

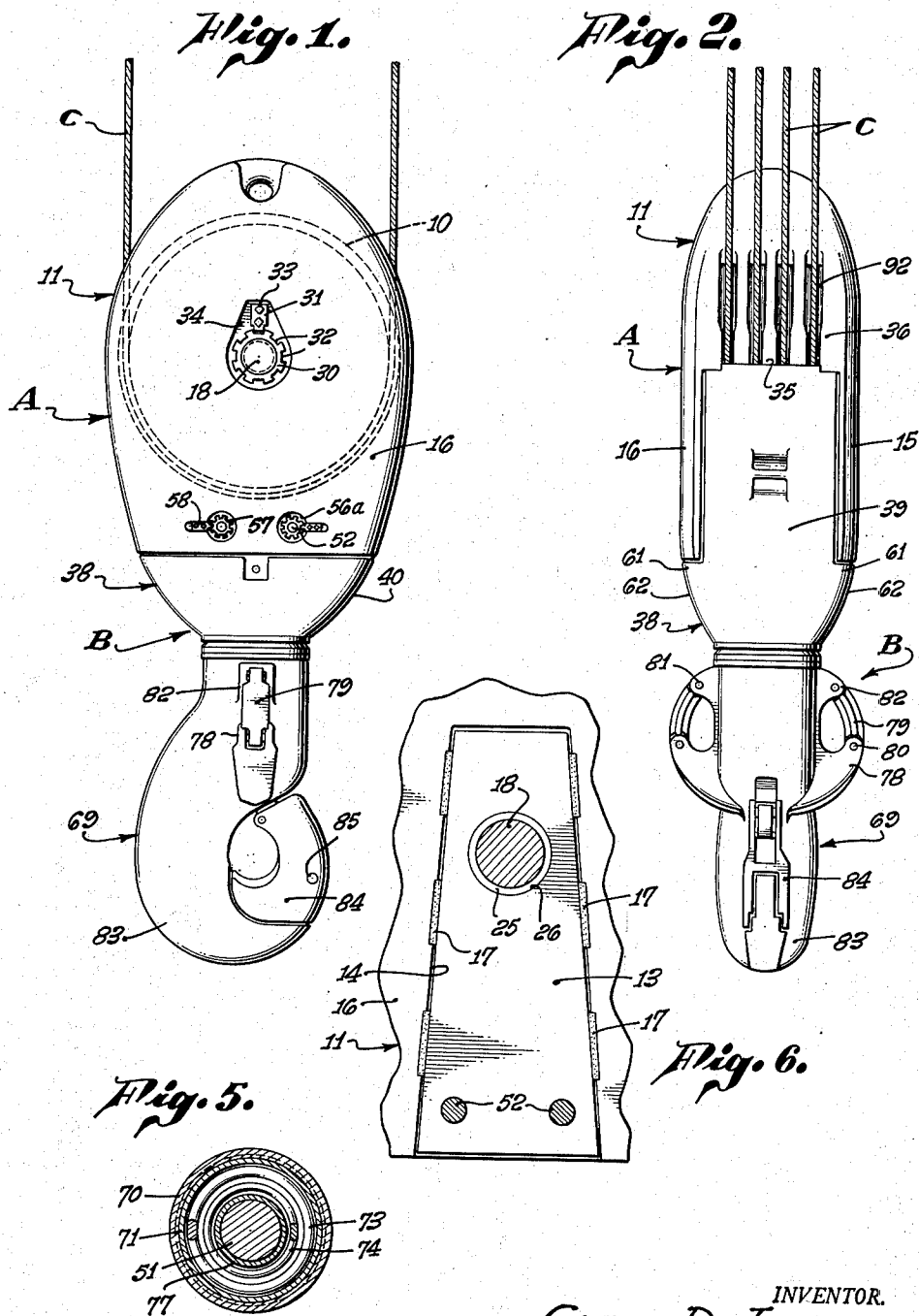
June 22, 1954

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TRAVELING BLOCK AND CONNECTOR

