Dec. 14, 1943. W. A. PEARL 2,336,748

LADLE TRANSPORTING AND HOISTING DEVICE

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Fig. 1

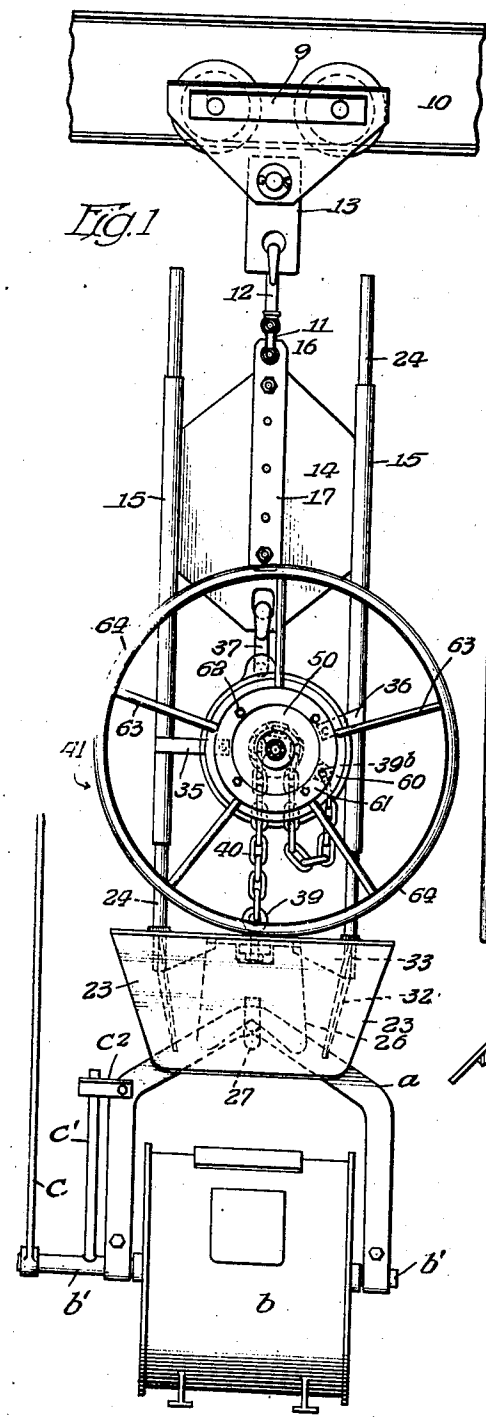


Fig. 2

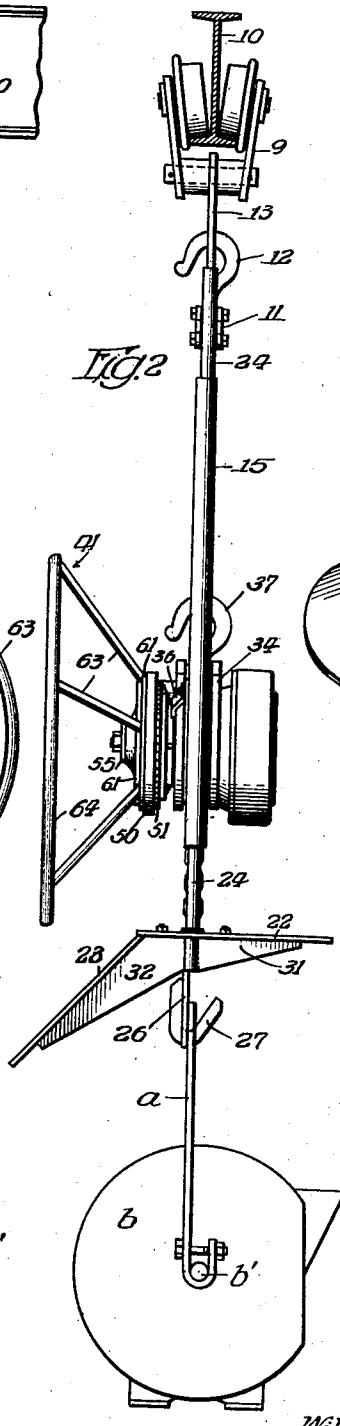


Fig. 4

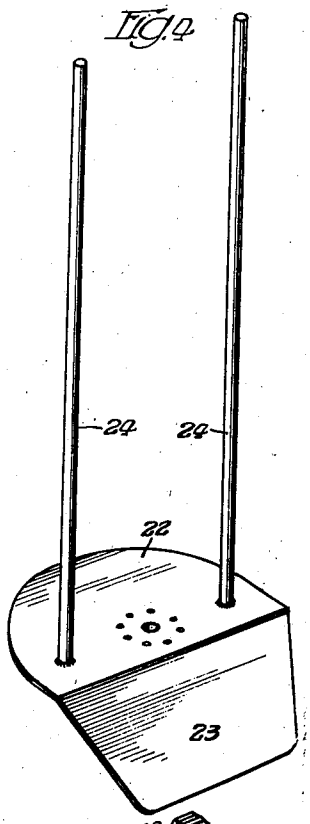
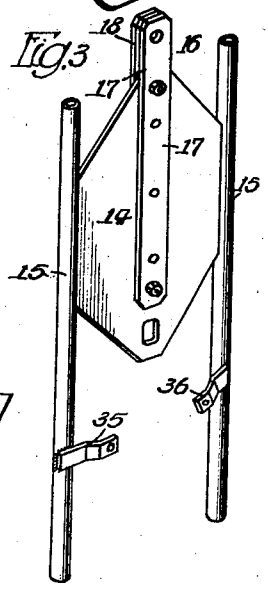


