Jan. 1, 1952 W. L. PEARCE 2,580,828

PIPE HOLDING SLIP

Filed April 9, 1947 4 Sheets-Sheet 1

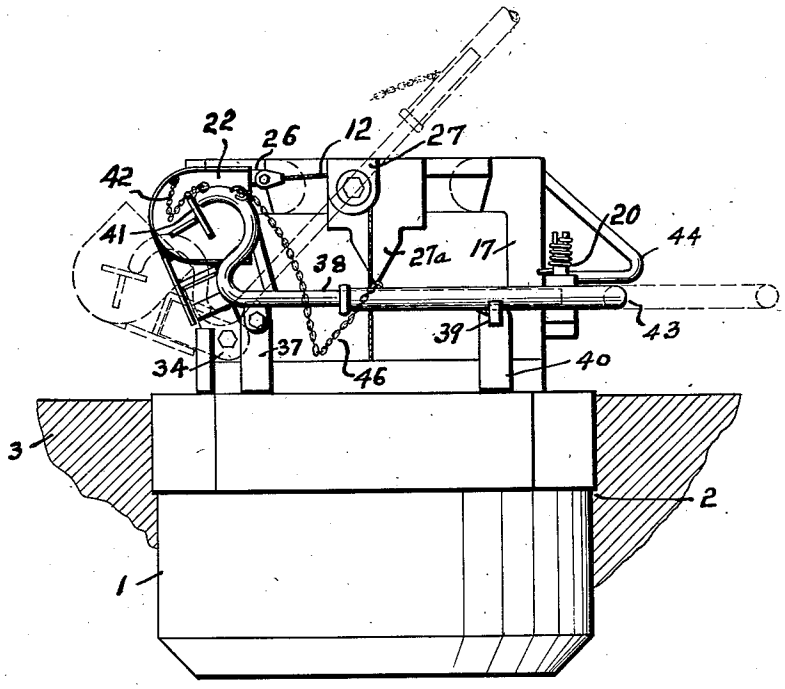


Fig. 1

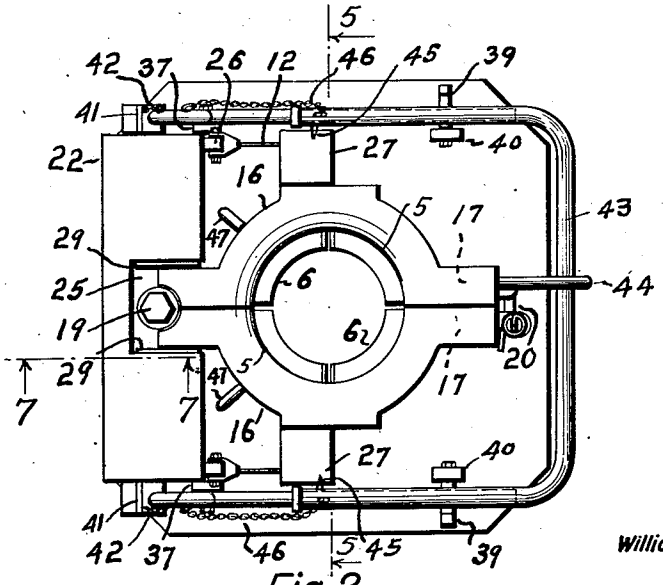


Fig. 2

Inventor
William L. Pearce

By E. V. Hardway
Attorney

Jan. 1, 1952 W. L. PEARCE 2,580,828

PIPE HOLDING SLIP

Filed April 9, 1947 4 Sheets-Sheet 2

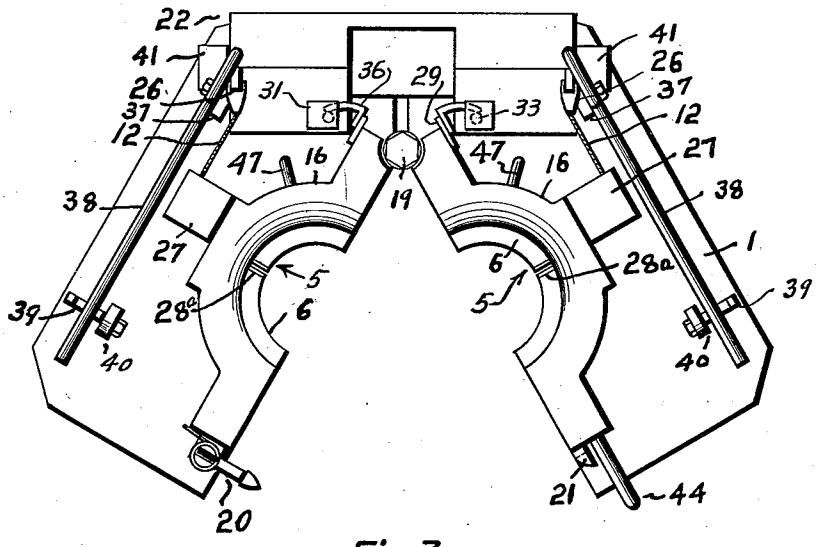


Fig.3

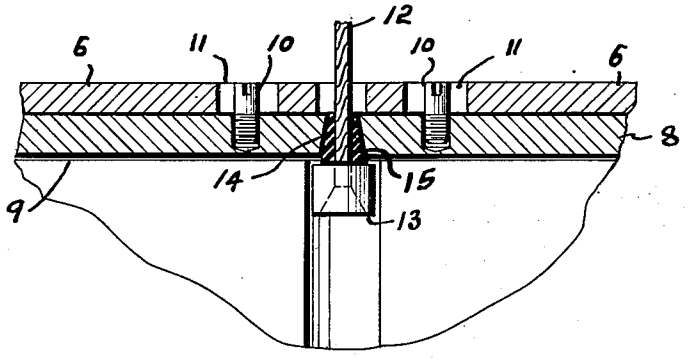


Fig. 4

Inventor
William L. Pearce

By E. V. Hardway.
Attorney

Jan. 1, 1952 W. L. PEARCE 2,580,828

PIPE HOLDING SLIP

Filed April 9, 1947 4 Sheets-Sheet 3

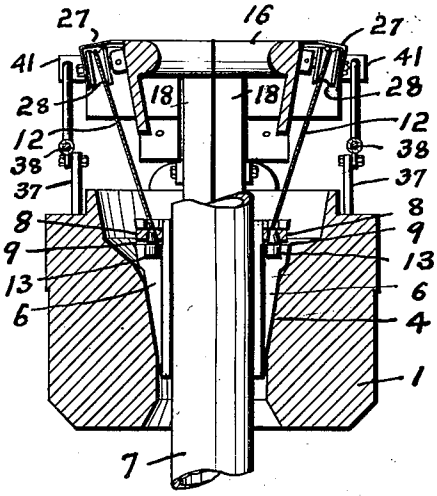


Fig.5

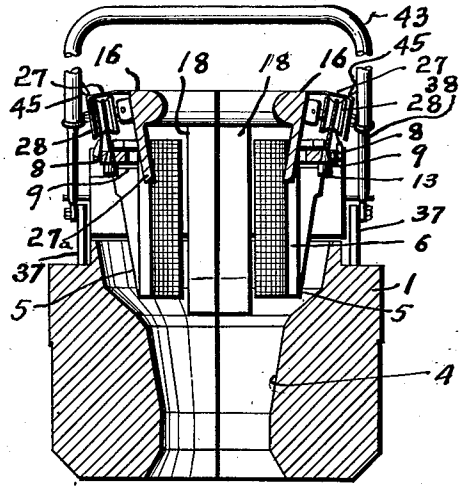


Fig.6

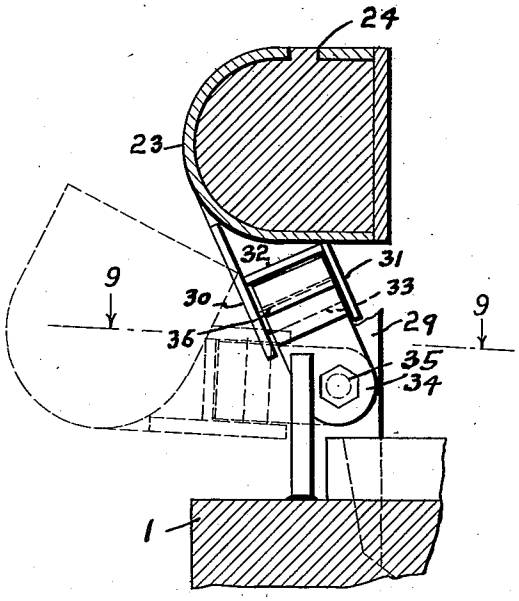


Fig. 7

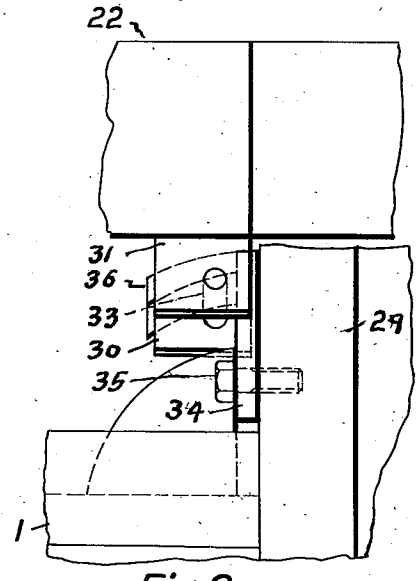


Fig.8

Inventor
William L. Pearce

By

E. V. Hardway.
Attorney

Jan. 1, 1952 W. L. PEARCE 2,580,828

PIPE HOLDING SLIP

Filed April 9, 1947 4 Sheets-Sheet 4

Fig. 9

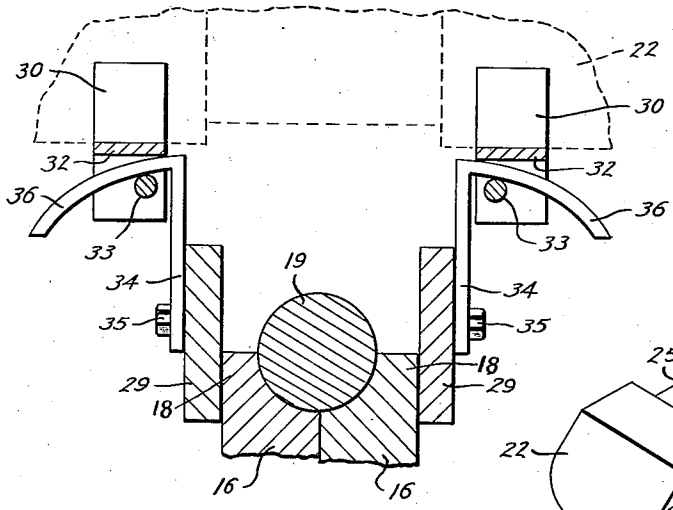


Fig. 11

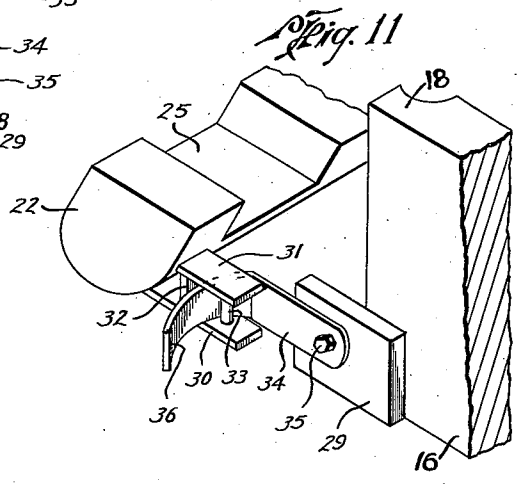
