Aug. 29, 1944. W. W. WILSON 2,356,805

PIPE ELEVATOR

Filed May 16, 1942

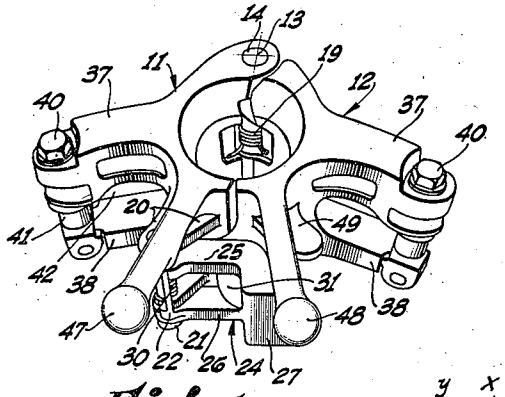


Fig. 1.

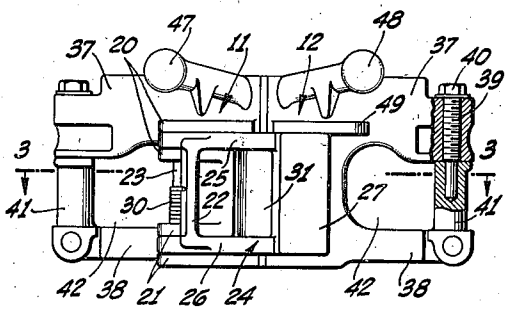


Fig. 2.

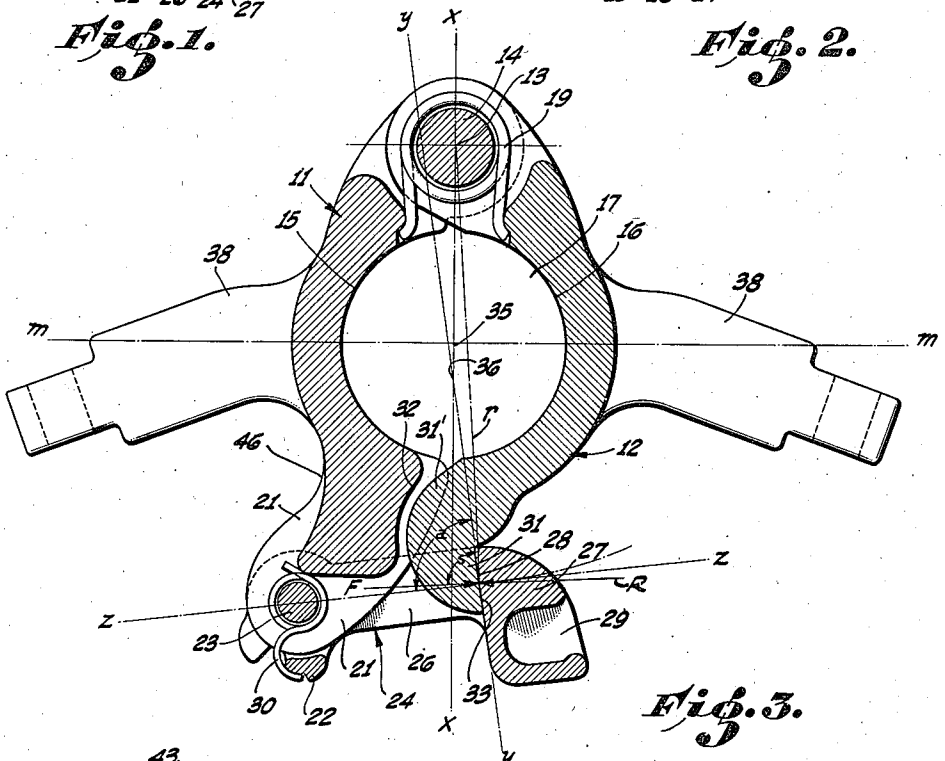


Fig. 3.

