

Nov. 15, 1966

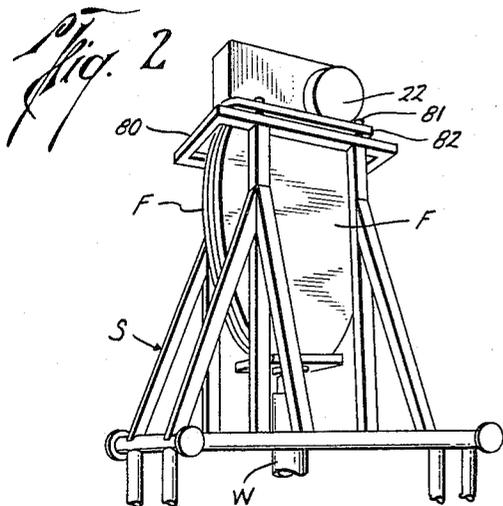
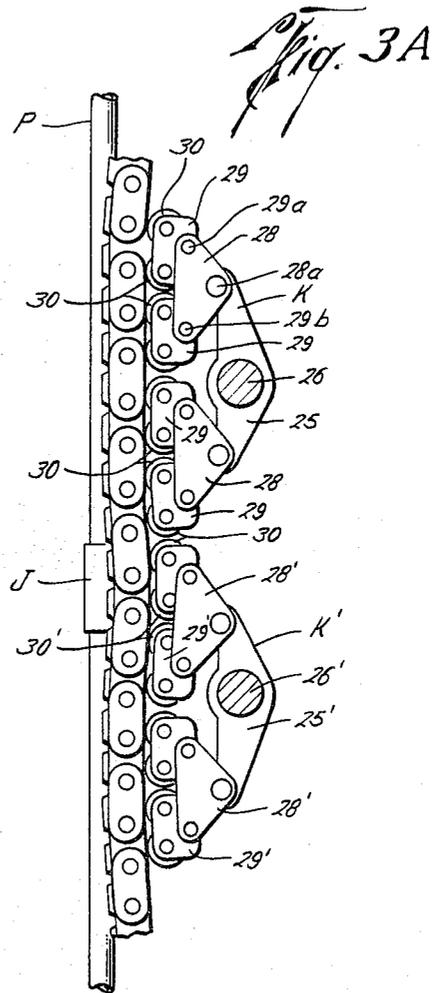
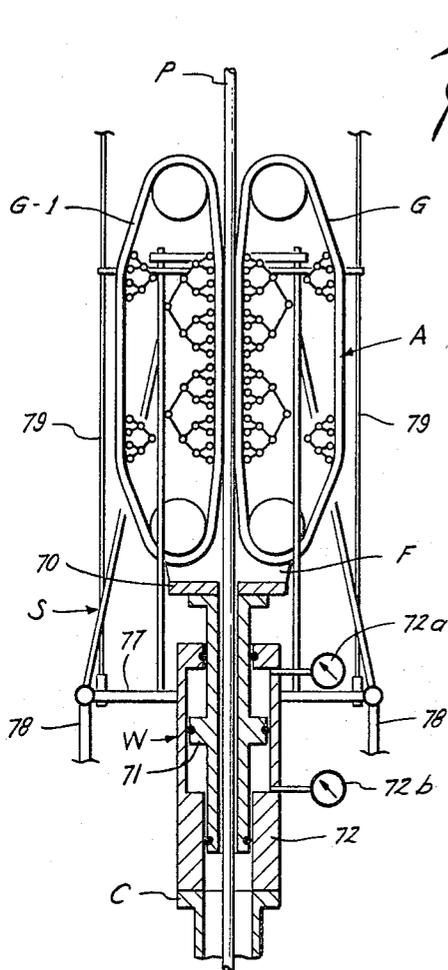
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3,285,485

