March 27, 1951 T. K. GRAHAM 2,546,362

APPARATUS FOR HANDLING HEAVY SLABS AND OTHER MATERIAL

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FIG. 1

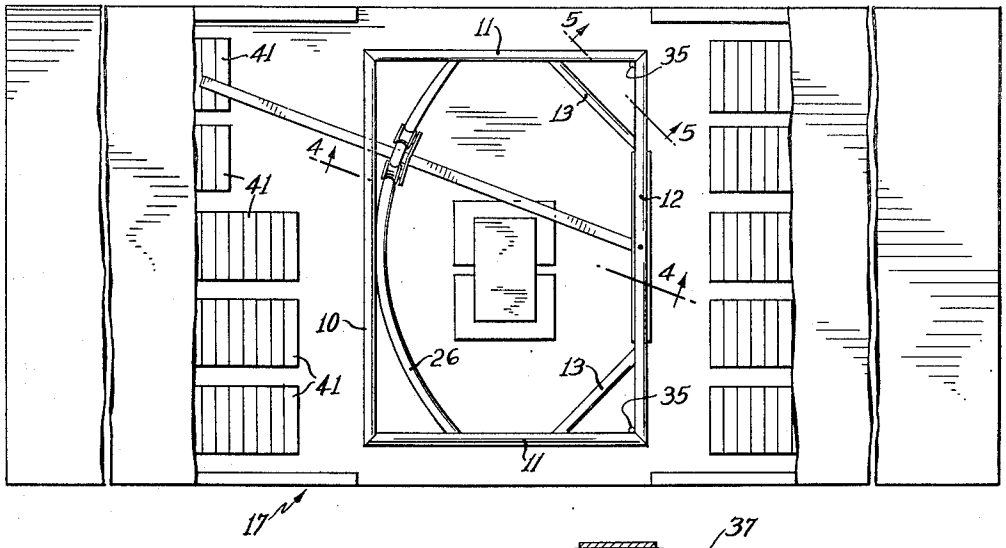
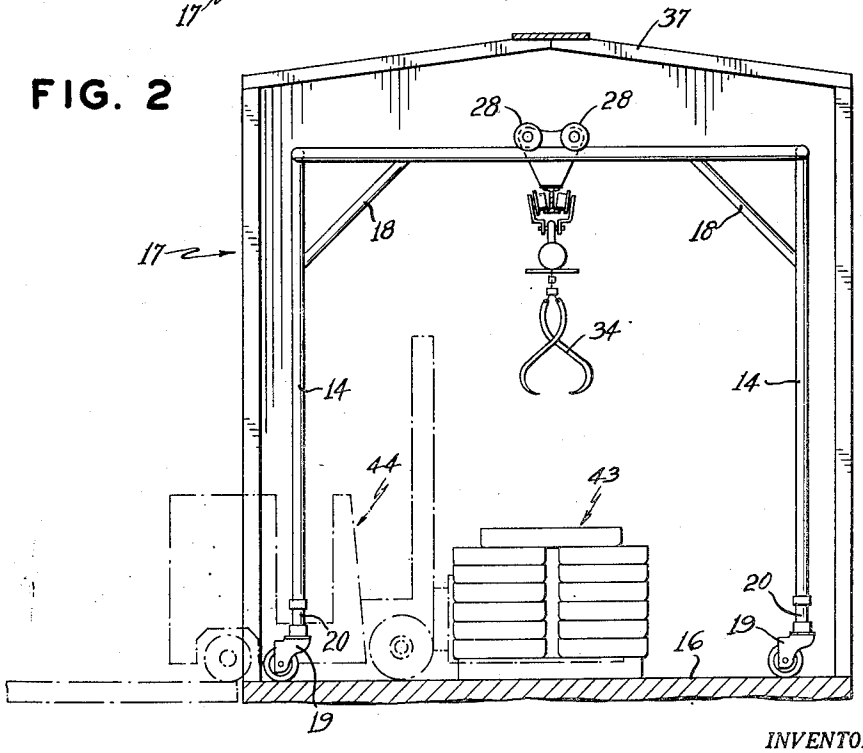


