This invention relates to elevators such as commonly used for raising and lowering gas and oil well casing, and to the latching devices for such elevators.

Present day casing elevators usually have two body sections, connected together on one side by a hinge pin connection and have a latch mechanism on the opposite side. Opening of the elevator when in closed position and latched, entails two operations; first, unlatching the body sections and second, swinging the unlatched sections to open position by means of operating handles which project from the body sections.

One object of this invention is to produce a casing elevator which can be easily manipulated both in unlatching as well as in latching.

Another object is to produce a casing elevator of simple construction and unusual strength.

A further object is to produce a casing elevator in which the latch is automatically held in engaged position by the direct weight of the tube sections comprising the casing, when said sections are held or supported by the elevator.

A still further object is to produce a casing elevator in which its latch is operated as part of the act of opening and closing the elevator.

A still further and more limited object is to produce a latching device for casing elevators which may be economically constructed of materials having greater strength than is required for the elevator body parts, and which may be quickly removed, renewed and firmly secured in position.

These, as well as other objects which will be apparent to those skilled in this particular art, I attain by means of the device described in the specification and illustrated in the drawings accompanying and forming part of this application.

In the drawings:

Figure 1 is a top plan view of a casing elevator embodying this invention;

Fig. 2 is a perspective view of the elevator of Fig. 1. This view indicates by dotted lines the supporting links. In this view, the outer ends of the operating handles are broken away;

Fig. 3 is a view of the elevator of Figs. 1 and 2 and is partially in section and partially in elevation. This view shows the latching device in latched position;

Fig. 4 is a detail sectional view taken on line IV—IV of Fig. 1;

Fig. 5 is a perspective view of the movable latch member and part of its operating mechanism;

Fig. 6 is a perspective view of a portion of the movable latch member and its housing parts;

Fig. 7 is a fragmentary view partially in plan and partially in section of details of the device; and

Fig. 8 is a fragmentary view, partially in section and partially in elevation of a portion of the structure disclosed in Fig. 4.

The body of the elevator of this invention is formed in two generally semi-circular sections 10 and 11 which are connected together on one side by a hinge connection employing a hinge pin 12, and about which these sections may be swung to open and closed positions.

Each body section is provided with an upper support arm 13 and a lower arm 14 and the elevator is adapted to be suspended within the derrick by holding mechanism and equipment including suitable links, such as links 15, which encircle the support arms, and which are prevented, by bolts 16, from being dislodged therefrom.

The body of the elevator, at its side opposite the hinge pin connection, is provided with a latching mechanism comprising a stationary jaw member 17 carried by body section 11, and a jaw member 18 which cooperates with the stationary jaw member and which is carried by body section 10 and is slidable with relation thereto in a path paralleling the longitudinal axis of the hinge pin.

Body section 11 is provided with a rigid operating handle 19 by which it may be swung about the hinge pin, while body section 10 is provided with an operating handle 20 which is mounted for swinging movement with relation to section 10 about a support pin 21 which also parallels said hinge pin. Support pin 21 passes through circular aligned holes formed for its reception in guard members 22 and 23 which are formed as unitary parts of body member 10.

A pivoted actuating lever 24 is interposed between a roller 25 carried on an extension 26 of said swinging handle and slidable jaw member 18, and serves as a lifter for said jaw member.

In the elevator of this invention, the unlatching and the swinging of the body sections from closed to open position, entails but a single operation so far as the operator of the elevator is concerned. He merely grasps the operating handles and swings the same apart. This carries the swinging handle to the limit of its movement with relation to body section 10, and thus raises latch member 16 to the limit of its upward travel out of latching engagement with
fixed or stationary latch member 11, allowing body sections 16 and 11 to be swung apart about hinge pin 12, by a continuation of the same movement.

Body section 11 on its side opposite the hinge connection, and extending from its top to its bottom, is provided with spaced members 27 and 28, and the space therebetween forms a slot which receives the hinge pin. At its inner end, this slot is enlarged to receive what may be termed the body of the fixed or stationary latch member or keeper 17, which is thus dovetailed to section 11 of the elevator body.

Stationary latch member or keeper 11 is provided with two jaws or hook-like portions 29 and 30 which are narrower than its body portion and which extend outwardly through the slot formed by spaced members 27 and 28. This latch member is secured in place within its slot, or prevented from sliding lengthwise thereof, by a tapped bolt 31. Such a securing means permits ready removal and renewal of the latch member.

Body section 10 on its side opposite the hinge connection is also provided with spaced members which in this case are numbered 32 and 33, and which between them form a slot for the sliding latch member 18. This member is also enlarged to receive what may be termed the body of the sliding latch member which is thus dovetailed to body section 10, but with a sliding fit. The sliding latch member is also provided with two jaws or hook-like portions 34 and 35, arranged in the reverse manner from the jaws of the stationary latch member so as to cooperate with said stationary jaws in holding the body sections in closed position. The jaws of the sliding latch member are also narrower than the body of said member and project outwardly beyond the forward edges of spaced portions 32 and 33.

