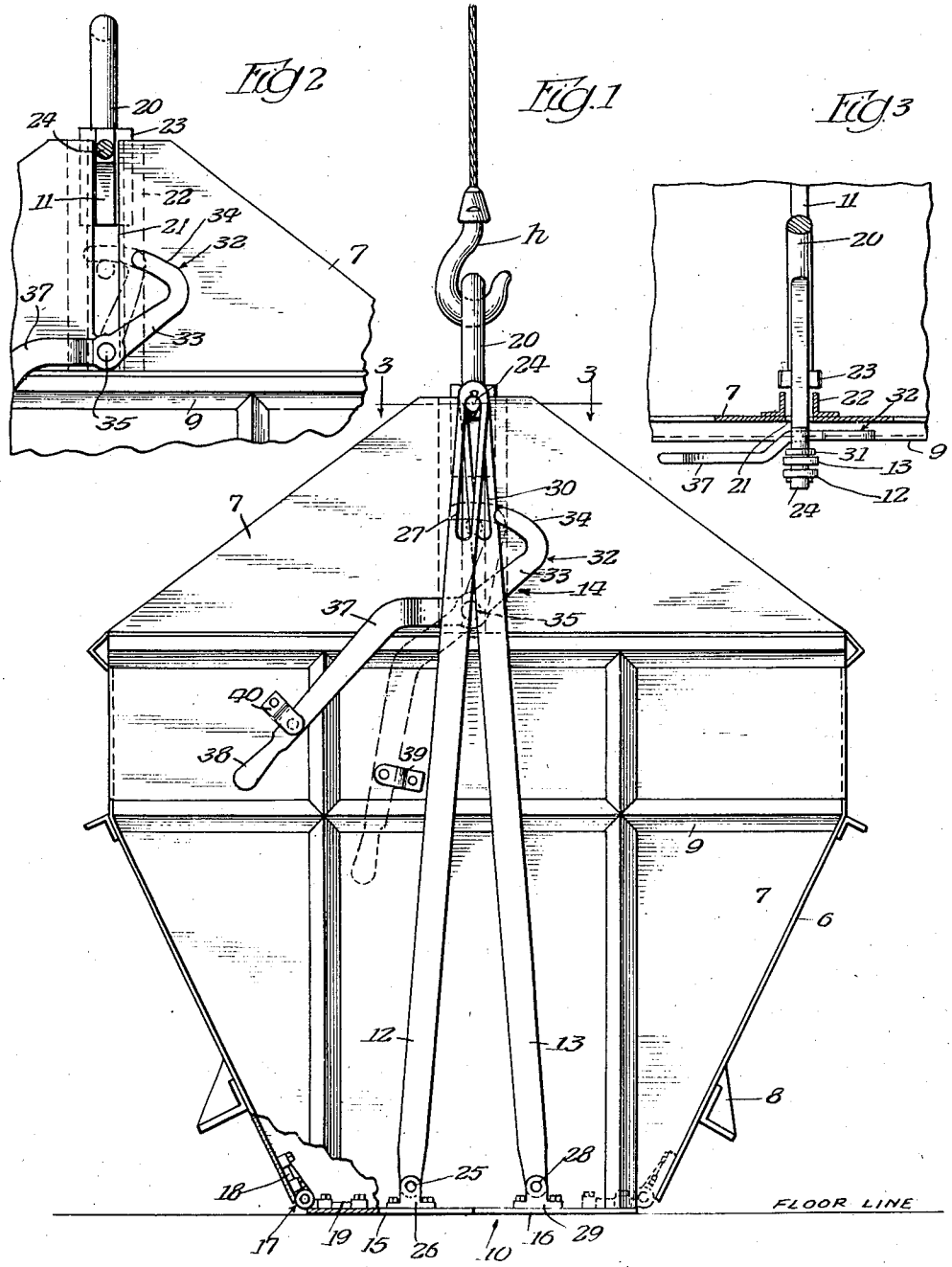
Sept. 4, 1945. J. W. MOORE 2,384,389

PORTABLE HOPPER

Filed May 11, 1944 3 Sheets-Sheet 1