APPARATUS FOR HANDLING TUBING OR OTHER ELONGATE OBJECTS

Filed Jan. 23, 1964

5 Sheets-Sheet 1



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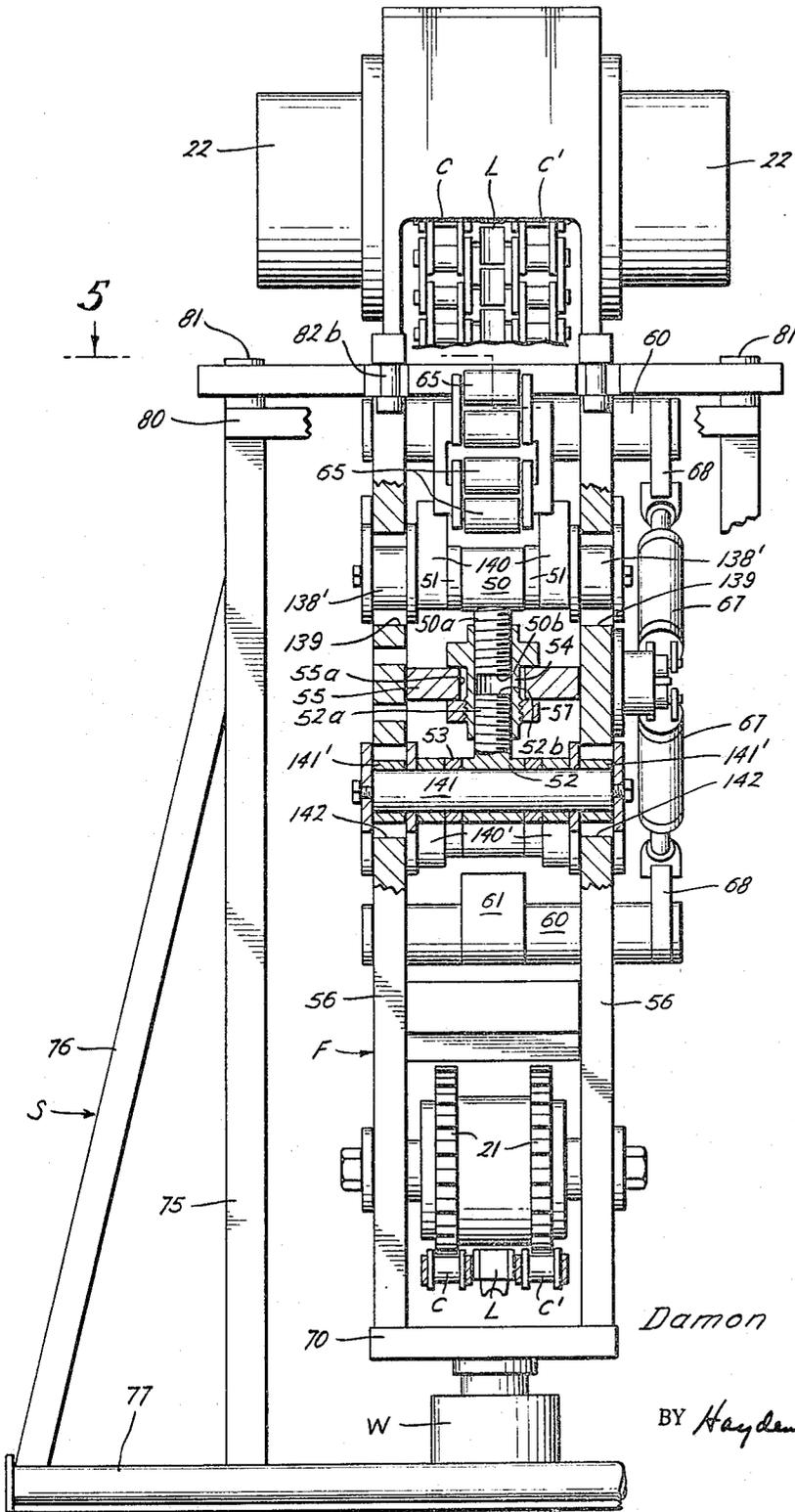
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5 Sheets-Sheet 3



*Fig. 4*

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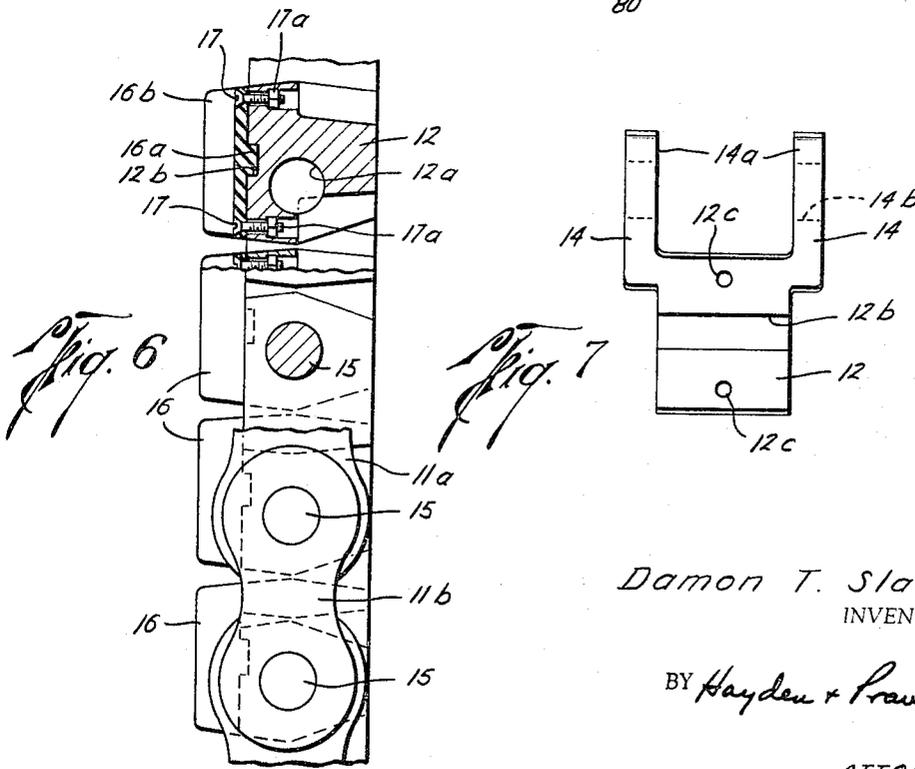
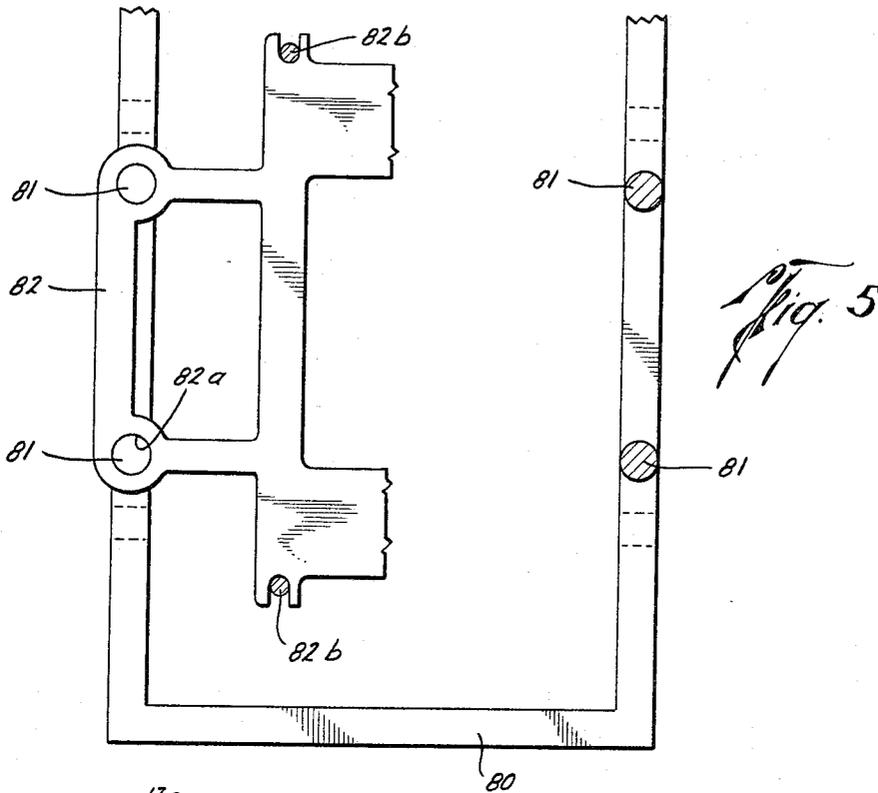
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APPARATUS FOR HANDLING TUBING OR OTHER ELONGATE OBJECTS