2,681,794

Filed June 13, 1950

3 Sheets-Sheet 1



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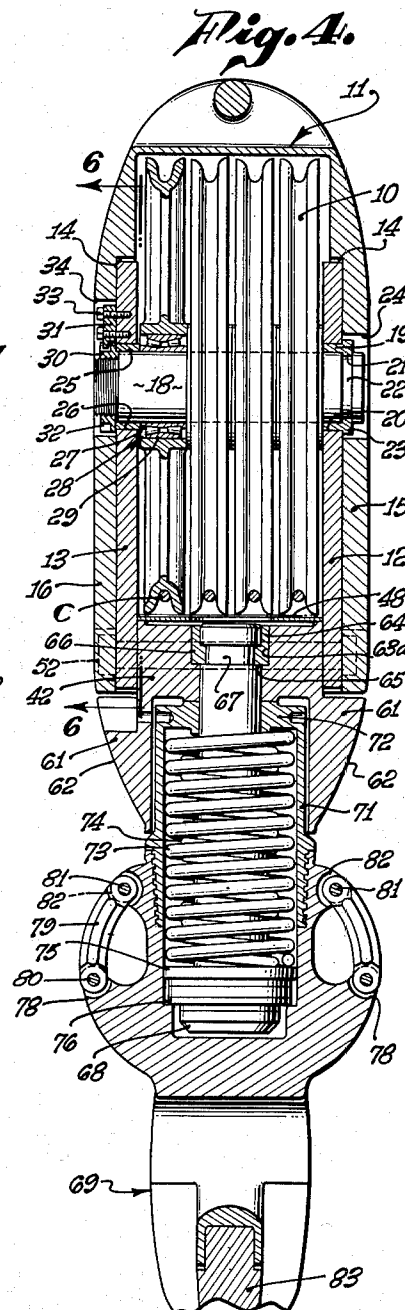
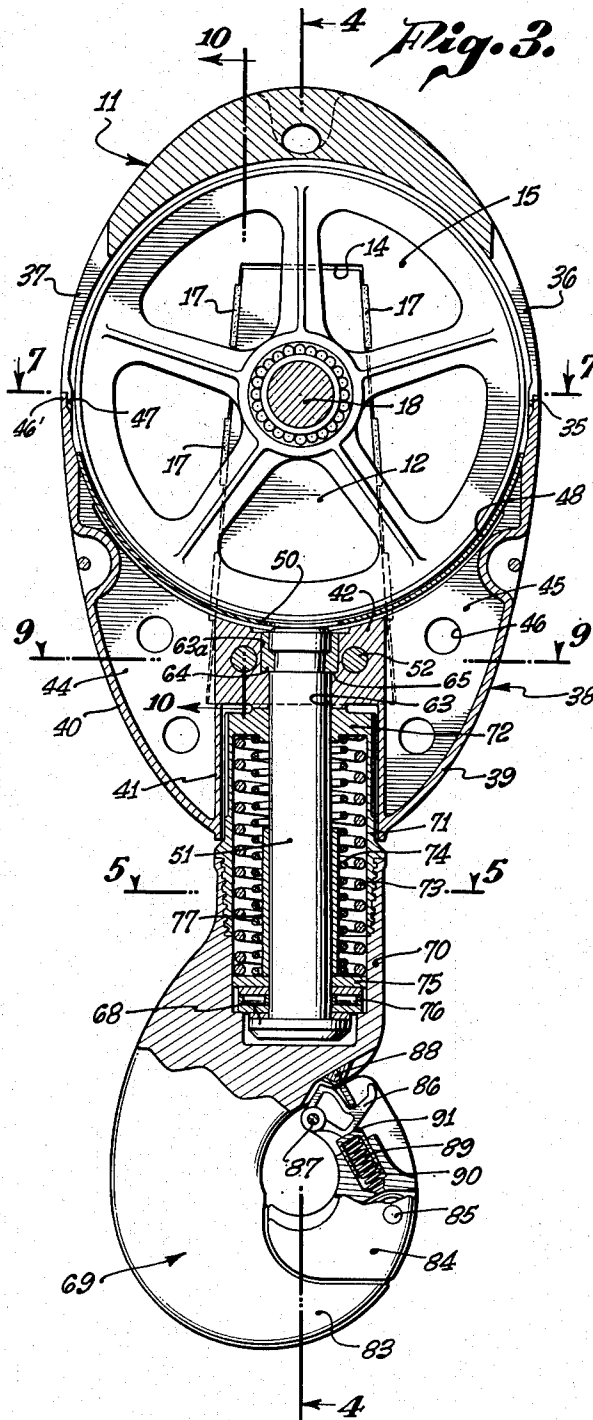
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TRAVELING BLOCK AND CONNECTOR

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3 Sheets-Sheet 2



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Fig. 7.