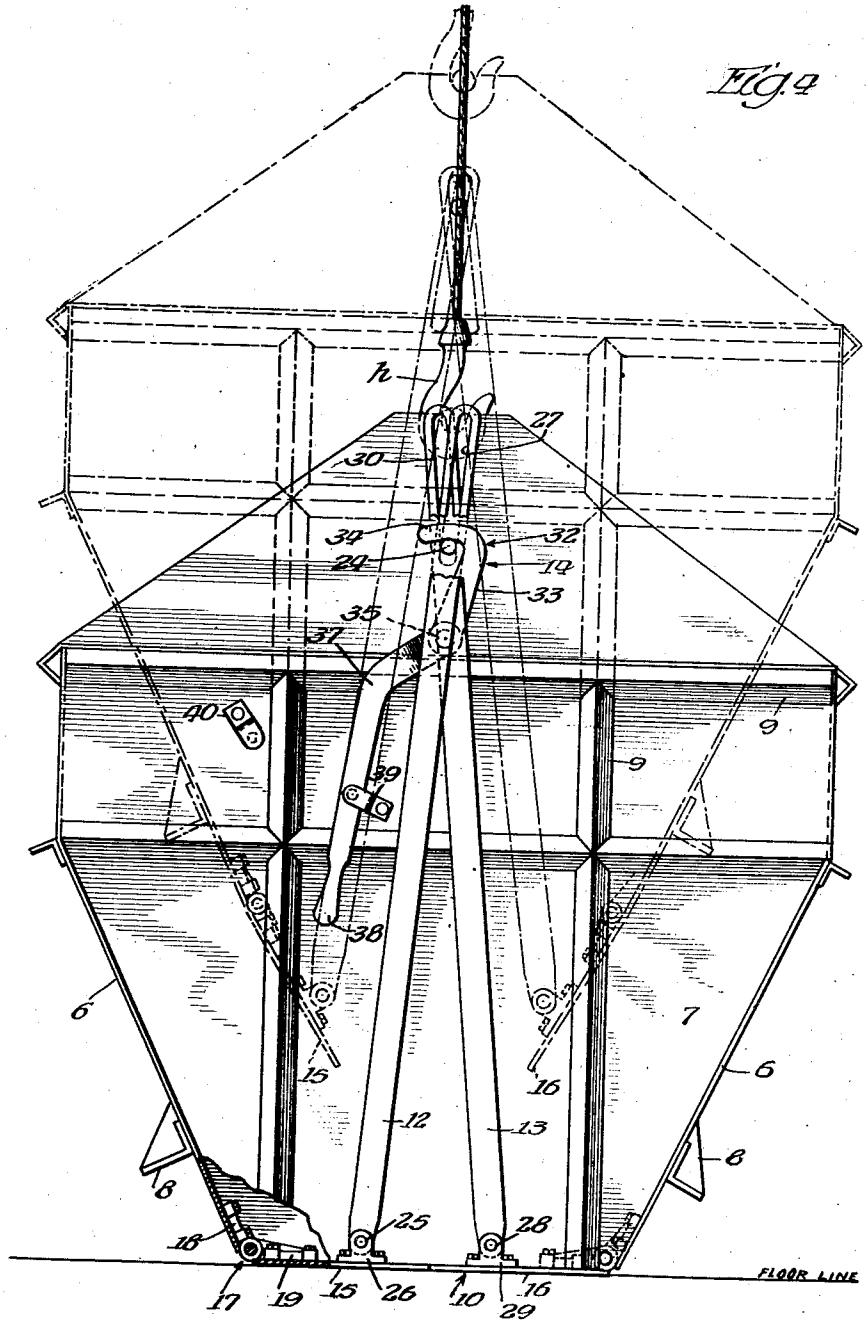
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PORTABLE HOPPER