Fig. 3



Inventor:
William A. Pearl
By Fred Gerlach his Atty

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Fig. 6

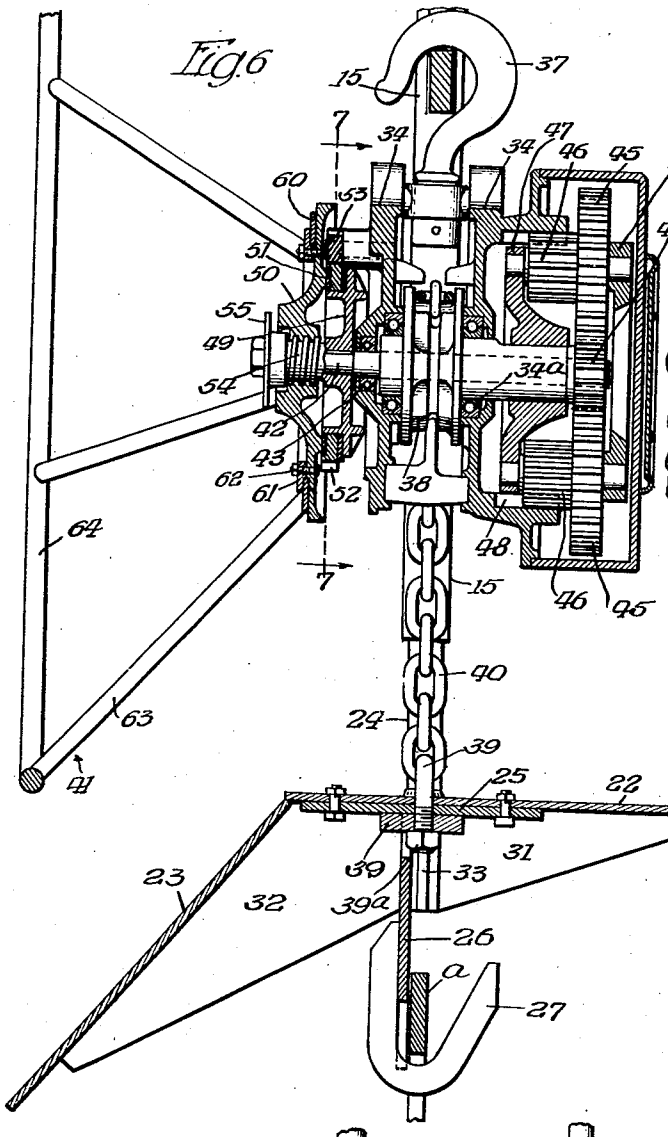


Fig. 7

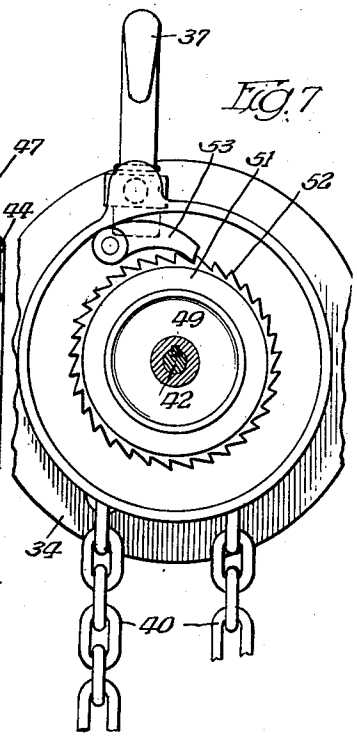
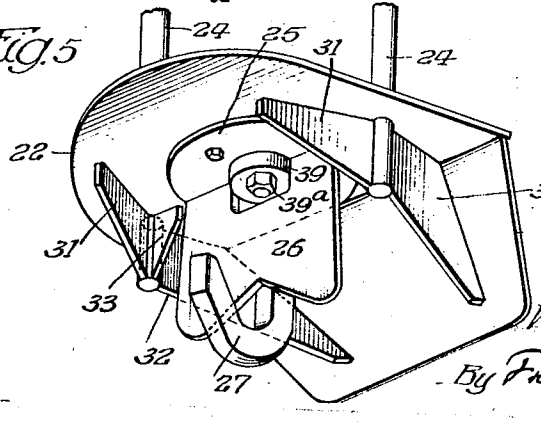


Fig. 5



Inventor.
William A. Pearl
By Fred Gerlach
his Atty

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UNITED STATES PATENT OFFICE

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LADLE TRANSPORTING AND HOISTING DEVICE

William A. Pearl, Chicago, Ill., assignor to Whiting Corporation, Harvey, Ill.

Application June 3, 1942, Serial No. 445,673

6 Claims. (Cl. 212—134)

The invention relates to devices for transporting ladles used in foundries.

The objects of the invention are to provide an improved ladle supporting device: which is rugged in construction for use in foundries and requires minimum maintenance; comprising hoisting mechanism which is manually operable to raise and lower the ladle with minimum force; which is equipped with a shield which protects the operator and the hoisting mechanism from heat from the molten metal in the ladle; which is simple in construction and reliable in operation.

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

In the drawings, Fig. 1 is a front elevation of a device embodying the invention. Fig. 2 is a side elevation. Fig. 3 is a perspective of the supporting frame which is supported by the trolley. Fig. 4 is a perspective of the vertically adjustable support for the ladle. Fig. 5 is a perspective, viewed from the underside, of the base of the vertically adjustable support for the ladle. Fig. 6 is a vertical longitudinal section of the hoisting mechanism and the support which is raised and lowered thereby. Fig. 7 is a section taken on line 7—7 of Fig. 6.

The ladle supporting and transporting device comprises a frame which is suspended from a trolley 9 which travels on a monorail 10; a support for the ladle which is mounted to slide vertically in the frame, for raising and lowering the ladle; and a manually operable hoisting mechanism mounted on the frame and connected by a chain to raise and lower the ladle and its support. The rail and trolley support the frame for transportation of the ladle and the hoisting mechanism.

