May 3, 1932. P. F. MURRAY 1,856,503

AUTOMATIC JOINT BREAKER

Filed May 15, 1929

Fig. 1.

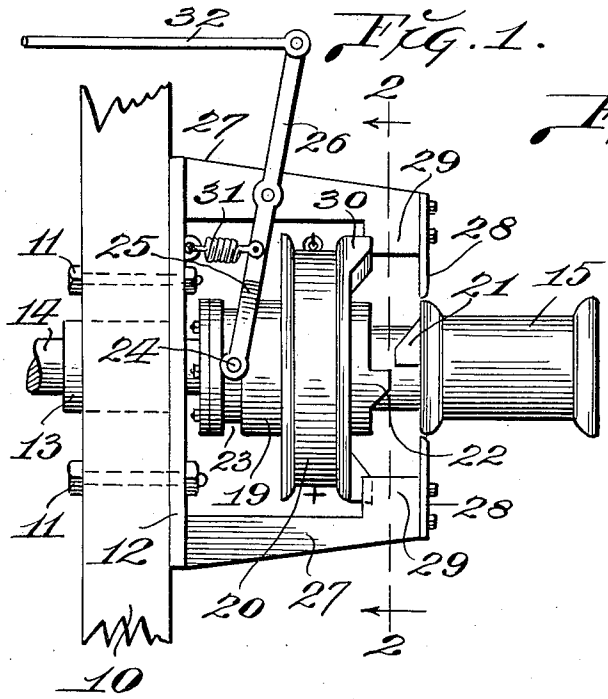



Fig. 2.

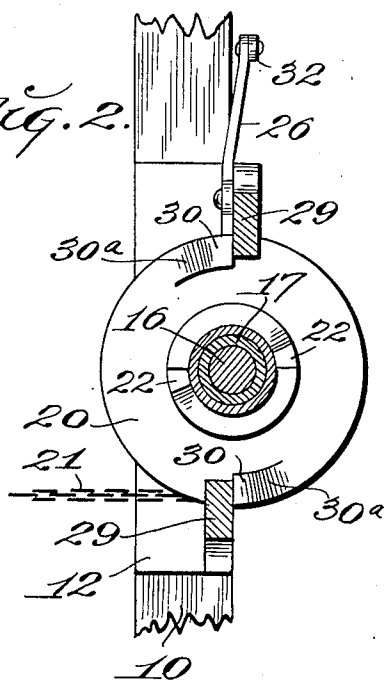
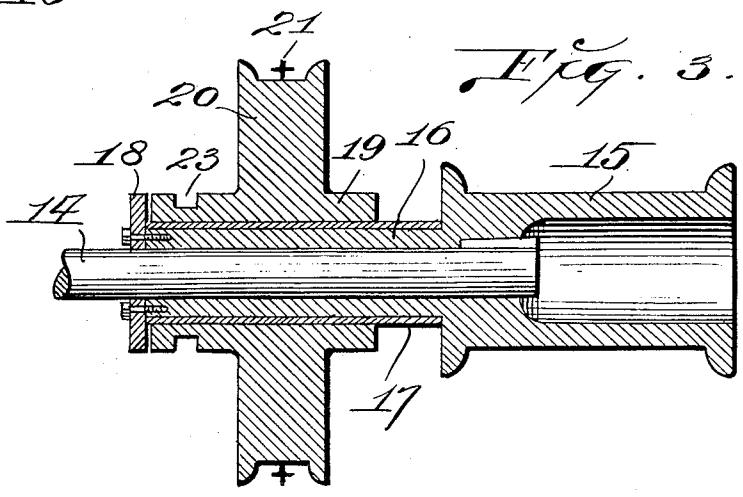



Fig. 3.

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Patented May 3, 1932

1,856,503

# UNITED STATES PATENT OFFICE

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## AUTOMATIC JOINT BREAKER

Application filed May 15, 1929. Serial No. 363,308.

My invention relates to an automatic joint breaker for rotary well drilling rigs and the principal objects of my invention are, to generally improve from and simplify the construction of the existing forms of automatic joint breakers, to provide a joint breaker that is relatively simple in construction, inexpensive of manufacture and which is very effective in performing the functions for which it is intended.

Further objects of my invention are to provide a joint breaker of the character referred to that is entirely automatic in its release operation, to provide a construction that may be employed with practically all standard forms of rotary drilling rigs and to provide a joint breaker that will permit the tongs with which it is associated to be applied to the tubes or pipe in any position, thereby greatly facilitating the work incident to the breaking of the joints.

With the foregoing and other objects in view my invention consists in certain novel features of construction and arrangement of parts that will be hereinafter more fully described and claimed and illustrated in the accompanying drawings in which:

Fig. 1 is a front elevational view of a joint breaker constructed in accordance with my invention.

Fig. 2 is a vertical section taken on the line 2—2 of Fig. 1.

Fig. 3 is a longitudinal section taken through the center of my improved joint breaker.