The jaws of both the stationary and slidable latch members have one face thereof inclined adjacent their outer ends as shown in the drawings to facilitate their entrance into and withdrawal from the latch member slot of the opposing body member during closing and opening of the elevator.

The inner faces 36 and 37 of the jaws of the stationary latch member are slightly inclined to the vertical as are also the inner faces 38 and 39 of the jaws of the sliding latch member, in order that the latch member will properly engage when the elevator is in locked position. These inclined faces of both latching members are bisected by the matching line 40 of the body sections of the elevator.

Faces 41 and 42 of the sliding latch member as well as faces 43 and 44 of the stationary latch member are inclined as shown so that the sliding latch member will be automatically raised as the body sections are swung together.

The slidable latch member is provided with a portion 45 which not only projects laterally beyond the adjacent face of its jaw 34, but which also projects above the top face of said member. Portion 45 has two functions, its lower face contacts with the top 46 of member 32 which is foreshortened to provide a stop shoulder. The upper face 47 of portion 45 rests on top face 48 of member 32, said upper face will be flush with upper surfaces 49 and 51 of the elevator body sections. Portion 45 thus constitutes a contact member by means of which the sliding latch member is not only forced down in its slot to locking position, but is held in such position. This occurs when the elevator is closed around a tube section and is raised into contact with the coupling of said adjacent tube section 9 on the upper end of said section.

The body of sliding latch member 18, on the side opposite jaws 34 and 35, is provided with a projection 50 which has its outer face curved as shown in Fig. 5 to loosely fit within slot 31 having a curved surface. This curved slot is immediately behind the enlarged part of the sliding latch member. This curved bottom slot extends up from the bottom of body member 9 to a point 52 and a helical compression spring 53 located within the slot is confined between projection 50 of latch member 18 and the top of the slot 51.

From this construction, it will be apparent that this spring yieldingly holds the sliding latch member 18 in its bottom or locking position where the lower face of projecting portion 45 thereof contacts with the shoulder formed by the top of theforeshortened front portion of member 32.

Projection 50 of sliding latch member 18 is formed separately from said member and is secured thereto in any desired manner such as by a suitable screw 50c. By removing portion 50 sliding latch member 18 at its 53, and has been placed within its slot, may be slid into its slot from the top of member 10. Replacement of projection 50 locks sliding latch member 18 within its slot.

Swinging handle 20 is provided with a tubular hub portion 54 which, extending above and below the handle proper as shown in Figs. 2 and 4, surrounds pin 21, with which it has a turning fit, and bridges the space between guard members 22 and 23. Pin 21 is provided with an enlarged head 55, and, extending below guard member 22, is provided with a cotter pin hole 56 and cotter pin which secures the same in place. Stub shaft 26 carrying roller 25 projects outwardly from one side of the tubular hub portion 54 of operating handle 20 and is formed as a unitary part of such tubular portion.

Actuating lever 24, which is of the bell crank type, is mounted on a pivot pin 57 which projects through and is secured within openings formed for its reception in spaced support portions 58 and 59 formed as unitary parts of body section 10; the space between said portions being sufficient to accommodate the body portion of actuating lever 24.

Lever 24 has a face 60 of one of its arms formed as a cam face, while its other arm, at its outer end, is provided with a contact portion 61 which is of greater width than the body portion of actuating lever, to provide an end extension 62, see Fig. 7.

Contact portion 61 extends into a slot formed in one side of the body portion of sliding latch member 18 (see Fig. 5). This slot provides a shoulder 63 in line with said contact portion 61.

Member 32, which with member 32 forms the slot for the sliding latch member, as well as a portion of body section 10, is cut away, as shown in Fig. 2, in order to provide an opening for accommodating actuating lever 24.

From the above it will be apparent that the first effect of an upward or depressing pressure exerted on operating handles 19 and 20 will swing handle 20 around its mounting pin 21, causing roller 25, which contacts with cam face 60 of actuating lever 24, to swing said lever around its pivot pin 57 thereby extending its contact extension 61. The raising of this contact member lifts the sliding latch member until its jaws or hook-like
portions are disengaged from the jaws or hook-like portions of the stationary latch member.

At this point, contact member 51 of actuating lever 24 comes in contact with shoulder 54 of body section 44 and further relative movement of operating handle 20 with relation to body section 10 is stopped. Continued outward or separating pressure exerted on operating handles 19 and 20 swings the elevator sections to open position.

It will be apparent that before any separating or outward pressure which is exerted on operating handles 19 and 20 can be effective (in first unlatching the segments and then swinging them to open position) the elevator must be relieved of the weight of any casing sections. This can be accomplished by lowering the elevator to a point slightly below the coupling member of the casing by means of which the casing was supported. This of course cannot be done until the casing is gripped by the supporting device.

It will be noted that the latch members of this elevator are of exceptionally rugged construction and are so designed that they can be made of a suitable grade of steel that can be heat treated independently of the elevator body sections, that said members can be readily secured in place within the slots formed for their reception in said body sections.