This supporting frame comprises a heavy plate 14 and a pair of vertically extending tubes 15 which are welded to the side edges of the plate to form a rigid support. The frame is provided with a hanger bar 16 which is composed of a pair of flat strips 17 and a spacing strip 18 welded between strips 17 for reenforcing the upper end of said bar. The upper end of the hanger bar 16 is connected by a link 11 and a swivel hook 12 to a hanger 13 on trolley 9.

The vertically adjustable support for the ladle comprises a horizontally extending plate-member 22 and an angularly extending plate-member 23 which are welded together, and a pair of upstanding rods 24 which are welded to plate-member 22 and are adapted to slide vertically in the tubes 15. Plate-members 22 and 23 form a rigid base for and between the rods 24. The lower ends of rods 24 extend through and project below the plate-member 22. The plate-members 22, 23 and the lower end of each rod 24 are reenforced by a plate 31 which is welded to member 22 and to the rod, a plate 32 which is welded to members 22 and 23 and to the rod, and a plate member 33 which is welded to plate-member 22 and to the rod. This exemplifies a base for the upstanding guide rods which is formed of plates and is adapted for supporting heavy loads.

A bracket comprises a disk 25 fixedly secured to plate-member 22 and a downwardly extending plate 26 welded to the under side of said member. A hook 27 is welded to plate 26 and is adapted to removably support a bail or yoke a in which ladle b is pivotally and removably supported by pintles b^1. A lever c is secured to one of the pintles b^1 for tilting the ladle to pour the metal therefrom. A stop c^1 on said pintle engages a stop c^2 on bail a to hold the ladle in its metal retaining position. The bail a and ladle c are vertically movable with the base 22, 23 for lowering the ladle to the foundry floor and raising it for pouring and transportation.

The plate-members 22 and 23, which form the base of the vertically adjustable support, are shaped to function as a heat shield for protecting the operator and the hoisting mechanism from the heat of the ladle and the metal therein.

The hoisting mechanism comprises a casing 34, which is disposed between tubes 15, is formed of suitable sections rigidly connected together and supports all of the operating parts of said mechanism. A hook 37 which extends through a hole in the lower end of frame plate 14, is connected to and supports the casing 34. Strips 35 and 36, the outer edges of which are welded to the tubes 15, are secured by bolts to the casing 34 to prevent horizontal turning of the casing relatively to the supporting frame. The hoisting mechanism also comprises a pulley 38 which is journaled in bearings 34^a in the casing 34 and is disposed between the sections thereof, and a chain 40, the lower end of which is secured to an eye bolt 39 which extends through member 22, and disk 25 and is provided with a nut 39^a. The chain is looped around the upper portion of and interfits with the pulley so that its vertical reach can be raised and lowered by rotation of the pulley. From the pulley 38, the chain extends in a loose loop, the end of which is secured at 39^b to the casing 34.

The hoisting mechanism also comprises a large hand-wheel 41, planetary speed-reducing gearing, and automatic braking means for locking

the pulley 38 against rotation by the weight of the load on chain 40. A shaft 42 is journaled in a bearing 43 in the casing 34 and extends through the hub of chain-pulley 38. The planetary speed-reducing gearing comprises a pinion 44 fixed to the inner end of shaft 42; planetary gears 45, and pinions 46 which are journaled in rotatable rings 47, and an internal gear 48 on one of the sections of casing 34, and engaged by pinions 46. This gearing provides a high ratio of speed reduction between the hand-wheel 41 and the chain-pulley 38. A brake and clutch wheel 49 is keyed to the shaft 42 and is rotatable therewith. The hand-wheel 41 is fixed to rotate a clutch-hub or member 50. A clutch-ring 51 is rotatably mounted on the wheel 49 and is adapted to be gripped axially between said wheel and member 50. Ring 51 is provided with ratchet teeth 52 which are constantly engaged by a dog 53 to lock the ratchet against rotation in the direction in which the load tends to rotate the clutch wheel 49.