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5 Sheets-Sheet 4



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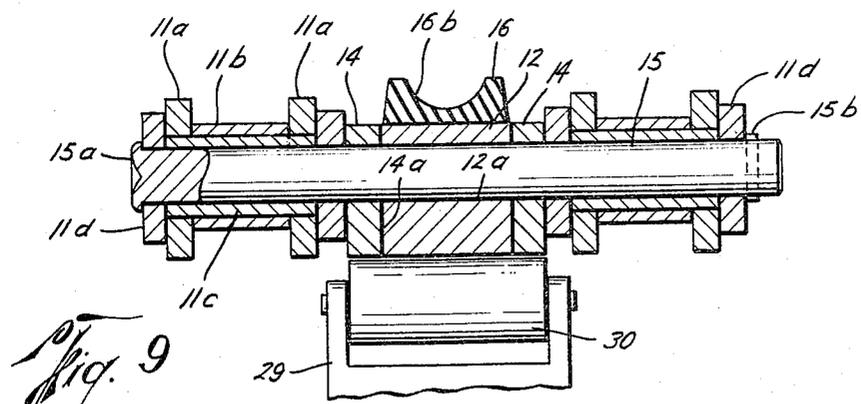
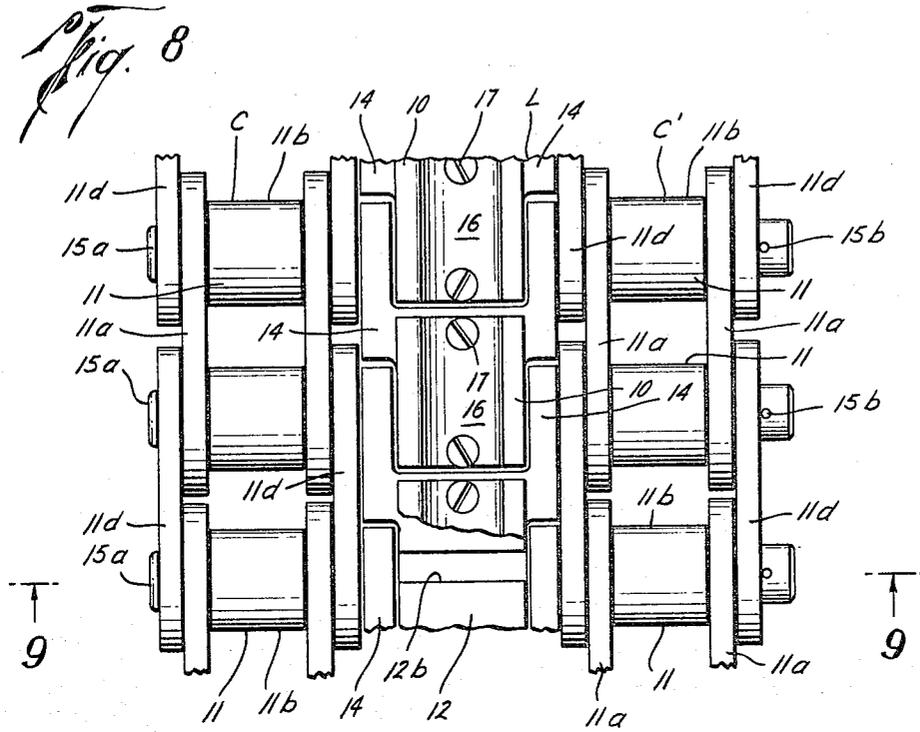
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APPARATUS FOR HANDLING TUBING OR OTHER ELONGATE OBJECTS

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5 Sheets-Sheet 5



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3,285,485

APPARATUS FOR HANDLING TUBING OR OTHER  
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8 Claims. (Cl. 226—172)

This invention relates to new and useful improvements in apparatus for handling tubing or other elongate objects during longitudinal movement thereof, and particularly to an apparatus for lowering and/or raising tubing or wire line in a well.