Filed May 11, 1944 3 Sheets-Sheet 2

Fig. 4



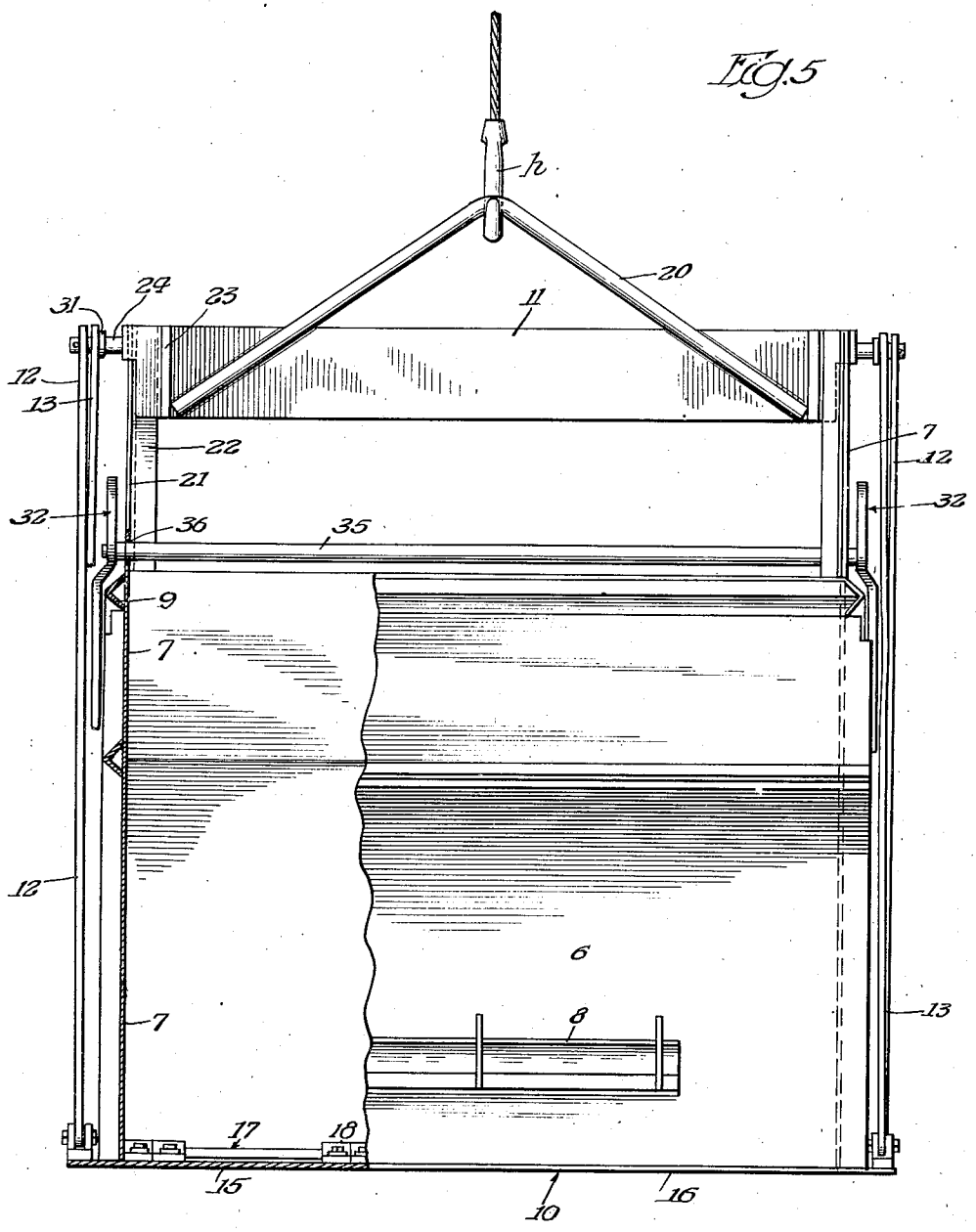
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PORTABLE HOPPER

Filed May 11, 1944 3 Sheets-Sheet 3

Fig. 5



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UNITED STATES PATENT OFFICE

2,384,389

PORTABLE HOPPER

James W. Moore, Norfolk, Va., assignor to The Beardsley & Piper Company, Chicago, Ill., a corporation of Illinois