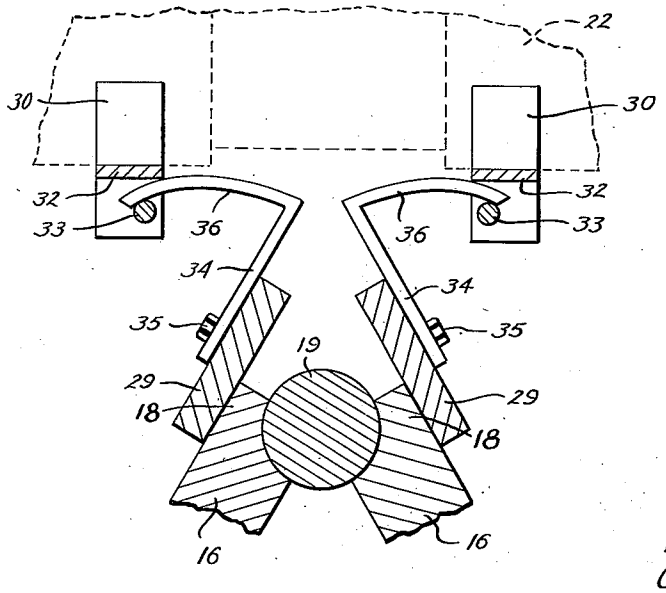


Fig. 10



William L. Pearce
INVENTOR.

BY
Charles E. Lightfoot
ATTORNEY

Patented Jan. 1, 1952 2,580,828

UNITED STATES PATENT OFFICE

2,580,828

PIPE HOLDING SLIP

William L. Pearce, Houston, Tex.

Application April 9, 1947, Serial No. 740,439

2 Claims. (Cl. 24—263)

1

This invention relates to a pipe holding slip.

The invention includes certain improvements over that type of pipe holding slip disclosed in the copending application of this applicant which was filed in the United States Patent Office on December 5, 1945, under Serial No. 632,889 now Patent No. 2,496,172.

An object of the present invention is to provide a slip of the character described specially designed for use in the handling of pipe and the like while lowering the same into or withdrawing the same from a well and the invention relates primarily to a novel type of counterbalancing means for the slip sections which will relieve the workman from a major portion of the load in lifting the slips from or lowering the same into the bushing of the rotary.