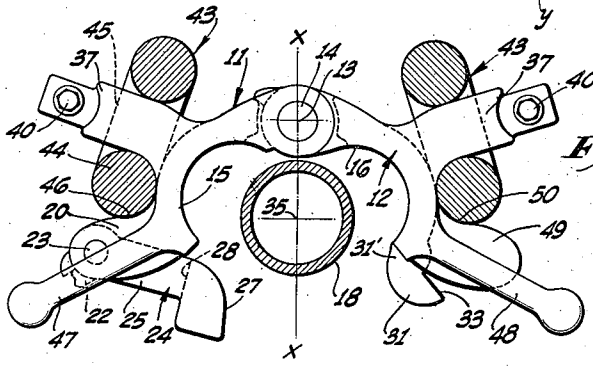


Fig. 4.

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## PIPE ELEVATOR

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7 Claims. (Cl. 294—90)

This invention relates to center-latch elevators and in particular to a latch which comprises a single swinging part and yet is safe and dependable in its operation.

Center-latch elevators may be defined as elevators which have two body halves or jaws which are hinged on an axis longitudinal of the body so that they may swing between closed and open positions toward and away from a median plane. By median plane is meant that longitudinal plane of the elevator in which lies both the hinge axis of the jaws and the axis of the cylindrical opening between the jaws which is also the axis of the pipe which the jaws encircle when the elevator is in operating position. The expression "median plane" has application either to the elevator as a whole or to either jaw thereof.

In a center-latch elevator the free or swinging outer ends of the jaws meet substantially in the median plane of the elevator when the jaws are in closed position, and a latch is employed to detachably connect these free ends.

In center-latch elevators, the first type of latch employed comprised a simple pawl hinged on one of the jaws and arranged to engage a dog or other catch means on the opposite jaw. These latches have the disadvantage of becoming accidentally disengaged in response to jars or shocks received by the elevator. Accordingly, these simple latching devices were supplemented by various locking means for holding the latch in position of engagement with the cooperating catch means to prevent accidental release of the latch.

It is an object of this invention to provide a safe and dependable latching means of the simple type without the use of a supplementary locking means.

It is another object of the invention, in pursuance of the aforesaid object, to provide a center-latch elevator having jaws, the free ends of which meet at the front of the elevator in the median plane thereof, equipped with a self-locking latch so formed in relation to the structure of the elevator that forces applied to the elevator jaws tending to open them, will not release the latch but, to the contrary, will produce an automatic locking action resulting inherently from the nature of the two elements of the latching means and not dependent upon any supplementary locking means.

It is a further object of the invention to provide a center latch elevator in which handles for the use of the operator in opening and closing the elevator jaws shall be arranged in relationship to the latching elements in such a manner as to facilitate manual operation of the latching means by the operator in accomplishing the releasing of the latching means.

In center-latch elevators, the arms which extend outwardly from the jaws for engagement with the bails, links, or other suspending means by which the elevator is supported upon the traveling block, are formed one on each of the jaws and extend outwardly from the two jaws in opposite directions, substantially in the transverse plane of the elevator. By transverse plane is meant that longitudinal plane of the elevator which passes through the axis of the elevator and is perpendicular to the median plane.

It is an object of the invention to provide an elevator in which one of these arms, to which are secured the supporting links, and a member of the latching means shall be so shaped as to provide a recess on the outer face of the corresponding elevator jaw in which may be disposed one of the suspending links in a manner to prevent lateral play of the link with respect to the elevator and to prevent tilting of the elevator when in open position with respect to the vertical.

It is still another object of the invention to provide in an elevator improved means for securing the elevator to the bails, links, or other means by which the elevator is suspended from the traveling block.

Other objects and advantages of the invention will appear from a reading of the following description and drawing which relate to a center-latch elevator constructed in accordance with the principles of this invention.

In the following description and accompanying drawing there is disclosed one embodiment of this invention. The invention, however, is not limited to this nor any other particular embodiment but is to be given the scope of the appended claims.

In the drawing which is for illustrative purposes only,

Fig. 1 is a perspective view of an elevator embodying this invention.

Fig. 2 is a front elevation of the elevator shown in Fig. 1.

