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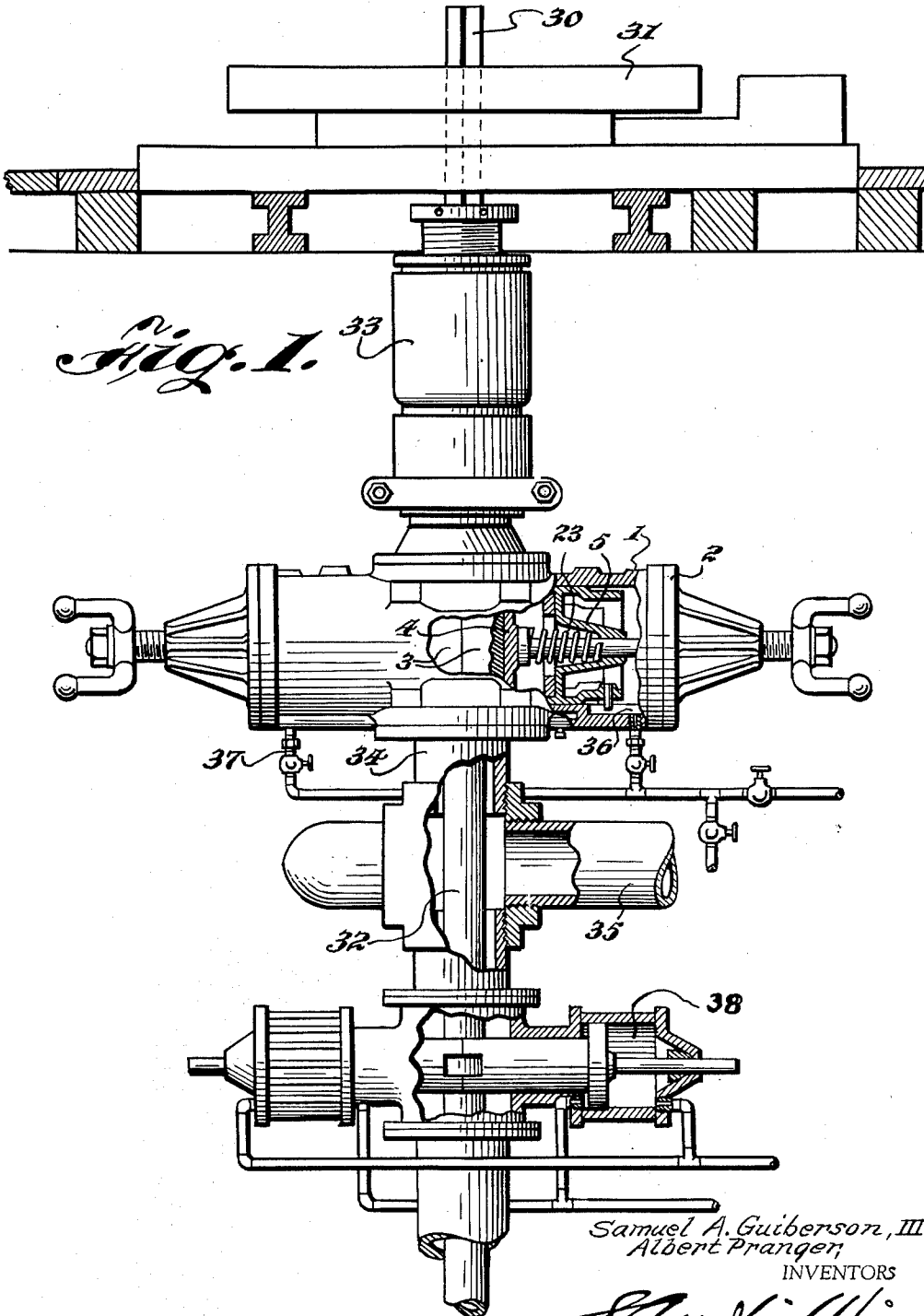
S. A. GUIBERSON, 3D., ET AL

