon which is shown as an I-beam welded to the tubing 45. When the mast sections are assembled the protruding tubing 48 of one section is placed within the tubing 46 of the section therebelow with the key member 49 of the upper section positioned in the recess 58 of the lower section.

The bolt 55 of the lower section is then tightened thereby firmly clamping the two sections together. As shown in Figs. 11 and 12 the crown member 45 includes an elongated cylindrical body portion 59 having a recess 61 therein opening through the bottom and a reduced aperture 62 opening through the top. At the bottom of the recess 61 I provide a key member 63 which is adapted to be positioned in the recess 58 of the uppermost mast section.

Extending upwardly and outwardly from the body on the same side as the key 63 the crown member includes a pair of spaced webs 64. Above the body aperture 62 and between the webs 64 I provide a wire rope pulley 65 mounted on a shaft 66 supported by the webs 64. Adjacent the outer end of the webs 64 and therebetween I provide a wire rope pulley 67 mounted on a shaft 68 supported by the webs 64. A wire rope or cable 69 is positioned over the pulleys 65 and 67 and extends downward through the mast 43 and is rove under the pulley 41 and over the pulley 42 and extends downwardly through an aperture 69 in the deck 12 where it is rove under a pulley 70 and then extends forward and is wound on a reel 71.

The pulley 70 is rotatably mounted on a shaft 72 which is supported in suitable bearing portions on spaced channel members 73 which are secured to and depend from the channel 27 and from another transverse channel 74 which is spaced a predetermined distance from the free channel of the frame 12.

The lower end is mounted on a shaft 75 one end of which is journaled in one of the bearing members 76 and the opposite end is journaled in a bearing member 76 which depends from the frame 12 and is secured thereto as by welding. On one side of the reel 71 I include a brake drum 77 which is engaged by suitable brake lining on a brake band 78. (See Fig. 8.) One end of the brake band 78 is anchored to the frame 12 as at 79 and the opposite end is suitably secured to a crank portion of a shaft 80 which is supported in bearing members 81 on the frame 12. The shaft 80 extends through a suitable aperture in the side channel of the frame and has an upwardly extending arm 83 mounted on and secured thereto.

One end of a rod 84 is suitably connected adjacent the upper end of the arm 83 and the opposite end is suitably connected to an operating lever 85 intermediate the length thereof. (See Fig. 7.) Adjacent the lower end the operating lever 85 is pivotally connected to a bearing member 87 mounted on the deck 13.

The free end of the cable 89 has a hook member 88 thereon which is adapted to be engaged by the hook member 89 of a bottomed bucket 90.

For guiding and steadying the bucket 90 in its upward and downward travel I provide a guide carriage which is indicated generally at 11 and shown in detail in Figs. 9 and 10. As shown the guide carriage 91 includes a body portion consisting of a flat plate 92. Adjacent the top and bottom the plate 92 has a pair of spaced arm members 93 extending upwardly thereon towards the mast 43 on each side of the guide rail 59. Rotatably mounted on the end of each of the arms 93 I provide a roller 94 which is adapted to engage the web of the guide rail adjacent the outer flange thereof. Each pair of the arms 93 supports a shaft 95 on which is mounted a roller 96 which engages the outer surface of the outer flange of the guide rail 59.

Adjacent each set of arms 93 the plate 92 has a pair of spaced arms 97 extending therefrom towards the mast 43 on each side of the guide rail 59. Adjacent the ends thereof each of the arms 97 has a roller member 98 rotatably mounted thereon and each of which engages the inner surface of the outer flange of the guide rail 59. The upper pair of arms 93 each has an upwardly extending boss 99 thereon which supports a rod 100. The rod 100 includes an extended portion which forms a ball 101 which is engaged by the hook 88. Adjacent the top thereof the plate 92 has an aperture 102 therein and the rear wall of the bucket 90 has an aperture 103 therein.

Mounted on the rod 100 between the bosses 99 I provide a latch member 104 which includes a hook portion 105 adapted to engage the inner surface of the rear wall of the bucket 90 and has a lug 106 thereon which is adapted to be positioned in the bucket aperture 103 and in the plate aperture 102.

The latch 104 allows the bucket to hang plumb from the hook 88 and prevents it from swinging away from the guide carriage 91 while the guide cart prevents the bucket from striking the mast 43.