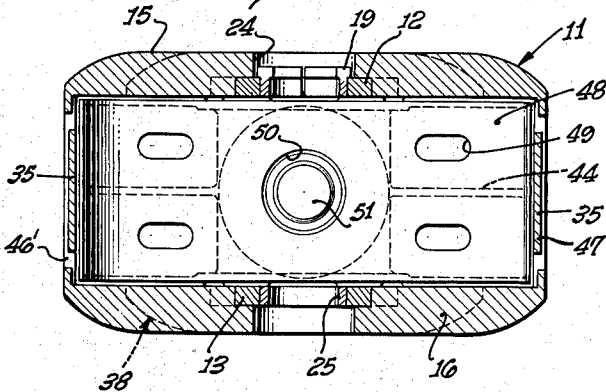


Fig. 8.

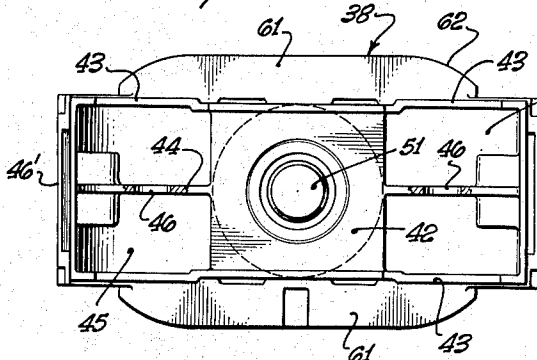


Fig. 9.

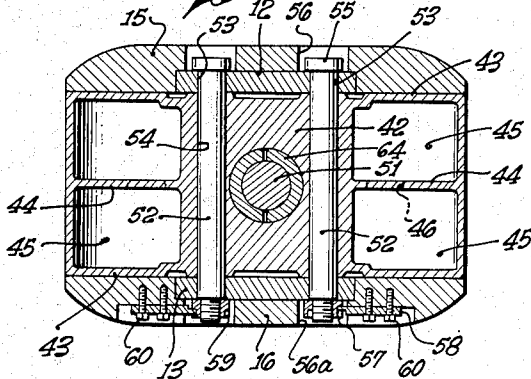
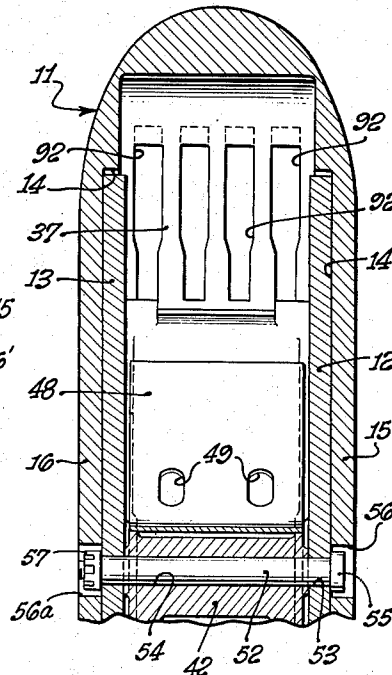


Fig. 10.



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TRAVELING BLOCK AND CONNECTOR

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11 Claims. (Cl. 254—192)

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The present invention relates to elevator devices, and more particularly to traveling blocks and connectors especially useful on well drilling or production rigs.

An object of the present invention is to provide a traveling block and connector, or traveling block and hook assembly, that has a comparatively short over-all vertical length for the load carrying capacity of the assembly, thereby permitting use of the assembly, with facility, on short derricks and drilling masts.

A further object of the invention is to provide a telescopic arrangement of a traveling block and associated connector unit, thereby materially shortening the over-all length of the assembly.

Another object of the invention is to provide a combined traveling block and swivel, in which the swivel is telescoped or piloted into the block housing, for the purpose of materially shortening the over-all length of the assembly.