2,174,366

HIGH PRESSURE TUBING OIL SAVER

Filed Oct. 31, 1936

3 Sheets-Sheet 1



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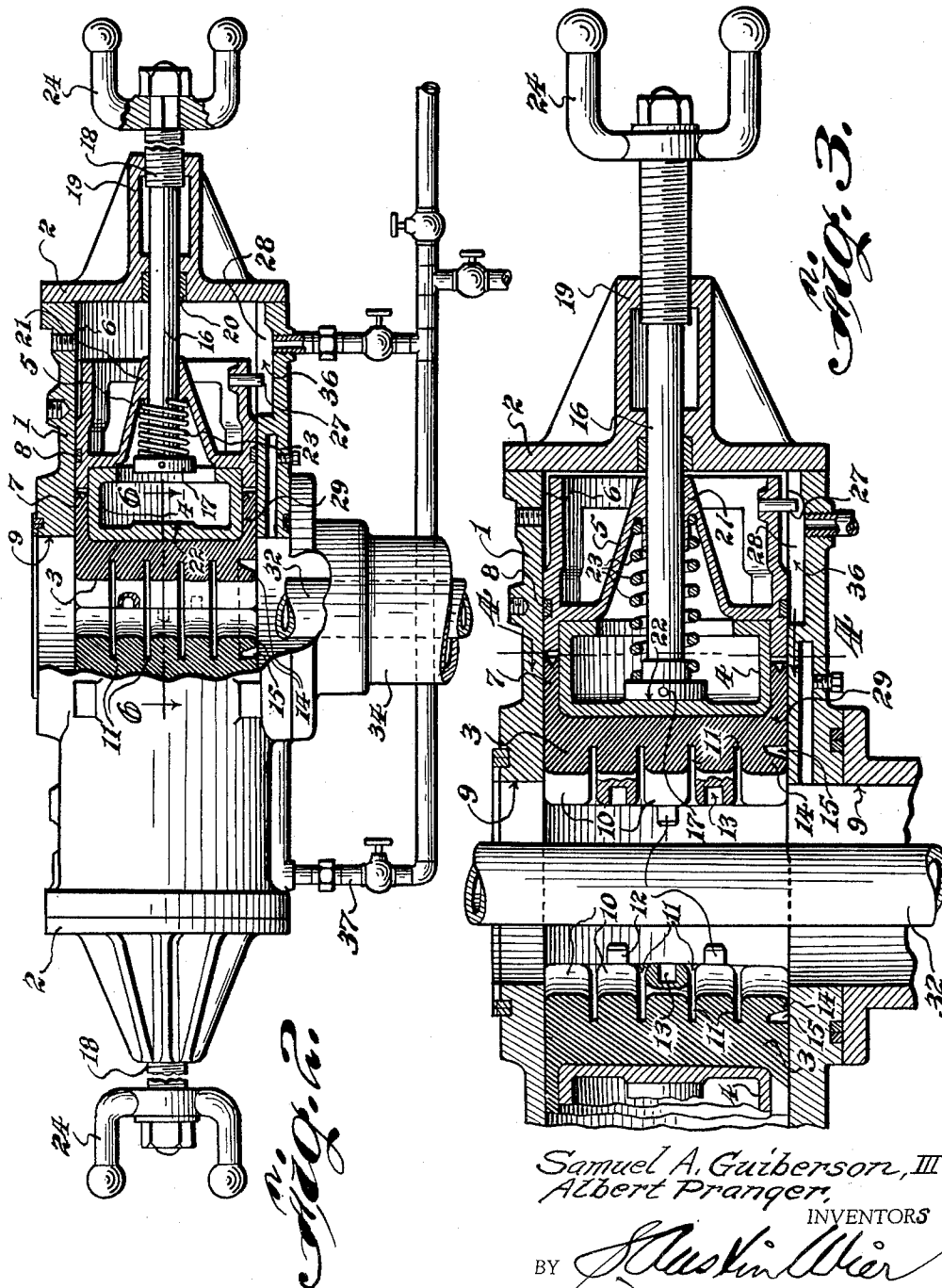
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3 Sheets-Sheet 3

