W. G. KNAPP.

SECTIONAL SLIP.

APPLICATION FILED JAN. 9, 1913.

1,234,041.

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Fig. 1

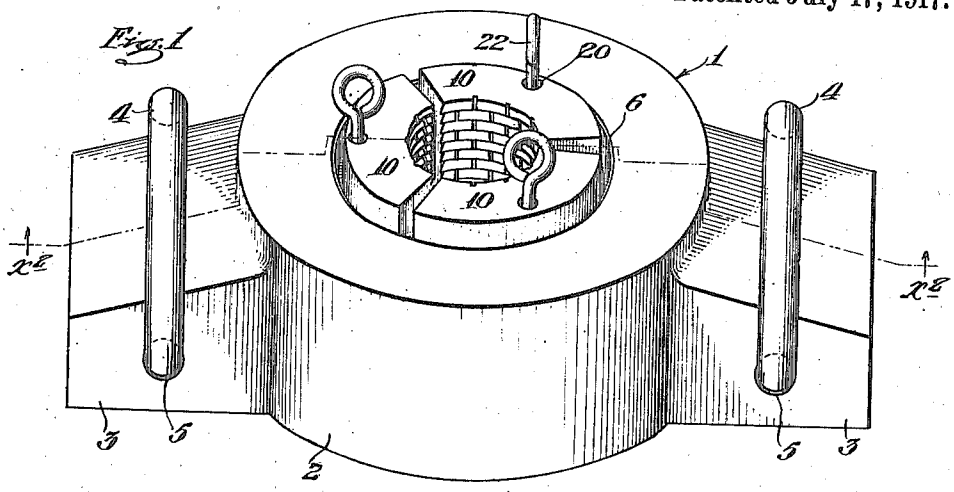


Fig. 2

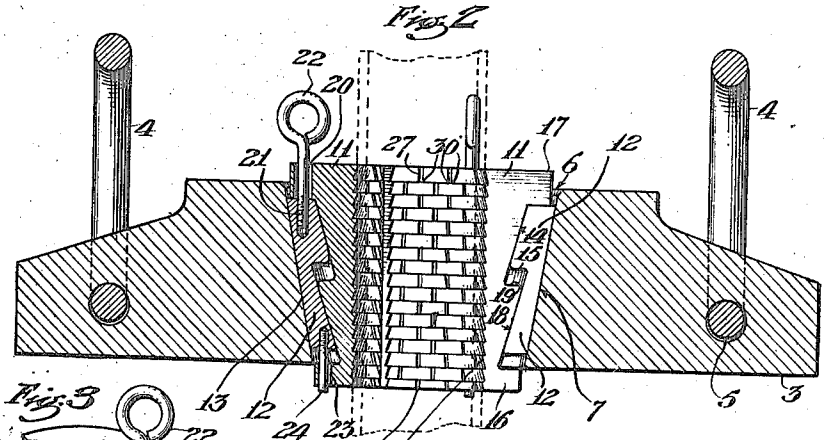


Fig. 3

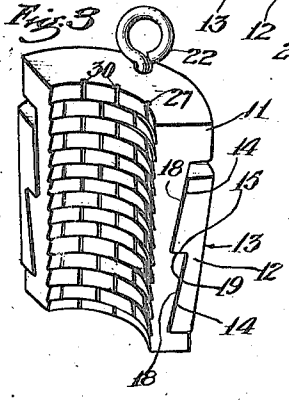


Fig. 4

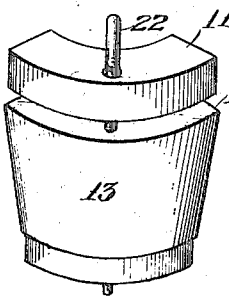
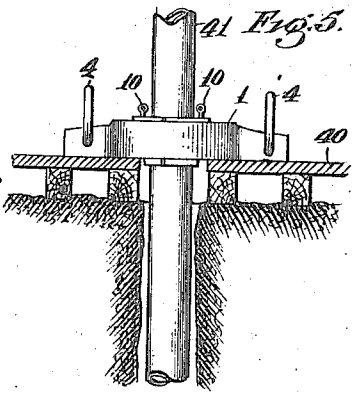


Fig. 5.



Witnesses:

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UNITED STATES PATENT OFFICE.