Fig. 3 is an enlarged horizontal sectional view taken as indicated by the line 3—3 of Fig. 2.

Fig. 4 is a top plan view of an elevator in open position showing in horizontal cross-section a pipe which the elevator is in position to engage and suspending links by which the elevator is hung from the traveling block.

The center-latch elevator shown in the draw-

ing comprises two body halves or jaws 11 and 12 hinged on an axis at 13 about a hinge pin 14 and disposed, when in closed position, on the two sides respectively of the median plane designated by the line $x$—$x$. The jaws are formed with inner semi-cylindrical bore surfaces 15 and 16 which, when the elevator is in closed position, form a cylindrical opening 17 in which is positioned a pipe section. Such a pipe section is shown and designated with the numeral 18 in Fig. 4, in which the jaws are represented in their open position. It will be observed that the jaws 15 and 16 in a center-latch elevator of this type are substantially symmetrically related to the median plane $x$—$x$.

Helical torsion springs 19 mounted on the pin 14 and accommodated in suitable recesses formed on the jaws apply forces to the jaws which tend to urge them to the open position shown in Fig. 4.

Two vertically spaced bifurcated arms 20 and 21 are integrally formed with and extend radially outwardly from the outer end of the jaw 15. Between the arms 20 and 21 is mounted a pintle 23 to which is hinged a latch 24. The latch is shown as comprising a latch head 27, and vertically spaced arms 25 and 26 extending laterally therefrom. The inner ends of arms 25 and 26 are pivotally mounted upon the pintle 23 and are joined by a vertical yoke 22. The latch head 27 has a latch face 28 and a finger grip recess 29. The latch 24 may be referred to as a spring-closed latch. A helical torsion spring 30 is mounted on the pintle 23 and the ends thereof arranged in engagement with the outer end of the jaw 11 and with the yoke 22 in a manner to resiliently urge the latch 24 in an anti-clockwise direction, moving the latch head 27 and latch face 28 toward the elevator. The jaw 12 has a latch shoulder 31 formed on an enlargement 31′ which projects from the jaw 12 across the median plane $x$—$x$ into a mating recess 32 of the jaw 11.

For cooperation with the latch head 27, the shoulder 31 has a latch engaging face 33 lying in a latching plane $y$—$y$, Fig. 3. This plane $y$—$y$ is parallel to the elevator axis 35 and intersects the median plane $x$—$x$ at 36. This intersection 36 may, in accordance with the principles of this invention, be at any point along the line $x$—$x$, which is substantially removed from the hinge axis 13 inwardly from that axis. It will be observed that the plane $y$—$y$ is inclined inwardly and away from the jaw 12. A further characteristic of the plane $y$—$y$ is that it passes to the negative side of the hinge axis 13.

The plane $y$—$y$ forms an inner angle $a$ of substantially 90° with a line $z$—$z$ representing the radius line of the latch 24. By the radius line of the latch is meant a line passing through the axis of the latch pintle 23 and intersecting the area of engagement of the latch face 28 and the catch face 33.

The safety characteristics of the latch mechanism apparently result from the relation of parts and functions described in the following. When outward pressure is applied to the jaw 12, tending to swing it relatively away from the jaw 11, the shoulder 31 will exert a force, as indicated by the arrow, F, tangential to the axis 13, or, in other words, perpendicular to the radius $r$, extending from the axis 13 to a midpoint in the face 33 of the latch shoulder 31. This force F is met by a reaction R supplied by the latch head 27. The face 33, being disposed at an angle to the radius $r$, is at an acute angles $s$ to the line along which the force F and the reaction R act, and since the head 27 reacts against the face 33 which slopes at an angle to the line or direction of the reaction, the head 27 will tend to move inwardly along the face 30 and outward movement of the latch head 27 will be defeated.

Since the plane $y$—$y$ is substantially perepndicular to the latch radius $z$—$z$ this tendency of the head 27 to move inwardly is not overcome by any outwardly acting force upon the latch head 27 which would be present if the angle $a$ were substantially greater than 90°.