FIG. 2



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FIG. 3

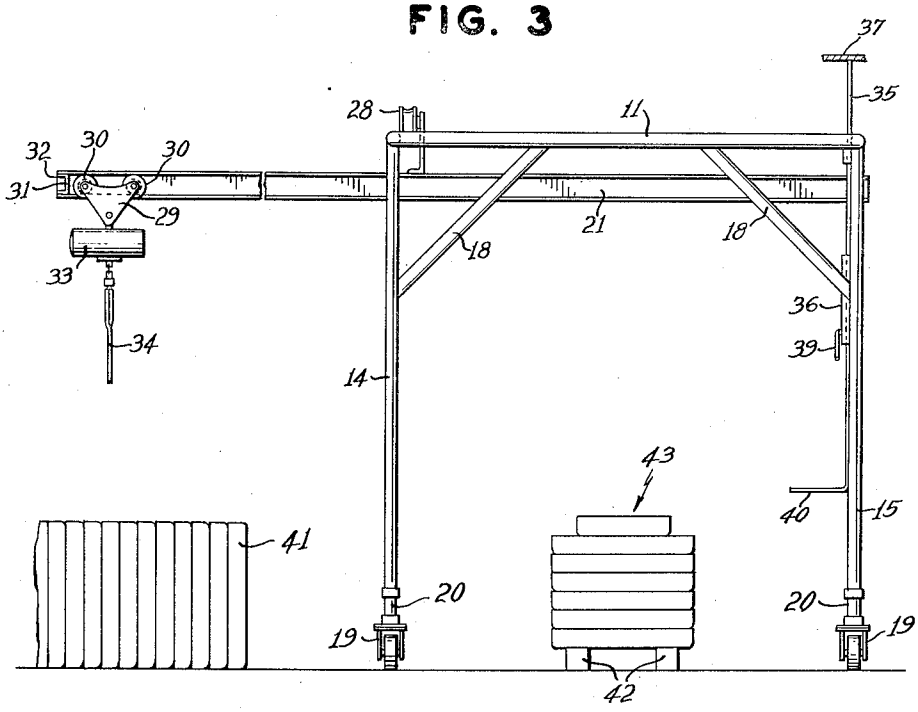


FIG. 5

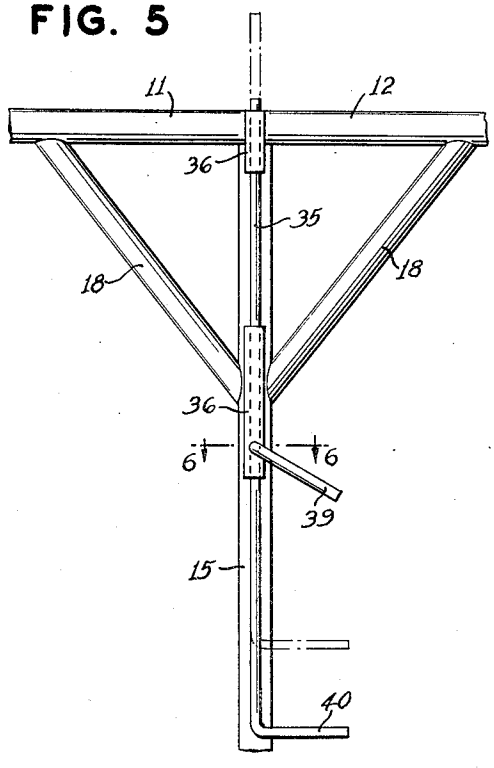


FIG. 4

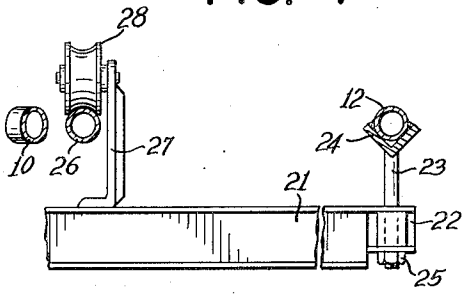
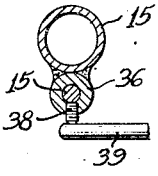


FIG. 6



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APPARATUS FOR HANDLING HEAVY SLABS AND OTHER MATERIAL

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2 Claims. (Cl. 212—17)

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This invention relates to portable apparatus for handling heavy slabs and other heavy material. It is particularly adapted for easing the labor involved in unloading heavy copper slabs or cakes from railway boxcars in which they are shipped, but it is suitable for a variety of other uses as well.

The new apparatus comprises a horizontal frame supported in an elevated position on a plurality of legs that are preferably mounted on wheels to facilitate moving the apparatus into any desired working position. A straight horizontal hoist track (advantageously an I-beam) is pivotally secured at one end to the rear of the frame, and its other end projects beyond the front of the frame. A circularly curved horizontal roller track is fastened to the front of the frame in such position that its center of curvature is on the axis (or on a projection of the axis) of the hoist track pivot. Rollers riding on the roller track and secured to the hoist track are provided for supporting the hoist track while yet permitting it to be moved laterally through an arc about its pivot point. A hoist is carried by rollers engaging the hoist track, whereby the hoist may be moved back and forth along the hoist track. Slab-handling apparatus (or other material-handling apparatus) is suspended from the hoist, and is arranged to be lifted or lowered thereby. The combination of movements of hoist along the hoist track, and of hoist track through an arc about its pivot point, enables bringing the slab-handling apparatus directly over any point underlying the segment of a circle that is traversed by movement of the track hoist about its pivot.