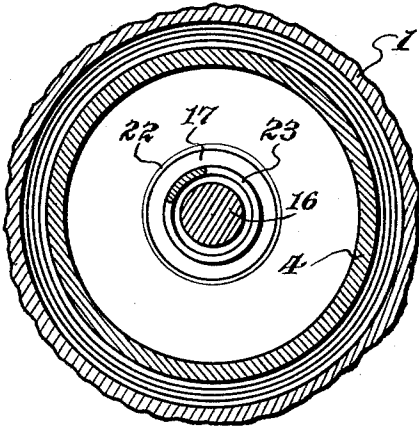


Fig. 4.

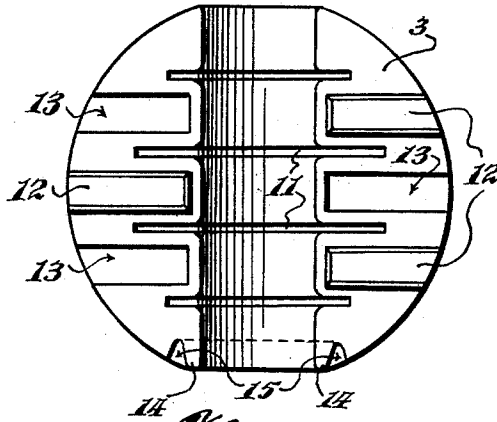


Fig. 5.

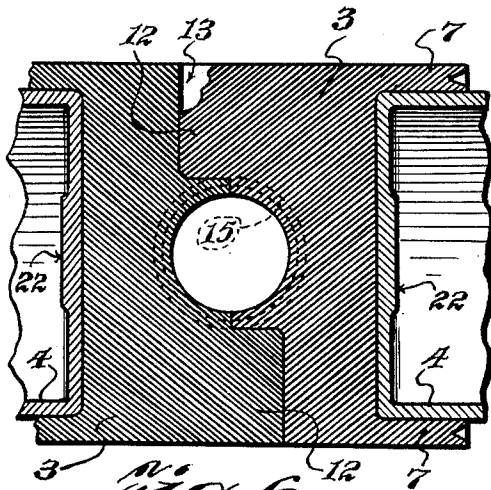


Fig. 6.

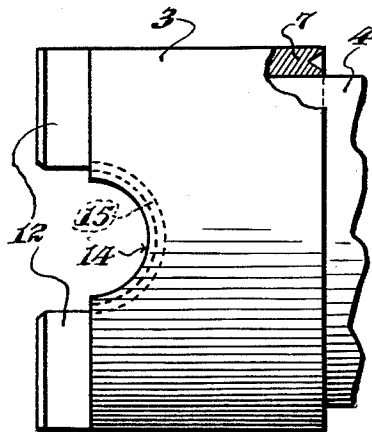


Fig. 7.

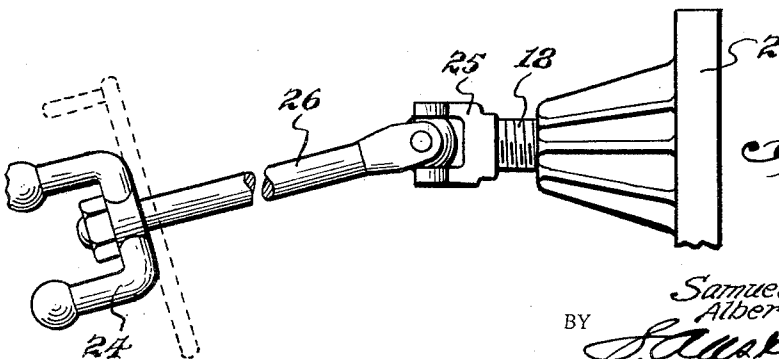


Fig. 8.