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

1. In a well casing elevator having a body which is divided into two sections joined together by a hinge pin about which they are adapted to be swung to open and closed position, a fixed operating handle for one body section, a swinging operating handle for the other body section, cooperating latch members carried by said body sections, located on the opposite side of the elevator body from said hinge pin and comprising a stationary jaw member carried by the body section having the fixed handle and a jaw member carried by the body section having the swinging handle and which is slidable with relation to said section in a path paralleling the longitudinal axis of the hinge pin, and means between said swinging handle and said slidable jaw member for sliding said jaw member as said handle is swung to unlatching position.

2. In a well casing elevator having a body which is divided into two sections joined together by a hinge pin about which they are adapted to be swung to open and closed position, a fixed operating handle for one body section, an operating handle for the other body section and which is mounted to swing with relation thereto, cooperating latch members carried by said body sections, located on the opposite side of the elevator body from said hinge pin and comprising a stationary jaw member carried by and fixed with relation to the body section having the fixed handle and a jaw member carried by the body section having the swinging handle and which is slidable with relation to said section in a path paralleling the longitudinal axis of the hinge pin, and means between the slidable latch member and said swinging handle for moving the slidable latch member to unlatching position.

3. In a well elevator, a body divided into two sections adapted to be swung to open and closed position about a hinge pin, a fixed operating handle for one body section, an operating handle for the other body section and which is mounted thereon to swing with relation thereto, a latch device located on the opposite side of the eleva-
about which they are adapted to be swung to open and closed position, an operating handle for one body section and which is fixed with relation thereto, an operating handle for the other body section and which is mounted to swing thereon about an axis paralleling the axis of said hinge pin, cooperating latch members carried by said body sections, located on the opposite side of the elevator body from said hinge pin and comprising a stationary jaw member carried by and fixed with relation to the body section having the fixed handle, and a jaw member carried by the body section having the swinging handle and which is slidable with relation to said section in a path paralleling the longitudinal axis of the hinge pin, and a pivoted bell crank lever having one arm bearing on a projecting part of the slidable latch member and the other arm located in the path of travel of a roller carried by a projecting part of said swinging handle.

8. In a well elevator, a body which is divided into two sections joined together by a hinge pin about which they are adapted to be swung to open and closed position, an operating handle for one body section and which is fixed with relation thereto, an operating handle for the other body section and which is mounted to swing thereon about an axis paralleling the axis of said hinge pin, cooperating latch members carried by said body sections, located on the opposite side of the elevator body from said hinge pin and comprising a stationary jaw member carried by and fixed with relation to the body section having the fixed handle, and a jaw member carried by the body section having the swinging handle and which is slidable with relation to said section in a path paralleling the longitudinal axis of the hinge pin, a pivoted bell crank lever having one arm bearing on a projecting part of the slidable latch member and the other arm located in the path of travel of a roller carried by a projecting part of said swinging handle, and means for yieldingly resisting movement of the slidable latch member.

9. In an elevator for collar type tubing, drill pipe and casing, a body divided into two portions adapted to be swung to open and closed position about a hinge pin, an operating handle for each body portion, one handle being fixed with relation to its body portion, with the other mounted to swing with relation to its body portion about an axis which is parallel to the axis of said hinge pin; a latch located on the opposite side of the elevator from said hinge pin, having a portion thereof carried by each body portion and comprising a stationary latch member which is carried by the body portion having the fixed handle, a slidable latch member carried by the body portion having the swinging handle having its path of travel paralleling the longitudinal axis of said hinge pin, a pivoted lever of the bell crank type between said slidable latch and said swinging handle and forming an operating agent between the swinging handle and the slidable latch member, and means tending to yieldably assist said slidable latch member to move to latching position.

10. In a well elevator, a body which is divided into two sections joined together by a hinge pin about which they are adapted to be swung to open and closed position, an operating handle for one body section which is fixed with relation thereto, an operating handle for the other body section which is mounted to swing with relation to such section about an axis paralleling the axis of said hinge pin, cooperating latch members carried by said body sections and located on the opposite side of the elevator from said hinge pin and comprising a stationary jaw member which is carried by and fixed with relation to the body section having the fixed handle and a jaw member carried by the body section having the swinging handle and which is slidable with relation thereto in a path paralleling the longitudinal axis of the hinge pin, a pivoted lever of the bell crank type having one arm bearing on a projecting part of the slidable latch member and the other arm located in the path of travel of a roller carried by part of said swinging handle and means for yieldingly assisting the slidable latch member to move to latching position.

11. In a well casing elevator having a body which is divided into two sections joined together on one side by a hinge pin, a fixed operating handle for one body section, a swinging operating handle for the other body section, latch members carried by the body sections adjacent their matching line and having interengaging projections that extend across said line; one of said body latching members being fixed with relation to the body section having the fixed operating handle while the other is slidable with relation to the body section having the swinging handle in a path paralleling the longitudinal axis of the hinge pin and a cam lever between the swinging handle and the slidable latch member; the construction and arrangement being such that separating pressure exerted on the operating handles will first unlatch the latching members and then swing the elevator body sections to open position.

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