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SECTIONAL SLIP.

1,234,041. Specification of Letters Patent. Patented July 17, 1917.

Application filed January 9, 1913. Serial No. 741,109.

To all whom it may concern:

Be it known that I, WILLIAM G. KNAPP, a citizen of the United States, residing at Alhambra, in the county of Los Angeles and State of California, have invented new and useful Improvements in Sectional Slips, of which the following is a specification.

In oil well construction it is necessary to provide means for supporting the casing of the well during the operation of drilling the well. It is also necessary at times during the drilling operation to raise and lower the casing. Ordinarily there is provided for this purpose a supporting member, commonly termed a spider, which rests upon the floor of the derrick, or, where the derrick is provided with a cellar, upon the floor of the cellar. This spider is provided with a central opening through which the casing extends vertically, and between the casing and the wall of the central opening of the spider are provided a series of segments each having an inner gripping face adapted to engage the casing and a beveled outer face adapted to engage the wall of the opening in the spider. The angle of the beveled inner face of the opening of the spider and the outer face of each slip has been determined by experience to be about three inches to a foot. Should this angle be too great, the weight of the casing would cause the slips to back away from the casing, thereby permitting the casing to slide downwardly through the slips. If the angle is made too small, the binding of the slips about the casing is so great that the casing is pinched. When a great length of casing is supported by the usual form of slips, the slips become wedged so tightly in the spider that the casing when lifted, as is necessary at times during the drilling operation, raises the slips and the spider. It then becomes necessary to use a sledge or other heavy object to disengage the spider and slips, which operation places a great strain upon the casing and lifting devices and causes liability of damage to some portion of the mechanism.

One of the main objects of my invention is to provide slips made in sectional form which will immediately release upon raising the casing, without raising the spider or supporting member.

Another object of my invention is to provide slips in which the casing gripping face may be made of maximum length.

Referring to the drawings, which are for illustrative purposes only:

Figure 1 is a perspective view of a supporting member or spider provided with slips embodying a form of my invention.

Fig. 2 is a sectional view on line x^2 x^2 Fig. 1.

Fig. 3 is a perspective view of one of the slips showing the casing gripping face thereof.

Fig. 4 is a perspective view of one of the slips showing the outer face of the slip.

Fig. 5 is a diagrammatic view illustrating the manner of using the spider and slips for supporting the well casing.

My invention resides in general terms in producing an improved slip of sectional form, being constructed of two or more parts, one of which is an inner member adapted to engage the casing and another being an outer member having a tapered outer face adapted to engage the spider or supporting member, the contacting faces of the two parts being tapered at a greater angle than the spider engaging face of the outer member.

1 designates a supporting member or spider consisting of a heavy metal casting having a circular body portion 2 provided with extensions or arms 3, each arm 3 being provided with a ring 4 which extends through an opening 5 in the respective arms, the rings 4 being provided to facilitate the lifting or moving of the spider. The spider is provided with a round central opening 6, the wall 7 of which tapers downwardly and inwardly, as clearly illustrated in Fig. 2 of the drawing. Within the central opening 6 of the spider is arranged, in the form shown, three segmental sectional slips 10, each consisting of an inner or casing gripping member 11 and an outer or spider gripping member 12. The outer face 13 of the spider gripping member 12 is beveled at the same angle as the wall of the opening 6 in the spider. The angle shown, being about three inches to one foot, has been determined to be best adapted to prevent crushing of the casing or backing away of the slips from the casing, a crushing of the casing being caused by too small an angle and the backing away of all the slips being caused by too great an angle on the engaging face between the slips and the spider. Each spider gripping member 12 is provided with