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HIGH PRESSURE TUBING OIL SAVER

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Application October 31, 1936, Serial No. 108,528

9 Claims. (Cl. 137—139)

This invention relates to new and useful improvements in high pressure oil savers. It is attached to the well casing and is designed to allow the safe introduction and withdrawal of drill pipe and tools, the saving of oil stripped from the drill pipe, and to control excessive pressures.

This device is adaptable to be used in the drilling of oil and gas wells in which oil and gas may be found under very high pressures. Its use obviates the pumping of heavy weighted mud through the drill pipe to control excessive gas and oil pressure, and readily allows the more desirable practice of circulating oil into the hole being drilled, as a medium for controlling pressures, thus to avoid the mudding up of such low pressure oil and gas strata as may be encountered.

This invention may be used in connection with an ordinary type blow-out preventer installed therebelow. When the usual blow-out preventer is installed it may be used to control and prevent the blowing out of the well from excessive pressures, but, because such tool is ordinarily made with rigid metal faces on the rams which engage the drill pipe, it will not at the same time control the pressure and allow the safe withdrawal of the drill pipe and the saving of oil, the presence of which is incident to such withdrawal.

One object of this invention is to more easily save such oil and allow the same to be by-passed to a tank. This is accomplished by the use of flexible faces on the rams which engage the face of the drill pipe and strip the oil therefrom as the drill pipe is being removed, at the same time allowing easy passage of drill pipe collars and protuberances, as when bits are to be changed or drill pipe withdrawn for any purpose.

A primary object of this invention is to allow the rams, on which the flexible faces are mounted, to themselves act as pistons to be operated by fluid pressure, thus effecting the engagement and disengagement of said flexible faces with the drill pipe without the use of the conventional type piston in addition.

Another important object of this invention is to provide a spring return mechanism to immediately effect the disengagement of the flexible faces from the drill pipe without the application of either pressure or manual means to effect this disengagement. This spring release is of great importance, as it is automatic and instantaneous in action; and it eliminates the need for and cost of manual or fluid pressure mechanism to effect the release.

Another object of this invention is to provide

a combination of opposed rams capable of being operated by other than fluid pressure means, such as manually or with a combination of manual and spring means.

A still further object of this invention is to provide a sealing lip on the flexible faces of the rams, the better to engage the drill pipe.

Another important object of this invention is to provide means whereby these rams may be manually withdrawn from engagement and locked in open position.

A still further object of this invention is to provide a seal whereby to prevent the escape of pressure around the periphery of the combination ram-piston.

And another object of this invention is to provide a guide which will always keep the substantially circular aperture between the faces of the rams in approximately vertical position.

Other and further objects of this invention will be readily apparent to those skilled in the art to which the improvements herein set out relate, especially when the following description is considered in connection with the accompanying drawings, in which drawings—

Figure 1 is an elevation, sectionalized in part, showing the relation of the usual rotary table whereunder is mounted this invention below which appears a cross flow pipe under which is disclosed the usual ram type blow-out preventer.

Figure 2 is a partly sectionalized view of this invention with the rams in closed position.

Figure 3 is a view similar to Figure 2 but showing the rams in open position.

Figure 4 is a view taken along line 4—4 of Figure 3, disclosing a cross section of rod, spring, ram and housing.

Figure 5 is an elevation of one of the rubber faces which covers a ram, showing tongues and recesses on and in said face and indicating spacing grooves and a flexible lip on the lower side of the rubber.

Figure 6 is a plan-like view taken along line 6—6 of Figure 2, showing position of the rubber faces when in complete engagement with one another and with the drill pipe.

Figure 7 is a plan view of a rubber covered ram looked at from above.

Figure 8 shows an extension bar and universal joint for manually operating the device from outside the derrick floor.

In the drawings the numeral 1 represents a cylindrical housing, having a vertical and circular opening 9 therethrough. The opposite ends of this housing are closed by covers 2. A liquid tight

connection is provided between the housing and the drill pipe 32 by a pair of semi-circular packing rubbers 3. These rubbers are molded to cages 4, and these cages are firmly attached to circular spiders 5. The rubbers, cages and spiders are firmly affixed together and operate slidably within the cylindrical housing 1 to form a movable piston-like ram 29 therein, operating in close relation with the inside wall 6 of said housing.