Application May 11, 1944, Serial No. 535,101

1 Claim. (Cl. 294—71)

The present invention relates generally to portable hoppers. More particularly the invention relates to that type of hopper which is adapted to be moved from place to place by way of an overhead travelling crane, serves as a medium for temporarily retaining sand or other material and as its main or principal component parts comprises (1) a continuous side wall structure; (2) a bottom which is hinged to the lower portion of the structure to swing up and down between closed and open positions; (3) a horizontally extending centrally disposed bar which is mounted at the top of the continuous side wall structure for vertical sliding movement and has an upstanding bail for attachment to the overhead crane; and (4) an operating connection which extends between, and serves to connect, the bar and bottom and operates automatically to swing the bottom upwards into its closed position when the bar is raised in connection with hoisting of the hopper, and also operates when the hopper is brought to rest on an auxiliary supporting structure and the bar slides downwards after release thereof from the hook of the crane to permit the bottom to swing downwards into its open position.

As evidenced by United States patent application, Serial No. 477,317, filed by Frank Briner on February 26, 1943, it has heretofore been proposed in connection with a portable hopper of the type under consideration, to employ upstanding links as the operating connection between the bar and the bottom and to have the upper ends of the links pivotally connected to the ends of the bar and the lower ends of the links pivotally connected to distal portions of the hopper bottom. In practice it has been found that a hopper wherein the operating connection is in the form of links is subject to the objection that the bottom can only be swung downwards when the hopper is brought to rest on the auxiliary supporting structure and hence it is impossible to discharge the sand or other material in the hopper at locations other than the location where the auxiliary supporting structure is disposed.

The primary object of the present invention is to provide a portable hopper which is an improvement upon, and eliminates the defections or objections of, previously designed hoppers such, for example, as that disclosed in the aforementioned patent application, by reason of the fact that it includes simple and novel means whereby it is possible so to control the hopper that the sand or other material therein may be discharged at any place or location without the necessity of utilizing an auxiliary supporting structure. In general such hopper control means is used in conjunction with links having the upper ends thereof connected to the ends of the bar for longitudinal sliding, as well as pivotal, movement and comprises a latch mechanism which when shifted into its operative or latched position serves to lock the bar in its down position. When the bar is locked in its down position by the latch mechanism and is then raised by the overhead crane the hopper moves upwards and the links, because of the sliding connection between their upper ends and the ends of the bar, permit the bottom to swing downwards into its open position.

Another object of the invention is to provide a portable hopper of the type and character under consideration in which the latch mechanism constituting the hopper control means consists of a pair of latches which are located on the upper portions of the end walls of the continuous side wall structure of the hopper and are adapted, when shifted into their latched or operative position while the bar is in its down position, to overlie the ends of the bar.

A further object of the invention is to provide a portable hopper of the last mentioned type and character in which the two latches are connected together for conjoint shift into and out of their latched position with respect to the ends of the bar and have a lever associated with them whereby they may be conjointly shifted back and forth between their latched and unlatched positions.

A still further object of the invention is to provide a portable hopper which is generally of new and improved construction and efficiently and effectively fulfills its intended purpose.

Other objects of the invention and the various advantages and characteristics of the present portable hopper will be apparent from a consideration of the following detailed description.

The invention consists in the several novel features which are hereinafter set forth and are more particularly defined by claim at the conclusion hereof.