An object of this invention is to provide a new and improved apparatus for handling tubing or other elongate objects during the longitudinal movement thereof, and particularly to a new and improved apparatus for lowering and/or raising tubing or wire line in a well.

An important object of this invention is to provide a new and improved apparatus for handling tubing or other elongate objects in a well, wherein such apparatus has a pair of endless gripping assemblies, each of which has a pair of endless chains operably connected to an endless loop of gripping members therebetween.

Another object of this invention is to provide a new and improved apparatus for lowering and/or raising tubing or other objects in a well, wherein such apparatus has a pair of endless gripping assemblies, each of which has back-up rollers adapted to engage overlapping portions of the links of the gripping assembly for maintaining uninterrupted gripping action as the assemblies are moved in their endless paths.

A further object of this invention is to provide a new and improved apparatus for handling tubing or the like, wherein two endless loops of gripping elements are provided for engagement with the tubing or the like disposed longitudinally therebetween, and wherein each gripping element is independently movable laterally within limits to accommodate variations in the tubing or the like.

Still another object of this invention is to provide a new and improved apparatus for handling tubing and the like wherein an endless loop of gripping elements is provided with back-up means that receives and distributes the load on the gripping elements.

A particular object of this invention is to provide a new and improved apparatus for handling tubing or other elongate objects, wherein a floating piston is operably connected to a back-up assembly for at least one of two endless gripping units to effect a substantially uniform loading of the components of the back-up assembly.

A specific object of this invention is to provide a new and improved apparatus for handling tubing or other elongate objects, wherein a floating piston is operably connected in a fluid system with an accumulator for providing a yielding of the gripping elements when a tubing joint or other enlargement passes between opposed gripping elements.

The preferred embodiment of this invention will be described hereinafter, together with other features thereof, and additional objects will become evident from such description.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings forming a part thereof, wherein an example of the invention is shown, and wherein:

FIG. 1 is a schematic illustration of the apparatus of this invention in position on a well pipe or casing;

FIG. 2 is an isometric view illustrating in particular the stabilizing unit for restricting lateral movement while permitting limited longitudinal movement of the gripping assemblies and their related structure;

FIG. 3 is view, partly in section and partly in elevation,

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illustrating in particular the gripping assemblies, the back-up means therefor and other related apparatus forming a part of the apparatus of this invention;

FIG. 3A is a fragmentary view, partly in elevation and partly in section, illustrating the deflection of the gripping elements when a tubing collar, joint or other enlargement passes between the opposed reaches of the gripping assemblies;

FIG. 4 is a side view of the apparatus of FIG. 3, viewing FIG. 3 from the left;

FIG. 5 is a partial view taken on line 5—5 of FIG. 4; FIG. 6 is a partial view, partly in section and partly in elevation, illustrating details of one gripping assembly of this invention;

FIG. 7 is a plan view of one of the links of the endless loop forming the gripping assembly;

FIG. 8 is a vertical elevation illustrating a portion of one of the endless gripping assemblies; and

FIG. 9 is a sectional view, partly in elevation, taken on line 9—9 of FIG. 8, and further illustrating details of one of the gripper assemblies in the apparatus of this invention.

In the drawings, the letter A designates generally the apparatus for handling pipe, cable or other elongate objects such as indicated at P in the drawings. As will be explained in detail, the apparatus A includes a support frame F to which is secured a pair of opposed gripping assemblies G and G-1, all of which are supported on a weight indicator W. The weight indicator W is preferably mounted on the upper end of a well pipe or casing C, stuffing box, or other well head equipment in the known manner. As the load on the pipe P or other elongate object varies during use, the apparatus A shifts longitudinally either upwardly or downwardly to indicate a weight change at the weight indicator W. During such longitudinal movement, it is preferable to stabilize the apparatus A with a stabilizing unit S which permits the longitudinal movements of the apparatus A while restricting or preventing lateral movements thereof.

Considering the invention more in detail, each of the gripping assemblies is constructed identically in the preferred form of the invention and therefore the detailed description which follows with respect to the gripping assembly G applies also to the gripping assembly G-1, except as later explained. The assembly G includes an endless loop L (FIGS. 4 and 8) of gripping elements or units 10. Such endless loop L is disposed between a pair of endless chains C and C', each of which is identical in the preferred form of the invention, and each of which includes a plurality of links 11 as will be explained more in detail hereinafter.

Each of the gripping elements or units 10 includes a block 12 (FIGS. 6-9) which has arms 14 connected thereto or formed integrally therewith. The distance between the inner surfaces 14a of the pair of arms 14 of each gripping element 10 is at least equal to the width of the block 12 so that the pair of arms 14 on each gripping element 10 is disposed alongside of the block 12 on the next adjacent gripping element 10 as best seen in FIG. 8. Each of the arms 14 has an opening 14b therethrough which is aligned with an opening 12a (FIG. 6) for receiving a pivot pin 15 therethrough, thereby connecting the adjacent gripping elements 10 together.