It is another object of the present invention to provide a novel type of slip cage mounted on the rotary bushing and in which the slip sections are mounted for the convenient elevation or lowering of the slips.

The invention also includes a slip counterbalance connected to the slips in a novel manner with means for controlling the counterbalance.

The invention also embodies means for retaining said controlling means in inactive or inoperative position.

The improvements referred to include, among others, the provision of connecting means between the slip-segment-operating counterweight and the driving bushing, which permits the weight to have vertical swinging movement to accomplish the lifting of the slip segments and also to permit the hinged parts of the slip cage and driving bushing to have horizontal swinging movement relative to the weight and to each other when the weight is in its lowermost position. Another improvement resides in the provision of means for securing the slip in pipe gripping position to prevent accidental release of the slip segments, and whereby the slip may be more readily handled as a unit in placing the same in or removing the same from the table of the rotary drilling machine. A further improvement is the embodiment in the slip structure of resilient bumper means in the connection between the counterweight and the slip segments whereby the force applied to the segments in lifting the same is effectively cushioned.

Other improvements, objects and advantages will be apparent from the following specification which is illustrated by the accompanying drawings, wherein:

2

Figure 1 is a side elevation of the complete assembly.

Figure 2 is a plan view.

Figure 3 is a plan view showing the slips in open position.

Figure 4 is a enlarged, fragmentary, cross-sectional view.

Figure 5 is a vertical, sectional view taken along line 5—5 of Figure 2, showing the slips in released position.

Figure 6 is a vertical, sectional view taken along line 5—5 of Figure 2, showing the slips in released position.