In the drawings which accompany and form a part of this specification or disclosure and in which like letters and numerals of reference denote corresponding parts throughout the several views:

Figure 1 is an end view showing a portable hopper embodying the invention with the latches thereof in their open or unlatched position and illustrating the manner in which the vertically

slidable bail equipped bar operates while the latches are in their unlatched position and in response to hoisting thereof by the overhead crane to raise the hopper with the bottom thereof in its closed position;

Figure 2 is a fragmentary end view of the hopper showing in detail the manner in which the latches are mounted on the end walls of the continuous side wall structure of the hopper so that they are shiftable into and out of their operative or latched position wherein they overlie the ends of the bail equipped bar;

Figure 3 is a horizontal section taken on the line 3—3 of Figure 1 and illustrating the manner in which the bail equipped bar is connected to the upper portion of the continuous side wall structure so that it is slidable vertically;

Figure 4 is an end view of the hopper showing the latches in their latched position wherein they serve to lock the bar in its down position and illustrating the manner in which the links release the bottom so that it swings downwards into its open position when the hopper is hoisted or elevated while the latches serve to lock the bar in its down position; and

Figure 5 is a side view of the hopper, parts being broken away and other parts being shown in section for purposes of illustration.

The hopper which is shown in the drawings constitutes the preferred form or embodiment of the invention. It is adapted to be moved from place to place by way of an overhead travelling crane (not shown) having a hoisting hook *h*, and serves as a medium for temporarily holding sand or other material. Although the hopper has many capabilities of use it is designed primarily for use in connection with a mold or flask filling machine like that forming the subject matter of United States Letters Patent No. 1,774,076, dated August 26, 1930. As shown in the drawings the hopper embodies a continuous side wall structure in the form of a pair of sides 6 and a pair of end walls 7. The sides are preferably formed of plate steel and are disposed in opposed and laterally spaced relation. If desired, the lower portions of the sides may be downwardly convergent and provided with outwardly extending lugs 8 so that the hopper may be supported by way of a tapered auxiliary hopper or supporting structure like that shown in the aforementioned application Serial No. 477,317. The end walls 7 of the hopper extend between, and are welded or otherwise fixedly secured to, the end margins of the sides 6. They are formed of plate steel and have angle bars 9 welded to their outer faces for reenforcing purposes. The upper portions of the end walls 7 project above the upper edges or margins of the sides 6 and are triangular in contour or conformation.

In addition to the continuous side wall structure the hopper comprises a bottom 10, a bar 11, a pair of upstanding links 12, a pair of upstanding links 13, and a manually manipulable latch mechanism 14.

The bottom 10 serves as a closure for the portable hopper when it is desired to move a batch of sand or other material from one place to another. It consists of a pair of opposed parallel plate type gates 15 and 16 and these are connected by hinges 17 to the lower margins of the sides 6 so that they are adapted to swing back and forth between a closed or operative position wherein they underlie and extend across the bottom of the portable hopper and an open position wherein they extend downwards and permit the material in the hopper to be discharged. The hinges 17 are preferably disposed within the hopper and consist of hinge parts 18 which are fixed to the inner faces of the bottom margins of the sides 6 and complemental hinge parts 19 which are pivotally connected to the hinge parts 18 and are fixed to the outer side margins of the two plate type gates constituting the hopper bottom 10. As shown in Figure 5 the gates 14 and 15 are of such length that the ends thereof project beyond the end walls 7 of the continuous side wall structure.

The bar 11 is located at the top or upper portion of the continuous side wall structure and is disposed longitudinally and centrally of the latter. It is operatively connected to the gates 15 and 16 by way of the links 12 and 13 and has at the central portion thereof an upstanding bail 20 for attachment to the hook of the overhead travelling crane. The ends of the bar 11 are slidably mounted in vertically extending slots 21 in the upper triangularly shaped portions of the end walls 7 of the continuous side wall structure of the hopper. The slot defining portions of the end walls 7 are reenforced by vertically extending angle bars 22 and these are disposed inwards of the end walls and are arranged as shown in Figure 3. Vertically extending strips 23 are secured to the ends of the bar 11 and coact with the inner edges of the inner legs of the angle bars to prevent longitudinal displacement of the bar relatively to the continuous side wall structure of the hopper. The extremities or ends of the bar 11 project through the slots 21 and outwards of the end walls 7 and are provided with outwardly extending coaxial integral pintles 24.