One or more stabilizing rods are mounted for vertical movement in guides at the rear of the frame of the apparatus, and are so arranged that they may be raised above the frame into engagement with the roof of the boxcar or other roofed-over working space within which the apparatus is used. Locking means, such as set screws, are provided for holding the stabilizing rods in such raised position. The stabilizing rods prevent the apparatus from being upset when a heavy slab (or other heavy object) is lifted by the hoist at the projecting end of the I-beam, and thereby enables making the apparatus light in weight so that it is easy to move about.

A preferred embodiment of the new apparatus is shown in the accompanying drawings, in which

Fig. 1 is a plan of the apparatus in position inside a railway boxcar to facilitate unloading cast metal slabs;

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Figs. 2 and 3 are front and side elevations, respectively, of the apparatus shown in Fig. 1;

Fig. 4 is a view showing the pivotal suspension of the I-beam hoist track of the new apparatus, taken substantially as indicated by the line 4—4 of Fig. 1;

Fig. 5 is a view showing the way in which a stabilizing rod is mounted taken substantially as indicated by the line 5—5 of Fig. 1; and

Fig. 6 is a cross section taken substantially along the line 6—6 of Fig. 5.

The apparatus shown in the drawings comprises a horizontal rectangular frame having a front frame member 10, side frame members 11, and a rear frame member 12. These frame members advantageously are lengths of pipe welded together (or joined by pipe fittings) into the rectangular form shown. The frame is braced at its rear corners by diagonal braces 13.

Front legs 14 and rear legs 15 support the frame in an elevated position well above the floor 16 of the boxcar 17 in which it is shown in the drawings. Diagonal leg braces 18 at the sides and rear of the apparatus are provided to strengthen the attachment of the legs to the frame. No leg braces are provided at the front because in such position they would limit the work-area covered by the apparatus. The legs and diagonal braces, like the frame, are advantageously of ordinary steel secured in place by welding or by pipe fittings. The legs are mounted on wheel casters 19 so that the apparatus may easily be rolled into or from the working position where it is to be used. Short removable sections 20 are screw-threaded to the lower ends of the legs 14 just above the casters 19. Removal of these sections reduces the height of the apparatus to permit moving it through low doorways or to permit using it in areas with a roof that is lower than normal.

Suspended just below the horizontal frame of the apparatus is a hoist track in the form of an I-beam 21. This I-beam is provided at its rear end with a pivot bracket 22. A vertical pivot pin 23 passes through a hole provided for it in the bracket. The pivot pin is welded or otherwise firmly attached to an angle iron 24 which in turn is welded or otherwise fastened to the bottom of the rear frame member 12. A nut 25 supports the rear end of the I-beam on the pivot pin.

A horizontal roller track 26 is secured in place at the front of the frame. This roller track (which advantageously is a length of pipe similar to that used for making the frame) is curved to

the shape of an arc of a circle, and is mounted so that its center of curvature lies on the axis (or a projection of the axis) of the pivot pin 23. By welding the roller track to the front and side frame members 10 and 11 it serves effectively to brace the frame.

A trolley bracket 27 is attached to the upper surface of the I-beam 21 at a point underlying the roller track 26. Rollers 28 fastened to the bracket engage with the roller track and suspend the I-beam therefrom. It is evident that this construction permits the I-beam to be swung laterally about its pivot mounting on the pin 23 through an arc from one end to the other of the curved roller track 26.

A hoist crawl 29 is supported by rollers 30 on the I-beam 21, and may be moved from one end to the other thereof. The pivot bracket 22 acts as a stop preventing movement of the crawl 29 beyond the rear end of the I-beam; and a stop 31 may be provided to prevent the crawl from running off the front end 32 of the I-beam (which projects well beyond the front frame member 10). The crawl 29 supports a hoist 33, which may be motivated by compressed air or electricity. Suspended from the hoist is a pair of tongs 34 which heavy slabs may be grasped. The tongs may be raised or lowered by energizing or de-energizing the hoist motor.

A pair of stabilizing rods 35 are provided one at each rear corner of the horizontal frame to prevent the apparatus from upsetting when a heavy slab or other article is lifted. As best shown in Fig. 5, these rods are mounted for sliding up and down in vertical guides 36 which are welded or otherwise attached to the rear legs 15. The stabilizing rods thus may be raised above the frame into engagement with the roof 37 of the boxcar or other rigid overhead structure. Set screws 38 provided with handles 39 for easy manipulation are threaded into one or more of the tubular guides 36 for locking the stabilizing rods in any desired position within the limit of their scope of movement. The lower ends of the stabilizing rods 35 are advantageously bent horizontally to form handles 40 by which the rods may be raised or lowered when the set screws 38 are loosened.