Yet another object of the invention is to greatly increase the load carrying capacity of a traveling block having a cast frame or outer housing. In a more limited sense, this objective contemplates the relieving of the cast housing of substantially all of the thrust or load being transmitted between the various parts of the traveling block and an associated connector unit, which unit may have elevator ears for supporting elevator links, or which may include a hook, or both.

A further object of the invention is to provide a traveling block assembly possessing maximum compactness and strength, and which is streamlined by avoiding or minimizing the presence of projecting parts and sharp edges or corners.

Still a further object of the invention is to provide a combined traveling block and associated connector unit, in which the latter constitutes a closure for the lower end of the block frame or housing.

Another object of the invention is to provide for the addition of weight, if desired, to a traveling block assembly, without affecting or altering its external dimensions.

Yet another object of the invention is to provide a guard arrangement in a traveling block for the sheaves and line, which enables the line to be threaded around the sheaves without necessitating removal of the guard.

A further object of the invention is to provide a combined and compact assembly of a traveling block and connector unit, in which the latter can be easily disconnected from, or assembled to, the traveling block portion of the assembly, and which

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allows the line to be threaded readily through the block without detaching the connector unit from it.

This invention possesses many other advantages, and has other objects which may be made more clearly apparent from a consideration of a form in which it may be embodied. This form is shown in the drawings accompanying and forming part of the present specification. It will now be described in detail, for the purpose of illustrating the general principles of the invention; but it is to be understood that such detailed description is not to be taken in a limiting sense, since the scope of the invention is best defined by the appended claims.

Referring to the drawings:

Figure 1 is a side elevation of the apparatus;
Fig. 2 is a front elevation of the apparatus;
Fig. 3 is a vertical section through the apparatus, on an enlarged scale, with parts in elevation;

Fig. 4 is a vertical section taken along the line 4—4 on Fig. 3;

Fig. 5 is a cross-section taken along the line 5—5 on Fig. 3;

Fig. 6 is a vertical section taken along the line 6—6 on Fig. 4;

Fig. 7 is a cross-section taken along the line 7—7 on Fig. 3;

Fig. 8 is a top plan view of the lower cowl with the guard plate removed;

Fig. 9 is a cross-section taken along the line 9—9 on Fig. 3; and

Fig. 10 is a vertical section taken along the line 10—10 on Fig. 3.

As disclosed in the drawings, a traveling block A and connector B, or combined hook and link support, are operatively secured to one another, to be supported from the usual crown block of a suitable derrick or drilling mast by a wire or other flexible line C. For the purpose of shortening the over-all vertical length of the assembly, the connector unit B is telescoped into the block portion A of the device. The arrangement is such that the connector unit actually forms a lower closure for the block portion.

A plurality of sheaves 10 is arranged in side by side relation within the upper frame, shell or casing 11 of the block. This shell or casing is of streamlined shape and is usually made of cast steel. It is desired to avoid imposing any of the load carried by the wire line on the cast steel housing or shell 11, since such castings are of lesser strength than rolled or forged structural elements. Instead, the load is transmitted be-

tween the sheaves 10 and the connector unit B through a pair of opposed side plates 12, 13, that may be made of rolled steel, the plates fitting within recesses 14 in the inner side walls 15, 16 of the upper frame 11. The plates 12, 13 are preferably secured to these side walls of the frame by welding material 17.

A center pin 18 extends between the plates 12, 13. One end of the pin is received within a two-piece collar 19 fitting within a hole 20 in one side plate 12, and having an inwardly directed flange 21 received within a peripheral pin groove 22. The split or two-part collar 19 also has an outwardly directed flange 23 engaging the outer surface of the plate 12. This end of the pin and the collar 19 are disposed within a suitable hole 24 in one side wall 15 of the cast frame, the pin 18 preferably terminating inwardly of the external surface of such wall, to avoid a projecting element.

The other end of the center pin extends through a clamp ring 25 disposed in a hole 26 in the other side plate 13. This clamp ring abuts the inner race 27 of a tapered roller bearing assembly 28, the outer race 29 of which is disposed within a sheave 10. There is one bearing assembly 28 for each of the sheaves, which are arranged in side by side relation, so that all of the bearing assemblies can be secured between the clamp ring 25 and the center pin collar 19. Such clamping or securing action occurs as the result of tightening a clamp nut 30 on the threaded end of the center pin that bears against the clamp ring 25, the nut being prevented from loosening or unthreading by a suitable lock plate 31 projecting into one of the peripheral notches 32 in the nut and secured to the side plate 13 by one or more cap screws 33. The threaded end of the pin 18, nut 30, lock plate 31 and cap screws 33 are located in a hole 34 in the frame wall 16, and also do not project beyond the outer surface of this wall, to avoid projecting elements.