The links 12 are disposed directly outwards of the end walls 7 and have the lower ends thereof pivotally connected to the inner corners of the plate type gate 15 by way of pivot pins 25. The latter extend through holes in the lower ends of the links 12 and are carried by upstanding lugs 26 on said inner corners of the gate 15. The upper ends of the links 12 are provided with longitudinally extending slots 27 through which the pintles 24 extend, as best shown in Figure 3. The links 13 are in juxtaposition so far as the links 12 are concerned and are disposed outwards of the end walls 7 of the continuous side wall structure of the hopper. The lower ends of the links 13 are pivotally connected to the inner corners of the gate 16 by way of pivot pins 28 which extend through holes or apertures in the lower ends of the links 13 and are carried by upstanding lugs 29 on said inner corners of the gate 16. The upper ends of the links 13 are laterally offset with respect to the upper ends of the links 12 and have longitudinally extending slots 30 through which the pintles 24 extend. Collars 31 on the pintles serve to hold the upper ends of the links against axial displacement with respect to the pintles. The links 12 and 13 serve as an operating connection between the vertically slidable bar 11 and the gates 15 and 16 constituting the hopper bottom. They are of such length that when the bar 11 is raised by the crane hook until the pintles strike against the upper ends of the slots in the links they operate, as shown in Figure 1, to hold the gates 15 and 16 in their closed position. When the hopper is lowered by the crane onto the subjacent floor the slots in the upper ends of the links permit the bar 11 to slide downwards into its down position. When the bar is in its down position and the hopper is raised the links, due to the fact that the upper

ends thereof include the longitudinally extending slots, release the gates so that they swing downwards into their open position, as shown in dotted lines in Figure 4.

The latch mechanism 14 serves releasably to lock the bail equipped bar 11 in its down position and comprises a pair of L-shaped latches 32. The latter are disposed directly outwards of the upper portions of the end walls 7 of the continuous side wall structure of the hopper and are located beneath the bar 11. They are aligned with one another and consist of inner arms 33 and outer arms 34. The inner arms 33 of the latches are rigidly connected to, and extend radially from, the ends of a horizontally extending rock shaft 35. As shown in Figure 5, the rock shaft is disposed beneath, and vertically aligned with, the bar 11 and has its ends journalled in, and projecting through, holes 36 in the upper triangularly shaped portions of the end walls 7. The outer arms 34 of the latches 32 are connected to, and project in one direction from, the outer ends of the inner arms 33 and are adapted when the bar 11 is in its down position and the latches are swung in a counterclockwise direction as viewed in Figures 1, 2 and 4, to move into an operative or latched position wherein they overlie the pintles 24 on the ends of the bar and thus lock the bar in its operative position. When the rock shaft 35 is rocked in a clockwise direction as viewed in Figures 1, 2 and 4, the latches 32 are swung into their inoperative or unlatched position wherein the outer arms 34 are out of engagement with the pintles 24 and the bar is thus free so that it may be raised by the crane hook in connection with hoisting of the hopper. When the latches 32 are in their latched position and the bar is raised by the overhead travelling crane the hopper is hoisted and the gates 15 and 16 constituting the hopper bottom swing downwards into their open position and result in discharge of sand or other material from the hopper. The gates swing downwards as the result of the fact that when the bar is latched in its down position and then hoisted the links 12 and 13, due to the longitudinal slots in the upper ends thereof, slide downwards relatively to the pintles 24. When the latches 32 are in their unlatched position and the bar 11 is raised by the crane the bar moves or slides upwards relatively to the continuous side wall structure of the hopper until the pintles at the ends thereof engage the upper ends of the slots 27 and 30 and then through the medium of the links and the gates results in upward movement of the hopper. As heretofore pointed out, when the bar is raised by the crane while it is in its unlatched position it first slides upwards relatively to the continuous side wall structure of the hopper until, as previously pointed out, the pintles 24 thereof engage the upper ends of the slots 27 and 30 and then effects hoisting of the hopper as a whole, while at the same time maintaining through the medium of the links 12 and 13, the gates 15 and 16 in their closed position. In order to facilitate rocking of the shaft 35 in connection with shift of the latches 32 into and out of their operative or latched position with respect to the pintles 24 a lever 37 is provided. This lever is fivedly connected to, and projects downwards from, one end of the rock shaft and is provided at its outer end with a hand grip 38. The length of the lever is such that the grip is within convenient reach of a person or operative standing next to the adjacent end wall of the hopper. When the lever is swung in a counterclockwise direction as viewed in Figures 1 and 4 the latches 32 are swung into their operative or latched position and when the lever is reversely swung the latches are swung or shifted out of their operative or latched position. A spring clip 39 is mounted on the end wall of the hopper that is adjacent the lever 37 and serves releasably to hold the lever in place after it is swung so as to shift the latches 32 into their latched position. A second spring clip 40 is mounted on said end wall in opposed relation with said clip 39 and serves to hold the lever after it is swung in a clockwise direction in order to shift the latches out of their operative or latched position.