10 The back ends of said rubbers are provided with flexible lips 7 to seal against the inside wall 6 of said housing. For the purpose of effecting a further and more complete seal there are provided suitable packing rings 8 between the spiders 5 and the inside wall 6.

15 The combined assemblies of rubber and cage and spider constitute rams 29 which slide freely, in piston-like movement in the housing 1, and when fluid pressure is applied through openings or ports 36 into said cylindrical housing and back of said rams they will move inwardly until the rubbers 3 become closely compressed around the tubing or drill pipe 32 for the purpose of, first: stripping oil off of the drill pipe when it is being removed from the hole and, second: holding the drill pipe in immobile position against excessive well pressures and, third: closing rubbers against drill pipe while operating so as to prevent leakage due to well pressure while the drill pipe is being introduced or withdrawn from the well.

25 When this fluid pressure is released the compression springs 23 will move the rams 29 away from the drill pipe, forcing the fluid from the housing and allowing the introduction through opening 9 of tools of substantially greater diameter than the drill pipe.

30 The rubbers 3 are provided with a plurality of semi-circular ribs 10 having spacing grooves 11 therebetween. The faces of the rubbers 3 are provided with tongues 12 which fit into recesses 13, the better to form a more perfect seal between these rubbers. In order to form an additional seal around the drill pipe 32 the rubbers are provided with a flexible lip 14 and a groove 15 therebehind. The well pressure applied within this groove and on this lip will press the latter around the drill pipe, thus forming a pressure tight seal thereabout.

50 In order to exert additional pressure on the rubbers 3 around the drill pipe 32 and in order to lock the said rubbers around the said pipe, a long slidable rod 16 is provided to pass through the cover 2; and on the internal end of said rod is fixed a collar 17. The external end of said rod is provided with a screw thread 18 which screws into the threaded part 19 of the housing covers 2. Suitable packing 20 is mounted in said cover 2 and around said slidable rod 16 to prevent leakage. The spider 5 is slidably mounted at its hub 21 on the blank unthreaded end of the rod 16; and the compression spring 23 is mounted around said rod 16 between collar 17 and hub 21 so as to make contact with both collar and hub.

65 When it is desired to lock the rubbers 3 around the drill pipe 32 the rod 16 is turned by a handle or hand wheel 24 until collar 17 presses firmly against surface 22 of the cage 4. By this operation the rubbers may not only be locked against the drill pipe, but an auxiliary pressure, in addition to fluid pressure, may be exerted to hold said rubbers firmly in place. After the rubbers are thus locked around the drill pipe fluid pressure behind the rams may be released and the rods 75 will hold the rubbers firmly in place.

The rubbers 3 may be withdrawn from contact with the drill pipe and locked immovably in back position, well within the housing 1 after being entirely withdrawn from opening 9 simply by the backward movement of rod 16, accomplished by reversing hand wheel 24.

If for any reason compression spring 23 fails to immediately effect the release of the rubbers 3 from around the drill pipe, whenever fluid pressure is released from back of the ram 29, the backward rotation of rod 16 through cover 2 will quickly effect the release of these rubbers.

When the ram 29 is operated by the introduction of fluid pressure therebehind, or when the rubbers 3 are released from the face of the drill pipe by the spring 23 after the fluid pressure is relieved, it is obvious that it is unnecessary for the rod 16 to have moved, as the rams are slidably mounted on the blank end of this rod. This prevents leakage and wear around the rod where it passes through cover 2. This construction simplifies the cost of manufacture and also the cost of maintenance. It allows the operation of the rams backward and forward without the use of an auxiliary piston and obviates the necessity of two in-take ports for fluid pressure, one before and one behind a conventional piston. Doing away with this piston itself eliminates a considerable item of cost and maintenance and saves the expense of additional pipe connections to effect the backward movement of the piston, such as would be required if fluid pressure were used for this purpose.