Each of the blocks 12 is formed with a laterally extending groove 12b which is adapted to receive a laterally extending projection 16a of a gripping shoe 16. Each gripping shoe 16 is preferably provided with an inner curved surface 16b (FIG. 9) which preferably generally conforms with the curvature of the pipe or other elongate object being handled with the apparatus. Each of the gripping shoes 16 is secured to one of the blocks 12 by any fastening means such as rivets or bolts so as to pro-

vide for a limited amount of lateral movement with respect to the block 12. As illustrated by way of example in the drawings, each gripping shoe 16 is provided with two bolts 17 having nuts 17a connected thereto in the usual manner. Each of the bolts 17 fits within a hole 12c in the blocks 12, with the openings 12c being slightly larger than the diameter of the bolts 17 so as to provide for such limited lateral shifting of the gripping shoes 16 independently with respect to each other and the blocks 12 to which they are secured.

The chain C is formed by a plurality of the links 11 which include link sections 11a connecting two rollers 11b, each of which is mounted on a bearing 11c through which a pivot pin 15 extends (FIGS. 8 and 9). Another set of connecting link sections 11d are disposed outwardly of the link sections 11a but connect the alternate rollers 11b as is illustrated in FIG. 8.

The endless chain C' is constructed in the same manner as the endless chain C and therefore the same parts bear the same numerals for both the chains C and C'. As illustrated in FIG. 9, the two endless chains C and C' are interconnected with the endless loop L of gripping elements 10 by the pivot pins 15 which extend through the various components of such chains and loop as best illustrated in FIG. 9. Each pin 15 is preferably removable for replacement and repair purposes, and therefore is illustrated as having a head 15a on one end thereof and a removable retaining pin 15b on the other end thereof.

Each of the endless gripping assemblies G and G-1 is thus composed of the endless loop of gripping units or elements 10 with the chains C and C' disposed on either side thereof. The gripping assemblies G and G-1 are supported in an endless path by upper double sprockets 20 and lower double sprockets 21 (FIGS. 3 and 4) which are suitably mounted for rotation on the support frame F. The upper sprockets 20 are connected with rotary fluid motors indicated generally at 22 in FIG. 4, each of which is of any conventional construction and which is adapted to either impart rotation to the endless assemblies G and G-1 while driving same as a motor or to resist the rotation or movement of such assemblies while being operated as a brake. It is to be noted that as the gripping assemblies G and G-1 move in their endless paths, they move so as to provide a longitudinal reach R and R-1, respectively, on each side of the pipe P or other elongate object passing therebetween. The opposed reaches R and R-1 therefore provide a gripping and feeding action with respect to such pipe P or other elongate object. Since each of the gripping shoes 16 is adapted to shift laterally within the limits described heretofore, each shoe is adapted to shift to accommodate minor variations in the straightness of the pipe P or other elongate object being handled.

A back-up means B is provided within the gripping assembly G for maintaining the gripping contact throughout the length of the longitudinal reach R while at the same time permitting localized flexing to allow the passage of tubing joints, collars or other enlargements such as indicated at J in FIG. 3A. The back-up means B includes a first back-up assembly K and a second back-up assembly K' (FIG. 3). Each of the back-up assemblies K and K' are preferably identical as illustrated in FIGS. 3 and 3A. Thus, the assembly K includes a pivoted rocker arm 25 mounted on a pivot pin 26. The pivot pin 26 is adapted to move within a laterally extending slot 27 in the support frame F for a purpose to be hereinafter described. Each end of the rocker arm 25 has a bracket, plate or other type of carrier 28 pivotally connected thereto which is pivotally connected to another pair of brackets, plates, or roller blocks 29, utilizing three pivot pins 28a, 29a and 29b. Each of the plates 29 carries a pair of back-up rollers 30 which engage the rear surfaces of the blocks 12 and the arms 14 during the endless movement of the gripping assemblies G with respect to the back-up means B. The back-up assembly

K' has the identical parts described heretofore in connection with the back-up assembly K and therefore such parts have the same numerals and letters identifying them.

It is to be noted that each of the rollers 30 extends for a width approximating that of the arms 14 as best seen in FIG. 9 so that there is an overlapping contact between the rollers 30 as the gripping assembly G moves with respect thereto. Since the arms 14 of one gripping element 10 are disposed alongside of the next block 12 on the next gripping element 10, the rollers 30 are thus in contact with two of the gripping elements 10 at each position so that there is an uninterrupted engagement by the back-up rollers 30 with the rear surfaces of the gripping elements 10 during their longitudinal movement through the reach R. For moving the back-up assemblies K and K' into a resilient engagement with the rear surfaces of the gripping elements of the gripping assembly G, a floating piston and cylinder construction is provided. Such construction includes a cylinder 35 which is mounted for longitudinal sliding movement in the bore 36a of a laterally extending brace 36. The brace 36 preferably extends between the opposed plates 56 forming the support frame F and is connected thereto, but there is no connection between the cylinder 35 and such brace 36 whereby the cylinder 35 is adapted to move relative to such brace 36 and the support frame F. A piston is disposed within the cylinder 35 and it has a piston stem 37 projecting therefrom. A pivot pin 38 is connected to the upper end of the piston stem 37, with such pin 38 projecting into a longitudinally extending slot 39 in the support frame F so that the movement of the rod 37 is limited to longitudinal movement. The longitudinal movement of the piston stem 37 is converted into a lateral movement of the pin or shaft 26 by the linkage 40 which extends from the pin 38 to the pin 26. Thus, the longitudinal movement of the pin 38 within the slot 39 causes a lateral movement of the pin 26 within the lateral slot 27 to urge the assembly K inwardly and outwardly with respect to the reach R of the gripping assembly G.