Figure 7 is an enlarged, fragmentary, vertical, sectional view, taken along line 7—7 of Figure 2,

Figure 8 is an enlarged, fragmentary, elevational view taken at right angles to the view shown in Figure 7.

Figure 9 is a fragmentary cross-sectional view taken along line 9—9 of Figure 7, showing the slip cage sections in closed condition;

Figure 10 is a fragmentary cross-sectional view similar to Figure 9, taken along line 9—9 of Figure 7, showing the slip cage sections in open condition; and

Figure 11 is a fragmentary perspective view showing the structure and arrangement of the parts of the means by which the counterweight is connected to the slip cage sections.

In the drawings the numeral 1 designates a drive bushing which is adapted to be seated in the bushing seat 2 of the table 3 of a conventional rotary drilling machine. This drive bushing has a downwardly tapering inside seat 4 whose upper end is enlarged, as shown in Figures 5 and 6.

There are the opposed, confronting slip segments designated generally by the numerals 5, 5.

In the present illustration each segment is composed of a plurality of wedge shaped sections, as 6, 6.

In the present illustration, each segment is composed of two of said sections. The slip sections 6 are downwardly tapered externally to conform to the shape of and to fit into the seat 4, as shown in Figure 5. Internally the slip sections are curved to conform to the external curvature of the pipe 7 to be held and are preferably internally toothed, as indicated in Figure 6, so as to better grip and hold the pipe.

The slip sections of each segment are loosely connected together by means of arcuate yokes, as 8, 8. These yokes are fitted into external grooves 9, 9 in the upper end of the slip sections and are retained therein by retaining pins 10, 10 which are screwed into the respective yokes and

whose upper ends extend through oblong slots 11, 11 extending upwardly from the grooves 9 through the slip sections, as shown in Figure 4, and as also shown in said co-pending application, so that the respective slip sections will be loosely connected together.

The lower ends of lift cables 12, 12 are connected to the respective yokes. As shown in Figure 4, the lower ends of these cables pass between the slip sections of the respective segments and through the yokes 8 and are secured against detachment from the segments by means of the socket members 13 to which said cable ends are secured.

The openings 14 in the yokes through which the cables extend are downwardly flared and surrounding the ends of the cables and fitted into the openings are the resilient bumpers 15 which conform to the shape of said openings and whose lower ends extend beneath the yokes so that upon lifting the slips the socket members will contact with said bumpers, all as shown in Figure 4.

It will be noted that the bushing 1 is formed of two similar confronting sections.

Upstanding from the bushing there is a slip cage also formed of two similar confronting sections 16, 16 whose mid-portions are arcuate and whose forward and rear ends are outwardly turned, as more accurately shown in Figures 2 and 3.

Formed integrally with these outwardly turned ends are the forward legs, as 17, 17 and the rear legs 18, 18 whose lower ends extend down into, and are welded to, the corresponding bushing sections.

Said rear legs are hinged on a vertical axis by means of the hinge pin 19, as best illustrated in Figure 3, so that the bushing sections and cage sections may open and close as a unit.

When closed they may be latched in closed position by means of a latch 20 on the free end of one cage section which engages with a hasp 21 on the free end of the other cage section. Any conventional type of latch may be employed.

There is a counterweight designated generally by the numeral 22. This counterweight is shown in enlarged view in Figures 7 and 8. It may be composed of a metal housing 23 which may be provided with a gate 24 through which the housing may be filled with melted lead. Of course, any type of weighting material may be used, what is now considered a preferred embodiment of the weight being shown.

As shown in Figure 2, the weight is composed of a single unit which is elongated transversely of the bushing and whose forward side has a central recess 25 that provides room for the hinge connecting the bushing and cage sections.

The other ends of the cables 12 are connected to the lugs 26, 26 extending forwardly from the respective ends of the weight housing 23, as shown more accurately in Figures 1, 2 and 3.