The mast 43 is adapted to be retained in a true vertical position by three stays which are indicated generally at 107. Each of the stays 107 includes a turnbuckle 108 equal in length of which is anchored to the frame 12 and an eye bolt 109. Each of the stays 107 is formed of a plurality of steel cable sections 109 each of which has an eye 110 at one end and a hook member 112 thereon at the opposite end. The eye 110 of the lowermost stay sections are connected to the ends of the turnbuckles 108 and the hooks 112 thereon engage the eyes 110 of the stay sections thereabove. The hooks of the uppermost stay sections 12.
tion engage suitable eye portions 113 formed on the crown member 45.

For operating the hoisting mechanism and propelling the apparatus 10 I provide a power propulsion system which, as shown, consists of an internal combustion engine 115, a clutch mechanism 116 and a forward and reverse speed reduction transmission 117 all of which are shown as mounted on spaced channel iron 114 which are in turn mounted on the front channel of the frame and on the other on the transverse channel 118.

The clutch mechanism 116 includes an operating arm 116a and the transmission mechanism includes an operating arm 116b and has a drive shaft 120 extending therefrom. (See Figs. 3 and 5.)

The clutch arm 116a is connected through suitable connecting means such as indicated at 121 to a suitable operating lever 122 which is pivotally supported on a bearing member 128 mounted on the deck 13.

The transmission arm 119 is connected through suitable connecting means such as indicated at 123 to a suitable operating lever 125 which is pivotally supported on a bearing member 126 mounted on the deck 13.

At the rear of the power plant I provide a shaft 127 which is journaled in spaced end bearings 128 mounted on the deck 13 and in an intermediate bearing 126 mounted on the deck 13. (See Fig. 14.) The shaft 127 has a sprocket 130 mounted thereon which is adapted to be driven through the medium of a sprocket chain 139 passing through a suitable aperture 140 in the deck 13. (See Fig. 8.)

The sprocket 130 is mounted on and secured to a shaft 141 which is journaled in suitable bearings on channel irons 142 which are secured to the frame and depend from the channels 27 and 74. Mounted on and secured to the shaft 141 I provide a sprocket 143 which is adapted to drive a sprocket chain 144 driving a sprocket 145 mounted on and secured to the rear shaft 75.

The other portion 146 of the clutch mechanism 116 is mounted on and secured to a sleeve member 147 which is slidably mounted on the rear shaft 75 and secured thereto by a spline as indicated at 150.

The sleeve 147 has a shifting yoke 151 which is adapted to be moved by a shifting yoke 152 which is pivotally supported on a bearing member 153 mounted on the deck 13. (See Figs. 5 and 6.)

Mounted on the deck 13 is the opposite side of the center bearing 129 from the bearing 131. The bearing 155 supports a bearing member 156. The bearing 155 is journaled in suitable bearings on channel irons 154 which are secured to and depend from the channels 27 and 74. Mounted on and secured to the bearing 155 I provide a sprocket 156 which is adapted to drive a sprocket chain 157 passing through a suitable aperture 158 in the deck 13. (See Figs. 5 and 6.)

The sprocket 156 is mounted on and secured to a shaft 159 which is journaled in suitable bearings on channel irons 160 which are secured to and depend from the channels 27 and 74. Mounted on and secured to the shaft 159 I provide a sprocket 161 which through the medium of a sprocket chain 162 mounted on and secured to a shaft 163 is adapted to drive a sprocket 164 which is mounted on and secured to a sprocket chain 165 mounted on and secured to the shaft 166. The shaft 166 is journaled in the bearing member 167 and in one of the bearing members 168. Mounted on and secured to the shaft 166 I provide a drum member 170.

The other portion 171 of the clutch mechanism 116 is mounted on and secured to a sleeve member 172 which is slidably mounted on the shaft 173 and secured thereto by a spline as indicated at 174.

The sleeve 172 has a shifting yoke 175 which is adapted to be moved by a shifting yoke 176. The free end of the pivoted arm 178 is connected by a rod 177 to a shifting lever 179 which is pivotally supported by the bearing member 180. From the foregoing it will be apparent that when the engine 115 is operating and the clutch mechanism 116 is in engagement the shaft 127 will be rotated by the shaft 120 through the medium of the sprockets 130 and 132 and the sprocket chain 131.