The cylinder 35 also has a pivot pin 41 near its lower end which is disposed in a longitudinal slot 42 in the frame F so that the cylinder 35 is guided longitudinally and the pin 41 is guided longitudinally therewith. The pin 41 is connected to the pin 26' of the assembly K' by a link 40' so that the longitudinal movements of the cylinder 35 are translated into lateral movements of the pin 26' in the lateral slot 27'. Thus, as fluid is introduced into the cylinder 35 for causing the piston therein to move upwardly, the piston stem and the cylinder 35 expand with respect to each other so that the pins 38 and 41 move away from each other, thereby urging the rollers 30 and 30' on the back-up assemblies K and K', respectively, to the left as viewed in FIG. 3 to maintain a resilient back-up for the gripping assembly G.

Preferably, a fluid system such as schematically illustrated in FIG. 3 is employed for operating the piston and cylinder construction. Fluid lines 35a and 35b are connected to the cylinder 35 for introducing fluid below and above the piston, respectively, depending upon the direction in which such piston is to be moved. As illustrated in FIG. 3 schematically, a fluid reservoir or sump 43 is provided for the hydraulic fluid or other liquid used in the fluid system. The fluid is pumped from the reservoir 43 with any conventional equipment such as indicated by the pump 44 through a check valve 45 to a control valve 46. A pressure gauge 49 may also be employed if desired. The fluid being pumped flows to the line 35a when the valve 46 is in the position illustrated in FIG. 3 to cause the piston within the cylinder 35 to move upwardly and to likewise cause the cylinder 35 to move downwardly until the rollers 30 and 30' have resiliently engaged the rear surfaces of the gripping elements disposed within the length of the reach R. An accumulator 47 is provided in the line 35a and it includes air or other gas above the liquid so that in the event an enlargement such as a collar

or joint on the pipe P moves between the reaches R and R-1, the gas within the accumulator 47 may compress to some extent to permit a slight retraction of the particular rollers 30 or 30' which are affected during the movement of the enlargement longitudinally between the reaches R and R-1, as will be more evident hereinafter. For retracting the back-up assemblies K and K' from their active position shown in FIG. 3, the valve 46 is reversed to direct the fluid into the cylinder 35 through the line 35b.

The gripping assembly G-1 may have a floating piston and cylinder construction as illustrated for the gripping assembly G in FIG. 3, but an alternative construction may be employed such as illustrated in FIG. 4. Thus, with the form illustrated in FIG. 4, the back-up means K and K' are preferably identical and they are operated by links 140 and 140' which correspond respectively with the links 40 and 40' of FIG. 3. Such links 140 and 140' are connected to slidable pins 138 and 141, which correspond with the pins 38 and 41, respectively. The pin 138 has rollers 138' at each end which move in longitudinally extending slots 139 in the side plate 56 (FIG. 4) while the pin 141 has rollers 141' which move in slots 142 in such plate 56. A sleeve 50 having a threaded stud 50a formed integrally therewith is disposed around the central portion of the pivot pin 138 with spacing washers 51 disposed between the sleeve 50 and the links 140. Another sleeve 52 is disposed around the pin 141 with washers 53 between the sleeve 52 and the links 140'. The sleeve 52 has a threaded stud 52a formed integrally therewith or otherwise connected thereto. The threaded studs 50a and 52a each extend into a threaded sleeve or tube 54 which is disposed through the bore 55a of a laterally extending brace plate 55 which extends from one side of the frame F to the other. Such plate 55 is preferably welded or otherwise secured to the side plates 56 of the frame F. The threads 50a and 52a are in opposite directions so that one is a right-hand thread and the other is a left-hand thread, and the internal threads on the sleeve 54 are also similarly formed so that the rotation of the tube or sleeve 54 acts as a turnbuckle to move the inner ends 50b and 52b towards or away from each other, depending upon the direction of rotation of the tube 54. An annular lock nut 57 is threaded on the external surface of the tube 54 for locking the sleeve 54 in each selected position. Thus, when the lock nut 57 is employed, it is loosened to permit rotation of the tube 54 to move the threaded studs 50a and 52a to the selected position and then the nut 57 is rotated to clamp against the plate 55 to thereafter prevent movement of the tube 54 until the lock nut 57 is again released. When the ends 50b and 52b are moved away from each other, it can be seen from FIG. 4 that the sleeves 50 and 52 are thereby moved longitudinally away from each other and such movement results in an upward movement of the pin 138 and a downward movement of the pin 141 to effect a lateral shifting of the back-up assemblies K and K' in the same manner as heretofore described when using the floating piston and cylinder construction of FIG. 3. However, it will be understood that with the mechanical construction FIG. 4 as used on the gripping assembly G-1, there is no resilience provided for the back-up means so that all of the yielding for obstructions or enlargements on the pipe P occurs with respect to the gripping assembly G having the piston and cylinder construction.