Extending laterally from the sections 16 of the slip cage are the housings 27, 27 within which are mounted the rotatable sheaves 28, 28 over which the cables 12 work so that when the weight is moved rearwardly into the position shown in dotted lines in Figures 1 and 7, the slip segments will be elevated and moved outwardly, as indicated in Figure 6, so as to release the pipe and when the weight is moved to vertical position, as indicated in full lines, in Figures 1, 2, 5, 7 and 8, the slips will move downwardly by gravity and will be moved inwardly by the seat 4 and will wedge between the bushing and pipe, so as

to support the latter, as indicated in Figure 5.

Depending from the respective sections of the cage are the downwardly pointed, wedge shaped expanders 27*a*, 27*a* arranged between the slip sections of each segment so that upon upward movement of the slip segments these expanders will co-operate with the corresponding tapering faces 28*a*, 28*a* at the upper inner corners of adjacent sections whereby the sections of each pair, or segment, of the slip will be caused to move apart and the corresponding pins 16 will move outwardly along the corresponding slots 11 which will effect a uniform expansion of the slip sections as they move upwardly. The counterbalancing weight 22 is mounted on spaced upright standards 29, 29. These standards are suitably secured to the respective segments of the bushing and upstand therefrom on opposite sides of the hinge connection between the cage sections. These standards are shown in Figures 7 and 8 and may be partly seen through by recess 25 in Figure 2.

Secured to the underside of the housing 23 on opposite sides of the recess 25 are the depending brackets comprising spaced arms 30, 31 which may be welded to the housing 23 and provided with cross webs 32 welded to said arms. These brackets also include cross pins 33 whose ends are suitably secured, as by welding, to the arms 30, 31.

There are the hinge members 34, 34 whose lower ends are pivoted on the stud bolts 35, 35. These stud bolts are screwed into the inner sides of the corresponding standards 29, 29 and their outer ends have retaining heads thereon.

The upper ends of the hinge members 34 have the arcuate hook-like retainers 36 extending outwardly in opposite directions through the weight brackets and over the pins 33 therein. The weight 22, therefore, may be swung to its lower position, as indicated in dotted lines, or to its upper position pivoting about the stud bolts 35 which are in transverse alignment; also when it is desired to swing the sections of the bushing 1 to open or closed position this will be permitted by the free movement of the retainers 36 relative to the corresponding pins 33. So the respective sections of the bushing have, in effect, universal connections with the weight. It will be noted that when the weight 22 is moved to its up position the hinged legs 18, 18 of the sections 16, 16 of the slip cage are received in the recess 25 in the weight so that the slip cage sections and the sides of the recess 25 are interengaged and serve to prevent horizontal swinging movement of the slip cage sections. When, however, the weight is moved downwardly the hinged legs 18 clear the recess 25, and the slip cage sections may be moved apart about the pivot 19.

At opposite ends of the weight and located slightly in front thereof there are the upstanding rear standards 37, 37 which are transversely aligned and pivotally connected to these respective standards are the handles 38, 38 whose forward ends may be supported on the outwardly extended supports 39, 39 carried by the upper ends of the front standards 40, 40 which upstand from the respective sections of the bushing.

Extended outwardly from the ends of the weight 22 there are the bearing plates 41, 41 and the rear ends of the handles 38 are upturned and rearwardly curved with their free ends resting against the forward faces of said bearing plates so that when the handles are elevated, as in-

dicated in dotted lines in Figure 1, the weight 22 will be overbalanced and will move rearwardly into the position indicated in dotted lines in Figure 1 to elevate the slips into the position shown in Figure 6. Tie members, such as chains, 42, 42 are connected at their forward ends to the free rear ends of the handles 38 and at their other ends to the bearing plates 41 to assist in supporting the load of the weight 22 and to relieve the universal connections, above referred to, connecting the weight to the bushing.

There is a U-shaped tubular, grip member 43 whose side arms may be telescoped over the handles 38, as shown in Figures 1 and 2, and projecting forwardly from one of the legs 17 there is a retaining member 44. When the assembly is in pipe supporting position, as shown in Figures 1, 2 and 5, the grip member 43 is moved inwardly to engage underneath said retainer 44, as shown in Figures 1 and 2, so that the weight 22 may not be inadvertently overbalanced, or moved, to active position, to elevate the slips.