A typical use of the new apparatus for aiding in unloading heavy cast slabs 41 of copper from the boxcar 17 is described below:

The apparatus, with stabilizing rods 35 lowered about to the level of the rear frame member 12, is rolled on its casters 19 from the unloading dock into the interior of the boxcar, and is manipulated into position so that its front frame member 10 faces the rows of slabs 41 to be unloaded. The light construction of the frame enables it to be maneuvered manually without difficulty. When it has been located in the desired position, the stabilizing rods 35 are raised against the roof 37 of the boxcar and the set screws 38 are tightened to lock the rods in this raised position. The I-beam is then swung laterally to a position such that the crawl 29 may be moved therealong into a position directly overlying the first slab to be removed. When this has been done, the tongs 34 are lowered and caused to grasp the slab, after which the slab is raised by the hoist from the floor of the car. The crawl is then pushed back along the I-beam, and the latter is swung laterally, until the slab is brought into position where it may be laid across a pair of wooden blocks 42. After depositing the slab on these blocks, which are advantageously arranged directly beneath the center of the horizontal frame, the operation is repeated to lift the next slab in position for unloading and to deposit it on the blocks; and so on.

When enough slabs have been deposited on the blocks 42 to build a stack 43 of desired size, the stack is removed from the car by a fork-lift truck 44. The legs 14 and 15 are long enough and far enough apart to allow the truck to pass between them and under the frame. Thereafter a new stack is built on the blocks 42 in the same manner as before.

After unloading all of the slabs that can be reached conveniently by the tongs 34 with the apparatus in the position in which it was first located, the set screws 38 are loosened, the stabilizing rods 35 are lowered, and the apparatus is moved into a new position permitting unloading work to proceed on a further group of slabs. In this new position the stabilizing rods are again raised into engagement with the roof of the car, and unloading operations are resumed.

The new apparatus greatly expedites the unloading of heavy slabs from boxcars and like work requiring the handling of heavy articles. The apparatus is simple to construct and its lightness makes it easy to maneuver by hand into any desired working position. Notwithstanding its lightness, the stabilizing rods prevent it from being upset even when a heavy article is lifted by the hoist at the extreme outer end of the I-beam.

The apparatus has been described with particular reference to the handling of heavy copper slabs, but it is equally well suited for handling a wide variety of other heavy articles. It has been described and is shown in the drawings as equipped with tongs for handling slabs, but it is apparent that the tongs may be replaced by a hook, an excavator bucket, or any other type of material-handling apparatus that is best suited to the nature of the material being handled. Mention herein made to slab-handling is therefore to be construed as contemplating the handling of materials in other forms as well.

I claim:

1. Portable apparatus for handling heavy slabs or the like in a roofed-over working space comprising a light-weight horizontal frame supported in an elevated position on a plurality of legs, a horizontal I-beam pivotally secured at one end to the rear of said frame with its other end projecting beyond the front thereof, a circularly curved horizontal roller track secured to the front of the frame with its center of curvature on the axis of the I-beam pivot, rollers secured to the I-beam and riding on the roller track, whereby the I-beam may be moved laterally through an arc about its pivot, a hoist supported on rollers engaging the I-beam and movable therealong, slab-handling apparatus suspended from the hoist for being lifted and lowered thereby, at least one guide secured to the frame at the rear thereof, a stabilizing rod mounted for vertical movement in the guide, whereby said rod may be raised against the roof over the working space, and means supported by said frame for locking the rod in such raised position to prevent upsetting of the frame when a heavy slab is lifted by the hoist at the projecting end of the I-beam.

2. Portable apparatus for handling heavy slabs or the like in boxcars comprising a light-weight rectangular frame, legs at the corners of said frame supporting it in an elevated position, wheels on the legs to facilitate moving the apparatus into working position, a horizontal I-

beam having one end pivotally suspended from the rear of the frame about at the center thereof and having its other end projecting beyond the front of the frame, a circularly curved horizontal roller track secured to the frame with its center of curvature on the axis of the I-beam pivot, a trolley secured to the upper surface of the I-beam and fitted with rollers engaging the roller track, whereby the I-beam is suspended below the roller track and is movable laterally through an arc about its pivot, a hoist supported on rollers engaging the I-beam and movable therealong, slab-handling apparatus suspended from the hoist and arranged to be lifted and lowered thereby, a pair of guides secured to the frame one at each rear corner thereof, a stabilizing rod mounted for vertical movement in each guide, whereby said rods may be raised against the boxcar roof to prevent upsetting of the apparatus when a heavy slab is lifted by the hoist at the projecting end of the I-beam, and set screws supported by said guides and adapted to be tightened against said rods for holding the rods securely in a raised position.

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