When the shaft 127 is rotating and an operator moves the portion 146 of the clutch mechanism 116 into engagement with the portion 134 of the clutch mechanism 115 the sprocket 137 will rotate the portion 134 whereupon the sprocket 147 will rotate. As the sprocket 147 rotates it will rotate the shaft 143 through the medium of the sprockets 138 and 143 and 145 and the sprocket chains 139 and 144 thereby rotating the hoisting reel 71. The direction in which the hoisting reel rotates depends on the manner in which the operator sets the transmission mechanism.

In raising or lowering the mast an elevating means as, e.g., a pipe is inserted in the eye 113 on the crown member. The desired joint clamps 50 are released and the desired sections may then be inserted or removed due to the split portions 10. The parts are again clamped and the crown member secured in place.

In use the apparatus 10 is adapted to move alongside a wall form and to accomplish this a steel cable 183 is wound several times around the reel 170. The cable 183 is pulled tight and one end is secured to a stake 184 or other suitable anchoring means and the opposite end is secured to a stake 182 or other suitable anchoring means.

To move the apparatus 10 the operator moves the clutch portion 171 of the clutch mechanism 116 into engagement with the portion 156 whereupon the sprocket 156 will rotate the portion 156 through the medium of the sprockets 159, 160 and 167 and the sprocket chains 161 and 162 thereby rotating the drum 170. As the drum 170 rotates it will pull the apparatus 10 along the cable 183 in whichever direction the operator has set the transmission mechanism 117.

With the construction described the apparatus will run in a straight line and may be run to the corner of a wall or building and on account of the three point suspension and the triangular frame the apparatus may make a sharp turn with the mast remaining close to the wall as the turn is made. In doing this the rear stake 181 is pulled after the apparatus has advanced to a corner and the rear stake is driven into the ground around the corner and at the proper location. The cable 75 2,196,834
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180 is attached to the stake while remaining attached to what was the forward stake. Power is then applied to the drum 170 and the corner turn is readily made.

5. From the foregoing description it will be apparent that I have provided an improved mobile hoisting apparatus which is of novel construction and highly efficient in use. Having thus described my invention I claim:

10. 1. In a mobile hoisting apparatus, a right
    tria;ngularly shaped supporting frame, a mast
    mounted adjacent the middle of the hypotenuse
    side of said frame, a plurality of wheels mounted
    along one side of the frame, a shift able wheel
    mounted adjacent to the intersection of the
    hypotenuse side of the frame and the other side
    of the frame, and means to propel said apparatus.

15. 2. In a mobile hoisting apparatus, a tria;ngular
    supporting frame, a mast, a ball and socket con-
    nection supporting the lower end of the mast
    on the frame, said connection being arranged
    substantially midway of one side of the frame,
    means to adjustably support the upper end of
    the mast, a cable supported by said mast, a
    bucket mounted on said cable, and means en-
    gaging the bucket and the mast to prevent
    swinging of the bucket.

20. 3. In a mobile hoisting apparatus, a support-
    ing frame, wheels on said frame, a deck on said
    frame, a hollow mast standard mounted on said
    deck, a sectional mast removably mounted in
    said mast standard, said frame and said deck
    being tria;ngularly shaped, and said mast stan-
    dard being located adjacent the middle of the
    hypotenuse side of said frame and deck.

25. 4. In a mobile hoisting apparatus, a right
    tria;ngularly shaped frame, a mast mounted adja-
    cent the middle of the hypotenuse side of said
    frame, said mast including a crown member, a
    plurality of supports each having one end en-
    gaging said crown member, the other end of
    each support being secured to the frame with
    one support at the juncture of each two sides
    thereof, a pulley on said mast, a cable passing
    over said pulley and a bucket suspended from
    said cable.

30. 5. In a mobile hoisting apparatus, a support-
    ing frame, wheels on said frame, a deck on said
    frame, a hollow mast standard mounted on said
    deck, a sectional mast removably mounted in
    said mast standard, said frame and said deck
    being tria;ngularly shaped, said mast standard
    being located adjacent the middle of the hypo-
    tenuse side of said frame and deck, a crown
    member on the top of said mast, a guide rail
    extending along said mast, a carriage shift able
    along said guide rail, a receptacle mounted on
    said carriage, and means to move said receptacle.

35. 6. In a mobile hoisting apparatus, support-
    ing frame, wheels on said frame, a deck on said
    frame, a mast standard mounted on said deck, a
    sectional mast mounted on said mast standard,
    a crown member on the top of said mast, a guide
    rail extending along the sections of said mast.