a beveled inner face 14 having a considerably greater angle than the outer face 13 of the spider gripping member 12. The inner face 14 of each member 12 is staggered, as indicated in Figs. 2 and 3, and provided with a shoulder 15. Each casing gripping member 11 is of greater length than the respective spider gripping members 12, being provided with an upper flange 17 which rests upon the upper end of its associated outer member 12, and a lower flange 16 which extends under the lower end of the respective outer members 12, there being a space between the lower end of the members 12 and the respective flanges 16 when the upper flange 17 is resting upon the upper end of the respective outer members 12. The casing gripping members 11 are each provided with an outer staggered beveled face 18 of the same angle as the inner face of the members 12, the face 18 of each member 11 being provided with a shoulder 19, as clearly shown in Fig. 2, there being provided a sufficient distance between the shoulders 15 on the members 12 and shoulders 19 on the members 11 so that the same at no time come into contact with each other. In each flange 17 of the respective inner members 11 is provided an opening 20 through which downwardly extends the threaded end 21 of an eye 22, the threaded end 21 extending into the spider gripping member 12 of the respective slips. The lower flange 16 of each inner member 11 is provided with an opening 23 through which extends a pin 24, the inner end of which is threaded into the lower end of the respective outer members 12. The eyes 22 and pins 24 serve to keep the two parts of each slip, namely, the casing gripping member 11 and the spider gripping member 12, in proper relation to each other. Each casing gripping member 11 is provided with a series of circular teeth 26, the points of which are extended upwardly and cut at intervals, as indicated at 27, thereby providing a plurality of teeth arranged in circular form on the inner face of the respective casing gripping members 11 to prevent the casing or pipe from slipping downwardly therein when the slips are in proper position in the spider. The cuts 27 in the teeth provide the teeth with a series of corners or edges 30, thereby adding additional length of life to the gripping action of the slips, the cuts 27 being preferably arranged in staggered form, as indicated in Figs. 2 and 3.

The device is used in the following manner:

As illustrated in Fig. 5 the spider 1 is placed upon the floor of the derrick indicated at 40, the casing 41 extending through the spider as shown with the slips 10 within the central opening 6 of the spider between the same and the casing 41. The weight of the casing is carried by suitable elevators not shown so that none of the weight is taken by the slips 10. Before the casing 41 is lowered the operators take hold of the eye bolts 22 and pull the outer or spider gripping members 12 upwardly until they are in substantially the position shown in Fig. 2, the inner members 11 resting loosely by means of their flanges 17 upon the top of the members 12. The operators hold the members 11 and 12 in the same relative position as the casing is lowered. This lowering of the casing causes the teeth 26 to grip the casing and the members 11 and 12 are carried down together and wedged in the spider 1 gripping the casing firmly at the same time. There is no movement of the inner member 11 with relation to the outer member 12, the two members moving downwardly with the casing, the only sliding movement being on the beveled face 13. It is a well known fact that when metal surfaces are ground together under heavy pressure they tend to become welded together due probably to a locking action of the surfaces. This action is known in mechanics as "seizing." In the ordinary form of slip having a single wedge this seizing tends to "freeze" the wedge to the spider and makes the removal thereof very difficult. It is to obviate this difficulty which is often so serious as to call for vigorous action with a sledge hammer that the slips 10 are made in two parts 11 and 12. There being no sliding between these members but merely an expansive action they do not seize but part readily and cleanly. Moreover the wedging angle between the members 11 and 12 being greater than the angle of the surface 13 the tendency to stick is greatly reduced.

When it is desired to raise the casing, any of the ordinary or well known forms of elevating means may be employed, and as the casing moves upwardly the outer face 18 of each inner member 11 immediately becomes disengaged from the inner face 14 of each outer member 12, due to the great angle of the respective adjacent bearing faces which immediately permits an expanding action of the inner members 11. The inner members 11 thereupon drop away or become disengaged from the casing. Should the weight of the casing have caused the teeth of the inner members 11 to enter the casing, thereby causing the inner members 11 to remain in engagement with the casing after the outer bearing face of each inner member 11 has become disengaged from the inner face of the outer members 12, the lower flange 16 of the inner members 11 of each slip would come into engagement with the lower end of the respective outer members 12 of each slip, and there being considerable lost motion between the

bearing faces of the inner and outer members 11 and 12 respectively, the striking of the flange 16 against the lower end of the respective outer members 11 would cause disengagement of the outer members 12 and the spider, and at the same time cause disengagement of the inner members 11 with the casing.

While I have shown and described the slips as being used in a spider providing a stationary support for well casing, I do not limit my invention to such use, but it is understood that the same may be used as an elevator, in which case the cables commonly used for raising elevators would be attached to the rings 4 shown on the spider.

What I claim is:

1. A casing support comprising a supporting member having a beveled opening therein, a series of segmental slips in said opening, each consisting of relatively movable inner and outer members, a flange on each inner member at the upper end thereof extending over the upper end of its associated outer member, and a flange on each inner member at the lower end thereof extending under the lower end of its associated outer member, said flanges being adapted to alternately engage the opposite ends of said outer members.