To facilitate the operation of the rams manually from outside the derrick floor from a position convenient to the operator, there is provided to connect with rod 16 a long bar 26 having a universal joint 25 at its place of connection with rod 16. On the outer end of bar 26 may be mounted the hand wheel or handle 24, thus greatly adding to the convenience of manual operation.

To prevent the rams from rotating within the cylindrical housing 1 and to always assure the vertical positioning of rubbers 3 within the opening 9 a pin 27 is mounted in the spider part of the ram. This pin moves in a groove or slot 28 which is cast within the wall 6 of housing 1. This construction allows the perfect alignment at all times of rubbers 3 so that they will present complementary faces to the exterior wall of the drill pipe.

In Figure 1 is shown the kelly 30 which may be rotated through the rotary table 31 to turn the drill pipe 32.

Below the rotary table is disposed the drilling head 33. Below the drilling head is mounted the oil saver which is the subject of this application. It is firmly attached directly to the well casing 34, or to a nipple-like extension thereof. Immediately below this oil saver there is mounted in the well casing a cross flow pipe 35 for flowing oil out of the hole to tanks for recovery and for collecting the oil stripped and saved by this invention when the drill pipe 32 is removed.

Suitably valved piping 37 is connected with ports 36 to allow the introduction and release of fluid pressure for operating the ram 29.

Below the cross flow pipe 35 there is mounted in the well casing, or a section thereof, a conventional blow-out preventer 38 to engage the drill pipe and prevent blow-outs, with which apparatus the present invention is not concerned.

From the foregoing description it becomes apparent that this invention presents definite ad-

5 advantages and savings over the ordinary equip-
ment. It not only quickly but safely strips oil
from drill pipe removed from the hole and allows
this oil to be saved, but it does it in a very
economical manner. The initial cost of manu-
facturing this structure is greatly lessened by the
absence therein of the usual piston and the extra
packing required around such piston and the
absence of fittings necessary to introduce pres-
sure both in front of and behind such piston.
It speeds the operation of drilling in that it pro-
vides spring means for the immediate and auto-
matic release of rubbers 3 whenever pressure is
removed from ram 29. Less wear and friction
and loss of power is the result of the unique con-
struction and operation of rod 16 which is not
required to be moved except in the manual op-
eration of the device, saving wear upon packing
around this rod. Additional safety is provided
when ram 29 is locked in back position by the
withdrawal of rod 16, preventing accident to tools
going in or out of the hole, and avoiding the de-
facing and unnecessary damage to rubbers 3.

When it is desired to clamp and hold more
firmly the drill pipe this structure allows the
simultaneous application of pressure on the rams
by screw means on rods 16 and fluid pressure
means through ports 36. When this double pres-
sure is exerted on the rams greater safety in con-
trolling the well pressure obviously results.

After the rubber faces of the rams have been
placed in most positive engagement with the
drill pipe by the double pressure of fluid behind
these rams and the application of the threaded
rods screwed into place, then the fluid pressure
may be safely removed and the rubber faces will
remain in firm and constant engagement with the
drill pipe.

Increased saving in the quantity of oil stripped
and the more positive sealing of oil and gas pres-
sure within the well results from the novel con-
struction of flexible lip 14 on the rubbers 3 around
the drill pipe 32.

It becomes obvious also that in the drilling of a
well under high pressure it will not be at all
necessary to apply any external pressure, such
as steam or gas against any piston to cause the
rams to move backward when pressure behind
them is relieved, because the spring mechanism
in this invention disengages the rubbers from the
drill pipe and causes the rams to move backward
and away from the drill pipe.

Great advantage will be found in this novel
means of releasing the rubber faces from the
drill pipe without the application of any ex-
ternal pressure, such as air, water or steam, and,
especially without having to employ or depend
upon gas or oil pressure within the well itself,
such latter pressures being notably irregular and
may not safely be depended on.