Each of the gripping assemblies G and G-1 is also preferably provided with tension means T and T'. The inner portions of such means T and T' are illustrated in connection with the gripping assembly G in FIG. 3 while the outer portions are illustrated in connection with the gripping assembly G-1 in FIG. 3, as will be more clear from the following description. Thus, the tension means T includes a rotatable rod 60 which has a link 61 fixed thereto for rotation therewith. A support plate 62 is pivotally connected to the link 61 at a pivot pin 62a, and roller plates 63 are connected to the plate 62 at pivot pins 62b. Each of the rollers 65 is adapted to engage the rear or

inner surfaces of the gripping elements 10 as they pass in their endless path with respect to such rollers 65. The rollers 65 are urged into firm engagement with the gripping assembly G by means of a piston 66 which is disposed in a cylinder 67 and which is connected through a piston stem 66a to a link 68 and then to the rotatable rod 60 (FIG. 3).

The tension means T' is constructed in an identical manner to that described heretofore in connection with the tension means T and therefore has identical numeral and/or letter designations. Preferably, the cylinders 67 are connected by means of fluid lines 67a and 67b with a fluid system such as schematically illustrated at the right in FIG. 3. Thus, an accumulator is employed which provides a certain amount of resilience at the point of contact between the rollers 65 and the gripping assembly 10 for resiliently taking up any slack in the gripping assemblies G and G-1.

As previously explained, the apparatus A of this invention is preferably mounted on a weight indicator W. For this purpose, the support frame F has a base plate 70 which is welded or otherwise secured to the two side plates 56. The support plate 70 is bolted, welded or otherwise secured to a movable piston 71 in a conventional weight indicator schematically illustrated at W in FIG. 1 of the drawings. The piston 71 is disposed within a chamber or housing 72 and fluid pressure gauges 72a and 72b are provided for indicating the condition of the fluid above and below the piston 71. As the load on the apparatus A increases, a greater load is imparted to the piston 71 so that the fluid pressure below the piston 71 increases, which is indicated on the gauge 72b. Likewise, as the load on the apparatus A decreases, the gauge 72b will show a lesser reading. The gauge 72a changes in an opposite direction to the gauge 72b, as will be well understood by those skilled in the art.

Since it is important to dispose the apparatus A on the weight indicator W substantially directly over the pipe or casing C, and to maintain such alignment during usage even though the apparatus A moves longitudinally, it often becomes desirable and even necessary to provide the stabilizing apparatus S which permits the longitudinal movement of the apparatus A while preventing or restricting its lateral movements. The stabilizing unit S may be made of tubular pipes, bars or other similar framework material so as to provide the vertical supports 75, angular braces 76 and horizontal base members 77, all of which are welded or otherwise secured together as illustrated in FIG. 1, FIG. 2 and FIG. 4 in particular. The base framework 77 may be provided with upright support members 78 which are disposed on the ground, derrick platform or other affixed base. In some cases, cables 79 may be secured to the base framework 77 and then the upper ends of such cables 79 may be secured in the derrick to a traveling block or other suitable support.

At the upper end of the uprights 75 of the stabilizing assembly or unit S, a rectangular frame 80 is provided which has guide pins 81 disposed thereon (FIGS. 4 and 5). Such guide pins 81 extend upwardly through guide holes 82a formed in a guide extension 82 which is integrally connected with, or is otherwise secured to, the side plates 56 of the frame F. If desired, the guide extension 82 may be integral with or secured to the upper ends of the side plates 56 by any suitable means. Bolts 82b (FIG. 5) or other suitable securing means are used for mounting the drive unit 90 (FIG. 3) on the frame F. Thus, with the construction illustrated in the drawings, FIGS. 4 and 5 in particular, the apparatus A is adapted to move vertically in response to the loads imposed thereon as the pipe P moves between the gripping assemblies G and G-1, but lateral shifting of the apparatus A is prevented since the stabilizing unit S is fixed against lateral movement and the guide pins 81 prevent lateral shifting of the guide extension 82 and therefore the frame F.

In a typical use of the apparatus of this invention, a

pipe P is fed into a well under pressure so that the rotary fluid motors 22 operate with the motor on the right in FIG. 3 rotating in a counterclockwise direction and the motor on the left in FIG. 3 operating in a clockwise direction to force the pipe P downwardly against the pressure within the well. When a sufficient amount of the pipe P has been forced into the well to overcome the pressure within the well, the weight of the pipe is then subjected to a sufficient force due to gravity to cause it to move downwardly without any further force other than that which might be necessary to overcome frictional losses. The gripping assemblies G and G-1 are then subjected to a pulling action by the weight of the pipe P which causes the fluid motors 22 to operate as brakes with a suitable hydraulic control system.

Upon a withdrawal of the pipe P or the elongate object from the well or casing C, the pipe P is initially pulled upwardly with the gripping assemblies G and G-1 by rotating the fluid motors 22 as motors with the right-hand motor 22 turning in a clockwise direction and the left-hand motor as viewed in FIG. 3 turning in a counterclockwise direction. When a sufficient amount of the pipe P has been raised in the well to approximately have a balance between the downward force due to the weight of the pipe and the upward force due to the pressure in the well, the gripping assemblies G thereafter act as brakes to retard the upward movement of the pipe P since the pressure thereafter urges the pipe P upwardly. Under such circumstances, the fluid motors 22 again act as brakes while rotating in the same directions until the pipe P has been removed from the well.

The foregoing disclosure and description of the invention is illustrative and explanatory thereof and various changes in the size, shape and materials, as well as in the details of the illustrated construction, may be made within the scope of the appended claims without departing from the spirit of the invention.