The side plates 12, 13 depend from the center pin 18 and disposed within the depending skirt portions or sides 15, 16 of the cast frame 11. The lowermost ends 35 of the front and back portions 36, 37 of the cast frame 11 terminate substantially in a horizontal plane including the axis of the center pin 18. There is thus provided a substantial opening around the bottom of the cast shell 11 which is closed by the connector unit B.

The connector unit includes a lower housing, frame or cowl 38 having curved outer end walls 39, 40, which converge in convex fashion toward each other in a downward and inward direction, their lower ends being integral with a generally cylindrical inner wall 41 extending upwardly from the ends of the outer walls and merging into a central boss 42. The end walls 39, 40 and inner wall 41, as well as the boss 42, are integral with opposed side walls 43, and also with aligned center ribs 44 extending between the end walls 39, 40, on the one hand, and the inner wall 41 and boss 42, on the other hand. The spaces 45 between the various walls, boss and ribs provide pockets in the lower frame or cowl 38, which pockets may be placed in communication with each other by providing one or more holes 46 through the ribs 44.

The lower frame or cowl 38 is designed to fit between the side plates 12, 13 and depending skirts 15, 16 of the upper frame 11, and is also arranged to extend around the lower portions of the sheave 10, to complete the enclosure for the latter. Thus, the side walls 43 of the cowl-

ing are disposed adjacent the side plates 12, 13 and skirts 15, 16, whereas the outer end walls 39, 40 extend upwardly to bridge the space between the depending skirts 15, 16 and engage the front and back portions 36, 37 of the upper frame 11. In order to insure a proper relationship between the upper and lower housing parts 11, 38, the upper portions 46¹ of the end walls 39, 40 may overlap lips 47 depending from the upper frame.

The side walls 43 of the cowl, its center ribs 44, and the upper end of the central boss 42 are arcuate in shape, conforming to the curvature of the sheaves 10, but being spaced therefrom by a slight amount. Such spacing is preferably kept to a minimum, in order to minimize the length of the entire assembly. An arcuate guard plate 48 is disposed along the top ends of the side walls 43, center ribs 44 and boss 42, and is suitably welded thereto, in order to prevent interference with the line C as it passes around the sheaves 10. This arcuate guard plate preferably has holes 49 therethrough communicating with the cowl pockets 45, and a central hole 50 for enabling the stationary swivel pin 51 of the connector unit to be appropriately assembled in place.

The lower frame or cowl 38 is firmly attached to the rolled steel side plates 12, 13 by a plurality, such as a pair, of coupling pins 52 extending transversely through these side plates 12, 13 and through the central boss 42 on opposite sides of the stationary swivel pin 51. Each coupling pin fits snugly through holes 53 in the side plates, and through an aligned hole 54 in the boss. Each coupling pin 52 has a head 55 located within a hole 56 in the upper frame skirt 15 and bearing against the exterior of the plate 12. The other end of the pin 52 extends into a hole 56a in the other frame skirt 16, and is threaded for reception of a suitable nut 57, which is tightened against the exterior of the opposite plate 13. Loosening of this nut 57 may be prevented by a suitable locking device, which may take the form of a plate 58 extending into one of the notches 59 in the periphery of the nut, the plate 58 itself being secured to the frame skirt 16 by a plurality of cap screws 60.

It is apparent from the foregoing description that the lower cowl 38 forms a closure for the upper frame or shell 11, and that such lower cowl is firmly and rigidly attached to the side plates 12, 13 by the coupling pins 52, the side plates, in turn, carrying the center pin 18 on which the sheaves 10 are rotatably mounted. In order to complete the streamlining of the unit, lobes 61 may project outwardly from the sides 43 of the cowl, such lobes extending from the lower ends of these sides, with their outer surfaces 62 diverging and merging smoothly into the external surfaces of the upper frame skirts 15, 16. The lobes 61 terminate immediately below the lower ends of the skirts and the side plates, as clearly illustrated in Figs. 2 and 4.