The hub of clutch-wheel 49 is provided with a screw-thread 54 which interfits with a corresponding thread in clutch member 50, for shifting said member axially into and out of engaging relation with ring 51. When clutch member 50 is in the position illustrated in Fig. 6, the weight of the load on chain 40 will tend to rotate screw 54 and force the member 50 inwardly so that the ring 51, which is locked by dog 53 against rotation in one direction, so as to cause said ring to be gripped by the wheel 38 and the clutch member 50, thus locking the wheel 50, the planetary gearing and pulley 38 against rotation by the load on the chain 40. When the ladle is to be raised, the operator will rotate hand-wheel 41 in the direction in which ring 51 is permitted to rotate by dog 53 and ratchet 52. Clutch member 50, ring 51, clutch member 49, shaft 42 and the planetary gearing will then be operated to rotate chain-pulley 38 so it will raise chain 40 and lift the ladle. The dog 53 will lock the ratchet 52 to lock the same elements to hold the ladle in its raised position. A stop collar 55 for clutch member 50 is fixed to the outer end of shaft 42 and limits the outward axial rotation of said member and its rotation relatively to the screw 54. When the ladle is to be lowered the hand-wheel 41 will be rotated around screw 54 on wheel 49 in the opposite direction for which it is rotated for raising the ladle, which will cause clutch member 50 to move away from ring 51 and the latter to move out of gripping relation with the clutch-wheel 49 so that the latter will be free to be rotated by the weight on chain 40. When the member 50 engages stop collar 55, it will be rotatable with screw 54 and clutch-wheel 49 so that the operator, by retarding the rotation of the hand-wheel 41 by the load on the chain, or rotating, the hand wheel 41 can control the lowering movement of the ladle.

The hand-wheel 41 comprises a central ring or hub 60 which is clamped to clutch-member 50 by a ring 61 and bolts 62. The hand-wheel also comprises spokes 63 which have their inner ends welded to ring 60 and extend obliquely outward and away from the member 50. The outer ends of the spokes are welded to the rim of the hand wheel. A relatively large-hand wheel and the planetary speed-reducing gearing make it possible to operate the hoisting mechanism for raising the ladle and to control its lowering, with the minimum manual effort. The rim 64 of the hand-wheel is disposed laterally away from the hoisting device to shield it against the heat from the ladle and the metal therein. By extending the spokes 63 laterally the rim of the hand-wheel will be disposed where it can be comfortably gripped by the operator and easily manipulated to operate and control the raising and lowering of the ladle.

The operation will be as follows: When the ladle *b* is raised off the floor it will be supported by the bail *a*, which is suspended from hook 27 on the base of the vertically adjustable support. This support will be suspended by chain 40 from the pulley 38 and its vertical movement will be guided by the sliding of the rods 24 in the tubes 15 of the supporting frame. Ring 51 will be locked by dog 53 and ratchet teeth 52 against rotation in the direction in which the load tends to rotate the clutch-wheel 49. The ring 51 will be gripped between clutch member 50 on the hand-wheel and clutch wheel 49 on shaft 42 so that the ladle will be supported against downward movement. When the ladle is to be lowered, the operator will rotate hand-wheel 41 and member 50 around screw-thread 54 until it engages the stop collar 55. Continued movement of the hand-wheel in the same direction will then operate shaft 42, the planetary gearing and the pulley 38 to pay out chain 40 and lower the ladle. When the ladle has been lowered, as desired, the hand-wheel 41 can be reversely rotated to again couple clutch-wheel 49 and ring 51 to lock the chain against further lowering of the ladle. When the ladle is to be raised, the operator will rotate hand-wheel 41 while the ring 51 couples member 50 to wheel 49 for movement in the direction permitted by ratchet wheel 52. Wheel 49 will rotate shaft 42 and pinion 44 to drive the planetary gearing and chain-pulley 38 to raise the chain 40 and correspondingly raise the ladle. While the ladle is raised off the floor by the supporting frame the ladle can be transported by the trolley 9 along the monorail 10 for loading and to the molds for pouring.