When it is desired to charge the hopper the hook of the overhead travelling crane is hooked onto the bail 20. The crane is then manipulated so as to move the hopper to the source of material with which the hopper is to be charged. As soon as the hopper reaches the source it is lowered onto the subjacent floor or supporting surface. When the hopper is lowered onto the surface the gates 15 and 16 constituting the hopper bottom are in their closed position, as shown in Figure 1. When, after charging the hopper, it is desired to move the load of material to a particular location and there discharge the load the lever 37 is first swung in a clockwise direction as viewed in Figures 1 and 4 so as to shift the latches 32 out of their operative or latched position. After the latches are in their unlatched position the bar 11 is raised by the overhead crane. During the initial portion of upward movement of the bar the pintles 24 are brought into engagement with the upper ends of the slots 27 and 30 and thereafter the hopper as a whole is raised. Raising of the bar while the latches are in their unlatched position results in the gates 15 and 16 being held in their closed position. After raising of the hopper to the desired height it is shifted to the location or place where the load is to be discharged and then lowered onto the subjacent floor. As soon as the hopper is brought to rest on the floor the bar 11 slides downwards into its down position. When the bar is in its down position the lever 37 is swung in a counterclockwise direction so as to shift the latches 32 into their operative or latched position wherein the outer arms 34 thereof overlie the pintles 24 as shown in Figure 4. When, after locking of the bar 11 in its down position by means of the two latches, the crane is manipulated so as to hoist the bar the hopper is immediately raised and the gates 15 and 16 swing downwards into their open position to permit the sand or other material in the hopper to flow out of the continuous side wall structure. Because the hopper includes the latch mechanism 14 and the slotted links 12 and 13 the hopper as a whole may be raised with the bottom thereof either closed or open.

The herein described hopper effectively and efficiently fulfills its intended purpose and is characterized by the fact that it may be raised or hoisted with the gates 15 and 16 constituting the bottom either open or closed. It is simple in design and construction, may be manufactured at a low and reasonable cost and has many capabilities of use.

The invention is not to be understood as restricted to the details set forth since these may be modified within the scope of the appended

claim without departing from the spirit and scope of the invention.

Having thus described the invention what I claim as new and desire to secure by Letters Patent is:

A portable hopper comprising an open top continuous side wall structure, a bottom hinged to the lower portion of the structure to swing upwards and downwards between closed and open positions, a horizontal bar extending across the upper portion of the structure, mounted slidably so that it is shiftable up and down to a limited extent relatively to said structure, and provided with means for attachment to a hoisting apparatus, an operating connection between the bar and the bottom arranged and adapted to swing the bottom upwards into its closed position in response to shift of the bar into its up position and to release the bottom for opening purposes in response to shift of the bar into its down position, and embodying a pair of rigid upstanding links having the lower ends thereof connected pivotally to the distal portions of the bottom and their upper ends connected to the ends of the bar so that they are capable of pivoting, and also sliding longitudinally to a limited extent, relatively thereto, and releasable means for locking the bar in its down position embodying a pair of latches mounted movably on the side wall structure, connected together for conjoint operation, and arranged so that they are adjacent to, and adapted to coact with, the ends of the bar.

JAMES W. MOORE.