What is claimed is:

1. An apparatus for handling an elongate object during longitudinal movement thereof, comprising:
  - (a) a support frame,
  - (b) a pair of endless gripping assemblies mounted on said support frame for endless movement relative to each other for engaging an elongate object longitudinally therebetween,
  - (c) each of said gripping assemblies including an endless loop of gripping elements,
  - (d) a floating piston and cylinder mounted on said support frame for relative movement with respect thereto,
  - (e) back-up means connected to said piston and engageable with the inner surfaces of a portion of said gripping elements in said reach of one of said gripping assemblies for maintaining said gripping elements in contact with the elongate object,
  - (f) additional back-up means connected to said cylinder and engageable with the inner surfaces of another portion of said gripping elements in said reach of said one of said gripping assemblies, and
  - (g) fluid means operably connected with said piston and cylinder for moving same relative to each other and relative to said frame for causing both of said back-up means to press against their respective portions with a resilient force.
2. An apparatus for handling an elongate object during longitudinal movement thereof, comprising:
  - (a) a support frame,
  - (b) a pair of endless gripping assemblies mounted on said support frame for endless movement relative to each other for engaging an elongate object longitudinally therebetween,
  - (c) each of said gripping assemblies including an endless loop of gripping elements,
  - (d) a floating piston and cylinder mounted on said support frame for relative movement with respect thereto,

- (e) a first back-up means including a plurality of rollers engageable with the inner surfaces of a first portion of said gripping elements in said reach of one of said gripping assemblies,
  - (f) said first back-up means also including linkage means connecting said rollers to said piston for applying a resilient pushing force on said first portion of said gripping elements,
  - (g) a second back-up means including a plurality of rollers engageable with the inner surface of a second portion of said gripping elements in said reach of one of said gripping assemblies, and
  - (h) said second back-up means also including linkage means connecting said rollers of said second back-up means to said cylinder for applying a resilient pushing force on said second portion of said gripping elements.
3. An apparatus for handling an elongate object during longitudinal movement thereof, comprising:
    - (a) an endless loop of gripping elements,
    - (b) means for supporting said gripping elements as said loop travels in an endless path,
    - (c) each of said gripping elements including
      - (1) a block,
      - (2) a pair of arms on said block spaced apart at least the width of the block for receiving a portion of the adjacent block therebetween,
      - (d) pivot means pivotally connecting each of said pair of arms to the block disposed therebetween, and
      - (e) a single back-up roller engageable with each of said blocks and the pair of arms disposed outwardly thereof for providing an uninterrupted contact as the gripping elements move relative to the rollers.
  4. An apparatus for handling an elongate object during longitudinal movement thereof, comprising:
    - (a) an endless loop of gripping elements,
    - (b) means for supporting said gripping elements as said loop travels in an endless path,
    - (c) each of said gripping elements including
      - (1) a block,
      - (2) a gripping shoe for each block and having an inner curved surface conforming generally with the external surface of the elongate object, and
      - (3) means mounting each said gripping shoe on one of said blocks for limited lateral shifting to enable said shoes to independently move and thereby accommodate localized variations in the elongate object.
  5. An apparatus for handling an elongate object during longitudinal movement thereof, comprising:
    - (a) an endless loop of gripping elements,
    - (b) means for supporting said gripping elements as said loop travels in an endless path,
    - (c) each of said gripping elements including
      - (1) a block,
      - (2) a gripping shoe for each block and having an inner curved surface conforming generally with the external surface of the elongate object,
      - (3) each of said shoes and blocks having mating grooves and projections for permitting lateral movement of each of said shoes independently relative to the block to which it is attached, and
      - (4) means securing said shoes to said blocks for limiting said lateral movement.
  6. An apparatus for handling an elongate object during longitudinal movement thereof, comprising:
    - (a) a support frame,
    - (b) a pair of endless gripping assemblies mounted on said support frame for endless movement relative to each other for engaging an elongate object longitudinally therebetween,
    - (c) a weight indicator for mounting on the upper end of a well pipe,
    - (d) means for mounting said support frame on said weight indicator for transmitting longitudinal move-

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- ments of said frame due to loads on said gripping assemblies to said weight indicator,
- (e) a stabilizing unit mounted to restrict lateral movement thereof, and
- (f) interconnecting means on said support frame and said stabilizing unit to restrict lateral movement of said support frame while permitting its longitudinal movements. 5
7. An apparatus for handling an elongate object during longitudinal movement thereof, comprising: 10
- (a) a support frame,
- (b) a pair of endless gripping assemblies mounted on said support frame for endless movement relative to each other for engaging an elongate object longitudinally therebetween, 15
- (c) a weight indicator for mounting on the upper end of a well pipe,
- (d) means for mounting said support frame on said weight indicator for transmitting longitudinal movements of said frame due to loads on said gripping assemblies to said weight indicator, 20
- (e) a stabilizing unit having a plurality of longitudinally extending guide pins, and
- (f) means on said support frame including openings for receiving said guide pins to prevent lateral shifting of said support frame while permitting it to move longitudinally. 25
8. An apparatus for handling an elongate object during longitudinal movement thereof, comprising:
- (a) an endless loop of gripping elements, 30

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- (b) an endless chain of links on each side of said endless loop of gripping elements,
- (c) means for engaging and supporting said endless chains as said chains and said loop travel in an endless path,
- (d) each of said gripping elements including
- (1) a block,
- (2) a pair of arms on said block spaced apart at least the width of the block for receiving a portion of the adjacent block therebetween, and
- (e) a pivot pin pivotally connecting each of said pair of arms to the block disposed therebetween and to the links on each side thereof.

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