The connector unit B disclosed in the drawings includes the aforementioned stationary swivel pin 51, which extends upwardly through the inner wall 41 of the lower frame 38, and through a central vertical bore 63 in the central boss 42. The upper end of the vertical pin 51 is carried by the central boss through the agency of a two-part, or split, lock collar 64, which rests upon a shoulder 65 formed by an upper enlargement 63a of the bore 63. The collar has an inwardly directed flange 66 fitting within a peripheral groove 67 in the pin 51, in order to transmit the

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downward load on the pin 51, through the collar 64, to the boss shoulder 65.

The pin 51 depends from the boss 42 and terminates in a head 68 a substantial distance below the lower end of the inner wall 41 and outer end walls 39, 40 of the cowling 38. This pin forms the stationary element of a swivel, the rotatable or turning element of which may be formed as a hook 69. This latter part includes a lower hook housing 70 extending upwardly around the pin 51 and threaded onto an upper hook housing 71 projecting into the inner wall 41 of the cowling. This upper housing terminates in a thrust head 72 that is engageable with the lower end of the central boss 42. Such engagement is effected, under comparatively light or substantially zero load conditions imposed on the hook, by outer and inner helical springs 73, 74 whose upper ends bear upon the thrust head 72, and whose lower ends bear upon a thrust plate 75 resting against a suitable thrust bearing 76, which is, in turn, supported upon the stationary swivel pin head 68. It is apparent that the upper and lower hook housings 70, 71 may turn relative to the stationary pin 51 with substantial freedom, in view of the lower thrust bearing 76.

The inner and outer spring arrangement 74, 73 presents a relative short or compact unit for holding the hook housing 70, 71 in an upward position under certain conditions. As load is imposed upon the hook 69, the springs 73, 74 are compressed until the thrust head 72 engages the upper end of a stop and thrust sleeve 77 disposed around the swivel pin 51 and resting upon the thrust plate 75. Usually, the springs exert only sufficient force to aid in the elevation of a stand of pipe, as it is being unscrewed from a lower section of pipe supported in the rotary table of the rig. Greater loads result in a downward pulling of the hook housing 70, 71 and engagement of the thrust head 72 with the thrust sleeve 77, for the purpose of transmitting the load solidly through the thrust plate 75 and thrust bearing 76 to the pin head 68, where the load passes through the pin 51 and divided lock collar 64 to the boss 42 of the cowling. From this boss, the load is transmitted through the coupling pins 52 to the side plates 12, 13, and from these latter members through the center pin 18 to the sheaves 10 and line C.

The lower swivel unit illustrated in the drawings is designed to support both elevator links (not shown) and a swivel bail (not shown) simultaneously. The elevator links can be carried by ears 78 projecting outwardly from the sides of the lower hook housing 70, these links being prevented from inadvertent removal by link gates 79. The lower ends of the gates are pivotally mounted on pins 80 carried by the ears 78, and the upper ends are secured by suitable screws 81 to lugs 82 projecting from the lower hook housing.

The swivel bail (not shown) is carried by the hook portion 83 of the unit, which depends from the lower housing 70, and has a latch body 84 pivoted on a hinge pin 85 secured to the hook, the body extending across the hook opening. This body is prevented from swinging outwardly by a suitable latch 86 mounted on a latch pin 87, and adapted to engage a lock plate or insert 88 welded to the hook body 83. This latch 86 is urged towards its locking position by a spring 89 fitting within a socket 90 in the latch body and pressing against a plunger 91 which engages the latch 86.

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The arcuate guard plate 48 not only protects the sheaves 10 and the line C from interference with the connector unit B therebelow, but it also serves as a guide for threading the line through the openings 92 in the upper frame 11 and around the sheaves, thereby obviating the need for dismantling the apparatus. However, if such threading is not to be performed without dismantling the connector unit B from the upper housing 11, it is a simple matter to remove the two coupling pins 52 and lower the cowling 38, with all of the parts attached thereto, from the upper housing, which then exposes the underside of the sheaves 10 and enables the line C to be threaded appropriately around the sheaves.