It will be observed that there always exists a force between the catch face 33 and the latch face 28 in a direction tangential with respect to the axis 13, due to the spreading action of the torsion springs 19 on the hinge pin 14. The total tangentially acting force applied to the latch head 27, therefore, includes a constant element due to the action of the torsion springs and additional elements arising out of shocks and jars received by the elevator which tend to open the jaws.

It will also be observed that the inwardly acting component of the tangential force applied to the latch head 27 is assisted in holding the latch 24 in position of engagement with the catch 31 by the action of the torsion spring 30.

A means is provided for suspending the elevator from the traveling block in two supporting members which project outwardly from the jaws 11 and 12 respectively, each consisting of an upper arm 37 and a lower arm 38. These arms are integrally formed with their corresponding jaws and are joined thereto at points intermediate the inner and outer ends of the jaws which are substantially in the transverse plane of the elevator designated on Fig. 3 of the drawing by the letters $m$—$m$. The arms 37 and 38 are inclined somewhat outwardly and toward the outer ends of the jaws forming a small angle with the transverse plane $m$—$m$.

The upper arms 37 have threaded vertical bores 39 in which are disposed bolts 40. To the outer ends of the lower arms 38 are pivoted on horizontal axes retaining members 41, which are swingable from a vertical limit position in registry with the bolts 40 to an outer position which leaves open the outer end of recesses 42 between the upper arms 37 and lower arms 38. The outer ends of the retaining members 41 are centrally bored, affording sockets for the reception of the lower ends of the bolts 40 when the latter are screwed down in the upper arms 37.

The supports as thus described are adapted for use with links 43, each of which comprises a pair of vertically disposed rods 44 and a horizontal cross rod 45 formed by bending a length of round metal stock to provide a U-shaped suspending link. The elevator is secured to the traveling block by lowering the retaining members 41, moving the links 43 horizontally inward toward the respectively associated jaws, the cross arms 45 moving into the recesses 42. Thereafter, the retaining members 41 are moved to their upper vertical limit positions in registry with the bolts 40 which are then screwed downwardly until their lower ends are securely seated in the sockets of the upper ends of the retaining members 41.

The upper arms 37 are cut away downwardly at their outer ends to provide recesses for the accommodation of the heads of the bolts 40 to eliminate the possibility of the bolt heads becoming marred or deformed by contact with

other objects incidental to the use of the elevator in a well.

The pintle carrying arm 20 and the supporting arms 37 and 38 of the jaw 11 are spaced from each other and shaped to provide a recess 46 adapted to snugly receive one of the rods 44 and prevent lateral movement of the rod 44 circumferentially with respect to the jaw 11. The jaw 12 is provided with an arm 49 of a plan contour similar to that of the arm 20 and so related to the jaw 12 as to provide a recess 50 similar to the recess 46 and for a similar purpose. This feature of the invention has an advantage, in that when the elevator is in open position, the arms 20, 37, and 38 cooperate with the rod 44 disposed between them to prevent tilting of the jaw 11 and of the elevator as a whole about a horizontal axis, holding the jaws in vertical position and axially parallel to a pipe section for relative movement with respect to the pipe section into aligned relationship therewith, preparatory to closing the jaws of the elevator.

The jaws 11 and 12 are provided with handles 47 and 48 respectively, these handles extending radially outward from the outer ends of the jaws and being provided for use by the operator in opening and closing and otherwise manipulating the elevator. The handle 48 lies just above the finger grip recess 29 on the latch head 27, facilitating the release of the latch by the operator by reason of its proximity to the latch head. The arms 21 and 49 protect the hands of the operator from hurtful contact with the adjacent rods 44.

I claim as my invention:

1. In a center-latch elevator of the character described, the combination of: a pair of pipe-encircling jaws connected at their rear ends by hinge means; resilient means urging said jaws apart; a latch pivoted to one of the jaws on an axis longitudinal thereof and one side of the median plane of the elevator; and a catch on the other jaw and on the other side of said median plane for engaging said latch, the latching plane of the engaging faces of said latch and said catch being a plane longitudinal of the elevator which intersects the median plane of the elevator substantially inwardly from said hinge means, which is inclined inwardly and away from said other jaw, said axis of said latch being spaced a greater distance from said hinge means than said catch.