The spring mechanism which releases the rub-
ber faces of the rams from around the drill pipe
immediately when pressure (mechanical or fluid)
behind the rams is removed, not only effects an
instant and positive release but it does it with-
out having to maintain auxiliary pressure such
as may be supplied by air compressors, pumps
or steam generators, and it obviates the use of
mechanism and conductors for utilizing and ap-
plying such auxiliary pressures, thereby lessen-
ing cost of initial equipment and of operation.

Having described our invention, what we claim
is:

1. In an oil saver, a housing, an opening there-
through for the passage of a drill pipe, well

casing attached to said housing below said open-
ing, a cylindrical chamber within said housing,
slidable rams mounted within said chamber,
threaded rods passing through said housing and
connected to said rams whereby the latter may be
moved into engagement with the drill pipe, and
spring means for moving said rams out of en-
gagement with the drill pipe.

2. In an oil saver, a housing, an opening there-
through for the passage of a drill pipe, well cas-
ing attached to said housing below said opening,
a cylindrical chamber within said housing, slid-
able rams mounted within said chamber, threaded
rods passing through said housing and connected
to said rams whereby the latter may be moved
into engagement with the drill pipe, spring means
for moving said rams out of engagement with the
drill pipe, compressible rubber faces upon said
rams wherewith to engage the surface of the drill
pipe and to close the casing against the flow of
fluid therethrough, and means for introducing
fluid pressure behind said rams.

3. In a device of the character described, a
plurality of opposed slidable rams within a com-
mon housing, compressible packing means upon
the faces of said rams to engage the surface of
a drill pipe, fluid pressure means behind said rams
to move the same toward said drill pipe, spring
means to move said rams in the opposite direc-
tion, and threaded rods manually operated
through said housing so that said packing may
be locked in constant engagement with the drill
pipe or in disengaged position.

4. In a device of the character described, a plu-
rality of opposed slidable rams within a common
housing, compressible packing means upon the
faces of said rams to engage the surface of a drill
pipe, fluid pressure means behind said rams to
move the same toward said drill pipe, spring
means to move said rams in the opposite direc-
tion, and threaded rods manually operated
through said housing whereby said rams may be
moved back and forth.

5. In an oil saver a packing rubber, a cage
secured thereto and having a contact surface, a
spider secured to said cage, a rod having a collar,
said rod being adapted to contact said contact
surface of said cage, means whereby said rod may
be actuated in one direction, and a spring inter-
posed between said collar and spider tending to
move said spider, cage and rubber in the opposite
direction.

6. In an oil saver, slidable rams, fluid pressure
means whereby the rams may be caused to en-
gage a drill pipe, spring means whereby said rams
will be moved away from the drill pipe when the
pressure of said fluid pressure means is relieved
and means to adjust the tension of said spring
means.

7. In an oil saver, slidable rams, fluid pressure
means whereby the rams may be caused to en-
gage a drill pipe, spring means whereby said rams
will be moved away from the drill pipe when the
pressure of said fluid pressure means is relieved
and means to render said spring means effective
or ineffective.

8. In an oil saver, a cage, a housing for the
cage, a rubber packer secured to the cage and
adapted to engage the drill pipe, a spider secured
to said cage and provided with a spring seat,
a shaft provided with a head, said shaft extending
into said spider and the head being on the inner
end of said shaft, a spring positioned between
said head and spring seat, and means whereby

said shaft may be shifted longitudinally so as to engage, or be disengaged from the cage.

9. In an oil saver, a cage, a housing for the cage, a rubber packer secured to the cage and adapted to engage a drill pipe, a spider secured to said cage and provided with a spring seat, the inside of said cage and spider forming a chamber, a shaft projecting into said chamber and having a head on its inner end, a surface forming a part of said cage, means whereby said shaft may

be moved longitudinally so as to engage the head thereof against said seat or to remove said head from said seat, a spring positioned between said head and spring seat and tending to move said rubber away from said drill pipe and fluid pressure means to move said cage so as to cause said rubber to engage said drill pipe.

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