It is to be understood that the pipe 7 will be handled through the instrumentality of the conventional pipe elevators which, in turn, are elevated and lowered by means of a conventional travelling block suspended and operated by means of a cable threaded through sheaves of the derrick crown block and of the traveling block and operated by the conventional drawworks on the derrick floor. When it is desired to move the pipe 7 a workman on the derrick floor may pull the grip member 43 outwardly into the position shown in dotted lines in Figure 1 and then moved upwardly to its upper position, as shown in dotted lines in Figure 1 and as shown in full lines in Figure 6. This will operate, as above explained, to overbalance the weight 22 which, in turn, will elevate the slips 6 causing them to move also outwardly away from the pipe. When the weight reaches the limit of its downward movement the upward movement of the handles 38 will be stopped and the grip member 43 will slide downwardly along said handles but this downward movement of the grip member will be stopped by the engagement of the stop fingers 45, 45 against the housings 27, 27 as shown in Figures 2 and 6. These stop fingers are attached to, or formed integrally with, the side arms of the grip member 43 and they serve to limit the downward movement of the grip member so that the hands of the workman will not come into contact with, and be injured by, the pipe or elevators.

There are the side chains 46, 46 connected at their forward ends to the rear ends of the grip member 43 and detachably connected, at their rear ends to the upwardly turned rear ends of the handles 38, as shown in Figures 1 and 2. These chains 46 are provided so that when the grip member 43 is pulled outwardly, as indicated in dotted lines in Figure 1, the grip member will not be inadvertently detached from the handles; however, when it is desired to open the bushing and cage sections, as shown in Figure 3, the rear ends of the chains 46 may be detached and the grip member 43 completely removed.

The cage sections 16 are provided with the eyes 47, 47 to receive elevator hooks when it becomes necessary to remove the slip assembly from the rotary table.

The drawings and description are illustrative merely while the broad principle of the invention will be defined by the appended claims.

What I claim is:

1. A slip for supporting pipe, and the like, comprising, a bushing formed of confronting vertically-hinged members and having a downwardly tapering inside seat, a cage on the bushing, slip segments mounted in the cage and movable, by gravity, into active position into engagement with a pipe extended through the bushing, each segment comprising independent sections, a counterbalancing weight pivotal means connecting the bushing members and weight for relative vertical and horizontal swinging movement, said weight being normally in upright, inactive position, interengageable means on the weight and bushing cooperable to hold the members against horizontal swinging movement when the weight is in said upright position, flexible members connecting the segments with the weight, sheaves on the cage over which the members operate whereby the weight is effective to move the segments upwardly to inactive position upon downward movement of the weight, and means on the cage for moving the sections apart as the segments are moved upwardly.

2. Pipe suspending means comprising, a bushing having an inside seat, a weight mounted on the bushing and movable to upper and lower positions, handles mounted on the bushing and operative to overbalance the weight upon elevation of the handles, a cage on the bushing, a retainer on the cage, a grip member in telescopic relation with the handles movable into engagement with the retainer to lock the handles in inoperative position and releasable from the retainer to allow the handles to be elevated, pipe engaging means, means connected to the weight and to the pipe engaging means and suspended from the cage and effective to elevate the pipe engaging means when the weight is moved to lower position and to allow said engaging means to move, by gravity, into the seat to pipe engaging position when the weight is moved to its upper position.

WILLIAM L. PEARCE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,356,458	Moody	Oct. 18, 1920
1,486,035	Rich	Mar. 4, 1924
1,966,454	Moody	July 17, 1934
1,999,519	Standlee	Apr. 30, 1935
2,208,926	Fluellen	July 23, 1940
2,269,888	Sharp	Jan. 13, 1942
2,496,172	Pearce	Jan. 31, 1950