2. In a center-latch elevator of the character described, the combination of: a pair of pipe-encircling jaws connected at their rear ends by hinge means; resilient means urging said jaws apart; a latch pivoted to one of the jaws on an axis longitudinal thereof; a catch on the other jaw for engaging said latch, the latching plane of the engaging faces of said latch and said catch being a plane longitudinal of the elevator which passes between said hinge means and said axis of said latch, which is inclined inwardly and away from said other jaw, and which is substantially perpendicular to the radius of said latch, said axis of said latch being spaced a greater distance from said hinge than is said catch; and resilient means urging said latch inwardly of said elevator.

3. In a center-latch elevator of the character described, the combination of: a pair of longitudinally hinged, pipe-encircling jaws; means for latching said jaws; a pair of arms projecting outwardly from the circumferentially median portions of said jaws respectively and formed to provide securing means for suspending links; a pair of operating handles projecting forwardly from the outer portions of said jaws; and a pair of arms projecting radially outwardly from the outer end portions of said jaws below said handles, respectively, the juxtaposed longitudinal faces of each of said last mentioned arms being disposed so as to prevent engagement of said handles by said links.

4. In an elevator of the character described for use with suspending links having horizontally disposed lower ends, the combination of: a pair of longitudinally hinged, pipe-encircling jaws; means for latching said jaws together about a pipe; a pair of oppositely and outwardly extending supporting arms for securement to the suspending links, each of said arms having an upper fork and a lower fork providing an open ended slot for the reception of one of the said horizontal link ends; a retaining member for closing the open end of each of said slots, said member being horizontally pivoted to the outer end of the associated lower fork to swing outwardly from an inner limit position in which it is in vertical registry with the outer end of the associated upper fork, said member having an opening at its outer end; and a pin threaded in the outer end portion of the upper fork so that it may be screwed down to project its lower end into said opening to hold said member in its slot closing position.

5. In an elevator of the character described for use with suspending links having horizontally disposed lower ends, the combination of: a pair of longitudinally hinged, pipe-encircling jaws; means for latching said jaws together about a pipe; a pair of oppositely and outwardly extending supporting arms for securement to the suspending links, each of said arms having an upper fork and a lower fork providing an open ended slot for the reception of one of the said horizontal link ends; a retaining member for closing the open end of each of said slots, said member being horizontally pivoted to the outer end of the associated lower fork to swing outwardly from an inner limit position in which it is in vertical registry with the outer end of the associated upper fork, said member having an opening at its outer end; and a bolt having threaded engagement with the outer end portion of said upper fork and having sliding engagement in said opening, said upper fork being vertically cut down at its outer end to form a protecting recess for the head of said bolt.

6. In a center-latch elevator of the character described, the combination of: a pair of pipe-encircling jaws connected by hinge means at the rear ends thereof; a catch on the front end of one of said jaws; and a spring-closed latch on the front end of the other of said jaws swingable on a latch axis which is longitudinal of said elevator, the engaging faces of said latch and said catch being inclined toward said other jaw so as to lie substantially in a plane which passes between said latch axis and the axis of said hinge means, and said latch axis being further away from said hinge means than is the center of said catch so that said latch will move straight off said catch without requiring any substantial closing movement of said jaws in order to release said latch.

7. In a center-latch elevator of the character described, the combination of: a pair of pipe-encircling jaws connected by hinge means at the rear ends thereof; spring means urging said jaws toward open position; a catch on the front

end of one of said jaws; and a spring-closed latch on the front end of the other of said jaws swingable on a latch axis which is longitudinal of said elevator, the engaging faces of said latch and said catch being inclined toward said other jaw so as to lie substantially in a plane which passes between said latch axis and the axis of said hinge means, and said latch axis being further away from said hinge means than is the center of said catch so that said latch will move straight off said catch without requiring any substantial closing movement of said jaws in order to release said latch.

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