The connector unit B, in effect, is telescoped or piloted upwardly within the block frame 11 to a point immediately adjacent the sheaves 10, which enables the entire assembly to have a much lesser over-all length than was heretofore possible. Such decrease in over-all length is further enhanced by the upward telescoping or piloting of the swivel into the cowling or lower frame 38; and also by the piloting of the hook housing 70, 71 into the lower frame 38. Despite such piloting and consequent compact arrangement, the hook is still capable of swiveling freely through 360 degrees, and the springs 73, 74 associated therewith are still capable of facilitating unscrewing of a stand of pipe, or other objects, from the pipe supported in the rotary table.

All loads are transmitted through the side plates 12, 13 of the device, and not through the cast steel upper frame or shell 11. As a result, the outer shell or housing of the device can be fully streamlined, so as to avoid projections that may tend to hang up or interfere with other parts usually present in and around rigs. While the lower cowling 38 is a casting, it possesses substantial strength, since the load is transmitted through the comparatively thick boss 42 to the coupling pins 52, that are, in turn, supported by the rolled steel side plates 12, 13. The side walls 43, center ribs 44 and outer end walls 39, 40 of the cowling or lower housing 38 are not required to carry any portion of the load, and readily adapt themselves to a casting operation to produce a streamlined form.

The diminished over-all length of the traveling block and connector unit combination is accompanied by a decrease in weight. At times, it may be desirable to have the entire assemblage weigh more, and this is readily accomplished in the present instance by disposing weighting material in the pockets 45 provided in the lower housing 38. As an example, lead can be poured through the guard plate holes 49 into the pockets 45, the volume of the pockets being quite extensive and capable of receiving a substantial weight of lead. The lead will be retained in place, since it will flow, when in a molten state, through the rib holes 46 from one pocket to the adjacent pocket, thereby integrating and locking the contents of the pockets to one another.

In the manner just described, additional weight may be added to the block and connector unit assembly without interfering with the operation of any of its parts and without increasing the size of the device in any particular.

The inventor claims:

1. In apparatus of the character described: an upper housing; a supporting member within and carried by said housing; sheaves rotatable on said supporting member; a lower housing secured to said upper housing and closing the lower

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portion of said upper housing, said lower housing having one or more pockets therein adapted to contain weighting material; load supporting means carried by and depending from said lower housing; generally arcuate guide means on said lower housing conforming to and closely adjacent the lower peripheral portions of said sheaves, said guide means having one or more openings therein communicating with said one or more pockets.

2. In apparatus of the character described: an upper housing; a supporting member within and carried by said housing; sheaves rotatable on said supporting member; a lower housing secured to said upper housing and closing the lower portion of said upper housing, said lower housing having one or more pockets therein adapted to contain weighting material; load supporting means carried by and depending from said lower housing; and means providing access to said one or more pockets.

3. In apparatus of the character described: a housing; a supporting member within and carried by said housing; sheaves rotatable on said supporting member; load supporting means carried by and depending from said housing, said housing having one or more pockets therein adapted to contain weighting material; and means providing access to said one or more pockets for the introduction of the weighting material therewithin.

4. In apparatus of the character described: an upper cast housing having curved front and back walls and side walls depending substantially below said front and back walls; opposed side plates disposed within and secured to said side walls; a pin extending between and carried by said plates; sheaves rotatable on said pin; a lower housing extending upwardly between the side walls of said upper housing and having end walls terminating adjacent the lower ends of said front and back walls, said lower housing having one or more pockets therein adapted to contain weighting material; generally arcuate guide means on said lower housing conforming to and closely adjacent the lower peripheral portions of said sheaves, said guide means having one or more openings therein communicating with said one or more pockets; coupling pins securing said lower housing to said plates; a stationary pin extending upwardly into said lower housing between said coupling pins; means supporting said stationary pin by said lower housing; and load supporting means extending upwardly into said lower housing, said load supporting means being rotatably carried by said stationary pin.