2. A sectional slip of segmental form comprising an inner member, an outer member connected to said inner member to permit relative movement therebetween, said outer member having an outer beveled face, said members having slidably engaging faces beveled at an angle greater than the angle of the outer face of the outer member, and a flange on the inner member adapted to engage the top of the outer member.

3. A sectional slip of segmental form comprising an inner member, an outer member connected to said inner member to permit relative movement therebetween, said outer member having an outer beveled face, said members having slidably engaging faces beveled at an angle greater than the angle of the outer face of the outer member, a flange on the inner member adapted to engage the top of the outer member, and a flange on the inner member adapted to engage the lower end of the outer member, said flanges being arranged to alternately engage the opposite ends of said outer member.

4. A sectional slip comprising an outer member having an outer beveled face and a stepped inner face beveled at an angle greater than the outer face, an inner member having a toothed inner face and a stepped outer face corresponding to the inner face of the outer member, a flange extending outwardly from both ends of the inner member over the respective ends of the outer member, said flanges being adapted to alternately engage the opposite ends of the outer member, and an eye bolt secured to the upper end of the outer member extending through an opening in the inner member.

5. A casing support comprising a supporting member having a beveled opening therein, support gripping members placed therein, means whereby said support gripping members may be supported independently of said supporting member, casing gripping members between said support gripping members and the casing, and means by which said casing gripping members may be supported on said support gripping members.

6. A casing support comprising a supporting member having a beveled opening therein through which the casing passes, wedge shaped support gripping members placed in said opening, means by which the weight of said support gripping members may be carried independent of said supporting member, wedge shaped casing gripping members placed between said support gripping members and the casing, and means by which the weight of said casing gripping members may be carried on said support gripping members.

7. A casing support comprising a supporting member having a conical opening therein, support gripping members in said opening, casing gripping members between said support gripping members and the casing, means whereby said support gripping members may be supported out of contact with the conical surface of said conical opening in said supporting member, and flanges on said casing gripping members adapted to limit the downward movement of said casing gripping members with relation to the support gripping members.

8. A casing support comprising a supporting member having a beveled opening therein through which the casing passes, outer wedges in this opening, inner wedges between the outer wedges and the casing, means whereby said outer wedges may be supported out of contact with the walls of said beveled opening, and means formed on the inner wedges whereby said inner wedges may be suported on the outer wedges.

9. A casing support comprising a supporting member having a beveled opening through which the casing passes, outer wedges in this opening, inner wedges in this opening, and eye bolts secured in the top of said outer wedges by means of which the weight of the outer wedges may be supported independent of the supporting member.

10. A casing support comprising a supporting member having a beveled opening through which the casing passes, outer wedges in this opening, inner wedges in this opening, flanges on said inner wedges projecting out over the outer wedges, and means on said outer wedges whereby the

weight of said outer wedges may be supported from above independent of the supporting member.

11. A casing support comprising a supporting member having a beveled opening through which the casing passes, outer wedges in this opening, inner wedges in this opening, flanges on said inner wedges projecting out over the outer wedges, and eye bolts fixed in the top of said outer wedges by means of which the weight of said wedges may be supported independent of the supporting member.

12. A casing support comprising a supporting member having a beveled opening through which the casing passes, outer wedges in this opening, inner wedges in this opening, flanges on said inner wedges projecting out over the outer wedges, flanges on said inner members projecting beneath the outer members, and means on said outer wedges for attaching supporting means which are independent of said supporting member.

13. A casing support comprising a supporting member having a beveled opening through which the casing passes, outer wedges in this opening, inner wedges in this opening, flanges on said inner wedges projecting out over the outer wedges, flanges on said inner members projecting beneath the outer members, and eye bolts on said outer wedges to which independent supporting means may be attached.

14. A sectional slip adapted to be used between a cylindrical casing and a conical hole in a supporting member said slip comprising an outer member, means whereby said outer member may be supported independently of said casing or said support, an inner member, and means formed on the outer member for supporting said inner member.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 30th day of December, 1912.

WILLIAM G. KNAPP.

In presence of—

FRANK L. A. GRAHAM,

LORRAINE E. DURROW.