40. 7. A carriage shift able along said guide rail, a
    concrete bucket supported on said carriage, a
    supporting cable for said bucket, said crown
    member including a pulley for said cable, a reel
    means to guide said cable onto said reel and
    means to drive said reel.

45. 8. In a mobile hoisting apparatus, a support-
    ing frame, a deck on said frame, a mast standard
    mounted on said deck, a sectional mast remov-
    ably mounted in said mast standard, said frame
    and said deck being right tria;ngularly shaped,
    said mast standard being located adjacent the
    middle of the hypotenuse side of said frame and
    deck, a crown member on the top of said mast,
    a guide rail extending along said mast, a carriage
    shift able along said guide rail, a concrete bucket
    supported on said carriage, a supporting cable for
    said bucket, said crown member including a pulley
    for said cable, a reel, pulleys disposed adjacent to
    said mast standard and adapted to guide said cable
    onto said reel, an engine on said deck and means
    whereby said engine drives said reel.

50. 9. In a mobile hoisting apparatus, a support-
    ing frame, wheels on said frame, a deck on said
    frame, a hollow mast standard mounted on said
    deck, a hollow sectional mast removably mounted
    on said mast standard, a crown member on the
    top of said mast, a guide rail extending along
    said mast, a carriage shift able along said guide
    rail, a concrete bucket supported on said car-
    rige, a supporting cable for said bucket, said
    crown member including a pulley for said cable,
    said cable extending through said mast and
    through said mast standard, a reel on said deck,
    means to guide said cable onto said reel and
    means to drive said reel.

55. 10. In a mobile hoisting apparatus, a frame,
    a hollow mast standard on said frame, a plurality
    of lengths of mast removably secured on said
    mast standard, each of said mast lengths being
    hollow and the lower portion of each length hav-
    ing a cylindrical portion thereon extending within
    the upper end of the next lower length, the or-
    der length at the joint being silt and a clamping
    collar aligned with the silt portion releasable
    securing means adapted to be tightened to hold
    the parts in assembled relation, and means to
    prevent rotation of one length relative to the
    adjoining length.

60. 11. In a mobile hoisting apparatus, a frame,
    a hollow mast standard on said frame, a plurality
    of lengths of mast removably secured on said
    mast standard, each of said mast lengths being
    hollow and having a notch in the upper edge
    thereof, each of said mast sections at said lower
    end having a tongue fitting the notch in the next
    lower length and having a cylindrical portion
    thereon fitting within the upper end of the next
    lower length, the overlapping portions of the
    lengths being silt and a clamping collar passing
    over the lengths at the joint and adapted to be
    tightened to hold the parts in assembled relation.

65. 12. In a mobile hoisting apparatus, a frame,
    a mast on said frame, a guide rail secured on said
    mast, said guide rail including edge flanges, a
    carriage having rollers thereon engaging said mast standard being located adjacent the middle of the hypotenuse side of said frame and deck, a crown member on the top of said mast, a guide rail extending along said mast, a carriage shift able along said guide rail, a concrete bucket supported on said carriage, a supporting cable for said bucket, said crown member including a pulley for said cable, a reel, pulleys disposed adjacent to said mast standard and adapted to guide said cable onto said reel, an engine on said deck and means whereby said engine drives said reel.
guide rail flanges, a hook pivotally mounted on said carriage, said hook having a projecting end portion, a bucket, said bucket and said carriage having aligned apertures and said hook projecting portion passing through said aligned apertures.

13. In a mobile hoisting apparatus, a frame, a mast on said frame, a guide rail secured on said mast, said guide rail including an intermediate portion and a pair of edge flanges, a carriage having rollers thereon engaging the outside of said guide rail, said carriage having rollers thereon engaging the inner surface of said flanges, a hook pivotally mounted on said carriage, said hook having a projecting end portion, a bucket, said bucket having an aperture therein and said carriage having an aperture, said bucket aperture and said carriage aperture being aligned and said hook projecting end portion passing through said aligned apertures.

14. In a mobile hoisting apparatus, a supporting frame, said frame being triangularly shaped, a plurality of wheels mounted along the rear side of the frame, a shifttable wheel mounted at the front of the frame and adjacent to the intersection of the hypotenuse side of the frame and the other side of the frame, a mast on said frame, a cable supported by said mast and a bucket mounted on said cable, a drum adjacent to said plurality of wheels, a cable passing over said drum and having one end extending to the front of the frame and the other end extending to the rear of the frame, and means to drive said drum.

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