5. In apparatus of the character described: an upper cast housing having curved front and back walls and side walls depending substantially below said front and back walls; opposed side plates disposed within and secured to said side walls; a pin extending between and carried by said plates; sheaves rotatable on said pin; a lower housing extending upwardly between the side walls of said upper housing and having end walls terminating adjacent the lower ends of said front and back walls, said lower housing having one or more pockets therein adapted to contain weighting material; generally arcuate guide means on said lower housing conforming to and closely adjacent the lower peripheral portions of said sheaves, said guide means having one or more openings therein communicating with said one or more pockets; coupling pins securing said lower housing to said plates; a stationary pin extending upwardly into said lower

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housing between said coupling pins, said stationary pin having a head; a split collar engaging said stationary pin and lower housing to support said stationary pin from said lower housing; a load supporting enclosure extending upwardly into said lower housing and encompassing said stationary pin; and rotatable means for transmitting the load on said enclosure to said head.

6. In apparatus of the character described: a one-piece upper frame having curved front and back walls and side walls depending substantially below said front and back walls; a pin extending between and carried by said side walls; sheaves rotatable on said pin; a one-piece lower frame extending upwardly between said side walls and having end walls terminating adjacent the lower ends of said front and back walls and portions between said end walls terminating adjacent the lower ends of said side walls; the upper portion of said lower frame having generally arcuate guide means thereon conforming to and lying closely adjacent the periphery of said sheaves; means rigidly and immovably securing said lower frame to said upper frame; a stationary swivel pin carried by and depending from said lower frame; a swivel member surrounding and movable longitudinally of said swivel pin; and spring means surrounding said swivel pin and bearing upon a lower portion of said swivel pin and an upper portion of said swivel member.

7. In apparatus of the character described: a one-piece upper frame having curved front and back walls and side walls depending substantially below said front and back walls; a pin extending between and carried by said side walls; sheaves rotatable on said pin; a one-piece lower frame extending upwardly between said side walls and having end walls terminating adjacent the lower ends of said front and back walls and portions between said end walls terminating adjacent the lower ends of said side walls; the upper portion of said lower frame having generally arcuate guide means thereon conforming to and lying closely adjacent the periphery of said sheaves; means rigidly and immovably securing said lower frame to said upper frame; a stationary swivel pin carried by and depending from said lower frame; a swivel member surrounding said swivel pin and extending upwardly into said lower frame; and spring means surrounding said swivel pin and bearing upon a lower portion of said swivel pin and an upper portion of said swivel member.

8. In apparatus of the character described: a one-piece upper frame having curved front and back walls and side walls depending substantially below said front and back walls; a pin extending between and carried by said side walls; sheaves rotatable on said pin; a one-piece lower frame extending upwardly between said side walls and having end walls terminating adjacent the lower ends of said front and back walls and portions between said end walls terminating adjacent the lower ends of said side walls; means extending through said side walls and upwardly extending portion of said lower frame in a direction parallel to the axis of said pin for securing said lower frame to said upper frame; and load supporting means carried by and depending from said lower frame.

9. In apparatus of the character described: a housing having opposed side members; a supporting member carried by said side members; sheaves rotatable on said supporting member; a

connector device closing the lower portion of said housing; means extending through said side members and connector device parallel to the axis of said supporting member for securing said housing and connector device together; the upper portion of said device being generally arcuate to conform to the periphery of said sheaves and lying closely adjacent said sheaves along the lower portion of said sheaves to provide a guide facilitating threading of a flexible line around said sheaves.

10. In apparatus of the character described: a one-piece upper frame having curved front and back walls and side walls depending substantially below said front and back walls; a pin extending between and carried by said side walls; sheaves rotatable on said pin; a one-piece lower frame extending upwardly between said side walls and having end walls terminating adjacent the lower ends of said front and back walls and portions between said end walls terminating adjacent the lower ends of said side walls; means extending parallel to said pin and through said side walls and upwardly extending portion of said frame for rigidly and immovably securing said lower frame to said upper frame; a stationary swivel pin disposed within, carried by and depending from said lower frame; and a swivel member extending up-

wardly within said lower frame and surrounding and movable longitudinally of said swivel pin.

11. In apparatus of the character described: an upper housing; a supporting member within and carried by said housing; sheaves rotatable on said supporting member; a lower housing extending upwardly within and closing the lower portion of said upper housing; means extending through said upper housing and the upwardly extending portion of said lower housing in a direction parallel to the axis of said sheaves for securing said housings together; load supporting means carried by and depending from said lower housing; and generally arcuate guide means on said lower housing conforming to and closely adjacent the lower peripheral portions of said sheaves.

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