The invention exemplifies an improved portable device for raising and lowering a pouring ladle in which the supporting frame and the adjustable support for the ladle comprise plates and telescopic rods and tubes which are adapted for heavy loads and are simple in construction. The invention also exemplifies hoisting mechanism comprising a hand-wheel and high-ratio speed-reducing gearing whereby the ladle may be raised and lowered with minimum manual effort. The invention still further exemplifies a device of this type in which the base of the vertically adjustable support is formed of plates which function to protect the hoisting mechanism, hand-wheel and operator from the heat of the metal in the ladle. In its entirety the device is simple in construction, can be produced at a low cost, and requires minimum maintenance.

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 claims 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:

1. In a device for adjustably supporting a pouring ladle, the combination of a portable supporting frame comprising a pair of tubes, and a plate extending vertically between, and having its side margins rigidly secured to the tubes, means cen-

trally disposed between the tubes for detachably connecting the upper end of the plate to a suspension device, a ladle support comprising a base-member and a pair of upstanding rods rigidly secured to the base-member, and slidable vertically in the tubes, manually operable hoisting mechanism for said support, centrally disposed between the tubes and connected to shift the base member and a suspension connection between the central portion of the lower end of the plate and the hoisting mechanism.

2. In a device for adjustably supporting a pouring ladle, the combination of a portable supporting frame comprising a pair of tubes, a plate between and having its side-margins rigidly secured to the tubes, vertically extending reinforcing bars centrally secured to the upper plate and provided at their upper ends with means for connection to the suspension device, a ladle support comprising a base-plate and a pair of upstanding rods rigidly secured in the base-plate and slidable vertically in the tubes, and manually operable hoisting mechanism extending between the tubes, comprising a casing suspended from the central portion of the lower end of the plate, and a pulley and a chain disposed between the tubes and connected to the base plate.

3. In a device for adjustably supporting a pour-ladle, the combination of a portable supporting frame comprising a pair of tubes, and a plate between, and having its side-margins rigidly secured to the tubes, a ladle support comprising a base-plate and a pair of upstanding rods rigidly secured to the base-plate and slidable vertically in the tubes, the rods extending through the base-plate, reenforcing plates permanently joined to the lower ends of the rods and the under side of the base-plate, and manually operable hoisting mechanism for said support disposed centrally between the tubes and supported by the frame.

4. In a device for adjustably supporting a pouring ladle, the combination of a portable supporting frame comprising a pair of tubes, and a plate extending between and having its side margins rigidly secured to the tubes, a ladle support comprising a base and a pair of upstanding rods rigidly secured to the base and slidable vertically in the tubes, and hoisting mechanism mounted on the frame, comprising a pulley, a flexible element connected to the base plate and a manually operable hand-wheel, the base comprising a plate-structure extended to form a heat-shield beneath the hand-wheel.

5. In a device for supporting a pouring ladle, the combination with a portable supporting frame comprising a pair of vertical tubular members, and a ladle support provided with a base and a pair of rods vertically slidable in said tubular members, of hoisting mechanism supported by the frame over the base and comprising a casing between said rods, a pulley in the casing, a chain disposed between the tubes and rods connected to the base and operable by said pulley, and a hand-wheel for rotating the pulley to operate the pulley and chain for raising and lowering the ladle support, the hand-wheel on the hub extending axially away from the hub, and a rim on the spokes spaced laterally from the casing.

6. In a device for supporting a pouring ladle, the combination with a portable supporting frame comprising a pair of vertical tubular members, and a ladle support provided with a base and a pair of rods vertically slidable in said tubular members, of hoisting mechanism supported by the frame over the base and comprising a casing disposed between said tubular members and rods, a pulley in the casing, a chain connected to the base and operable by said pulley, speed-reducing gearing in the casing, a shaft for operating said gearing, and a hand-wheel for rotating the shaft, the hand-wheel having a hub having a limited rotation on the shaft, and spokes between the rim and the hub extending axially away and outwardly from the hub, and a rim on the outer ends of the spokes.

WILLIAM A. PEARL.