Referring by numerals to the accompanying drawings which illustrate a practical embodiment of my invention, 10 designates one of the upright posts that forms a part of the framework of the derrick and secured to said post in any suitable manner, preferably by means of bolts 11 is a plate 12 having a bearing 13 that receives a constantly rotating line shaft 14.

Rigidly fixed in any suitable manner upon the outer end of shaft 14 is a spool or drum 15, upon which is adapted to wind a chain or cable that may be used in drilling operations or in the operation of parts of the drilling rig. This spool 15 is provided with an elongated hub portion 16 that projects toward the bearing 13 and mounted on said hub is a bronze bushing 17. Secured in any suitable manner on the inner end of hub 16 is a retaining ring 18. Arranged to slide freely upon the bushing 17 is the hub portion 19 of a sheave 20 and secured in any suitable manner to the periphery thereof is one end of a chain 21 that passes downwardly around the rear side of said sheave and thence forwardly from the lower side thereof, and said chain is adapted to be secured to tongs that are utilized for breaking the joints in well tubes and pipes.

Projecting from the inner end of the spool 15 are lugs 21 that are adapted to engage corresponding lugs 22 that project from the adjacent end of hub 19 when the latter is moved outwardly toward drum 15.

Formed in the opposite end portion of hub 19 is a groove 23, into which project pins 24 that are carried by the lower ends of the arms of a yoke 25, and the latter depending from the lower end of a lever 26.

Projecting outwardly from the upper and lower portions of plate 12 and disposed above and below the sheave 20 are horizontally disposed arms 27 and the outer ends of these arms terminate in the same vertical plane with the inner end of spool 15.

Secured to the outer ends of the arms 27 and projecting toward the flange on the inner end of spool 15 are guard fingers 28, which prevent the chain or cable that winds onto the spool from leaving the inner end thereof and dropping into the space between the spool and sheave 20.

Formed on the outer portion of the arms 20 and projecting toward the shaft that carries the sheave and spool are oppositely arranged lugs 29 that function as stops for combined stop and cam lugs 30 that are formed on the outer face of sheave 20.

Lever 26 is fulcrumed on the upper one of the arms 27 and secured to said lever below its fulcrumed point is one end of a retractile spring 31, the opposite end of which spring is connected to plate 12.

The normal tendency of this spring 21 is to actuate yoke 25 so as to normally pull sheave 20 away from spool 15.

Pivotally connected to the upper end of lever 26 is one end of a pull rod 32 that extends to a point where it may be conveniently reached by an operator.

The rear ends of lugs 30 are provided with inclined or beveled faces 30ª, so that said lugs, in addition to functioning as stops for engaging the stops 29 to limit the rotary movement of the sheave in one direction, may also function as cams to engage the inner faces of the lugs 29 and thereby automatically move the sheave away from spool 15 and disengage lugs 22 from the lugs 21.

Under normal conditions the parts of a joint breaker occupy the positions as illustrated in Fig. 1, with the lugs 21 and 22 out of engagement with each one and with the lugs 30 bearing against lugs 29 which function as stops to limit the rotary movement of the sheave in one direction, or the direction in which it rotates when the chain unwinds from said sheave.

Spool 15 may receive a chain or cable that is utilized in hoisting or hauling operations and thus said spool, which is carried on the constantly rotating shaft 14 may be utilized in any desired manner.

In breaking a joint between pipe or tube sections the pipe tongs are applied to the tube adjacent to the joint thereof and chain 21 that extends from beneath sheave 20 is connected to said tongs. The operator then pulls on rod 32 thereby swinging lever 26 or its fulcrum and through yoke 25, hub 19 and sheave 20 that carries chain 21 will be moved outwardly on bushing 17 until lugs 21 engage lugs 22 and thereby transmit rotary motion to the sheave.

As the sheave is thus rotated chain 21 will be wound thereupon with a quick pulling or jerking movement and such movement being imparted to the tongs will swing the same so as to break the joint adjacent to the point where the tongs are applied.

When sheave 20 has been rotated approximately a half turn the inclined faces 30ª on lugs 30 will strike against the inner faces of the stop lugs 29 and as a result of this engagement sheave 20 will be forced inwardly away from the drum so as to effect a disengagement of the lugs 22 from lugs 21 and the shaft carrying the spool 15 on which lugs 21 are formed, may now continue to rotate without imparting rotary motion to the sheave.

As the chain is subsequently unwound from the sheave to reengage the tongs the lugs 30 will strike against the lugs 29, thereby limiting the reverse rotary motion of the sheave and with the lugs 30 in engagement with the lugs 29, the sheave and its chain will be in position for a subsequent joint breaking operation (see Figs. 1 and 2).

Thus it will be seen that I have provided a well tube joint breaker that is relatively simple in construction, inexpensive of manufacture and which may be advantageously employed on practically all rotary drilling rigs for breaking the joints between the sections of drilling tubes or pipes.

An especially desirable feature of my invention is the arrangement and construction that permits the tongs to be applied to the tube or pipe sections in any position.

My improved joint breaker has relatively few operating parts, thereby reducing the liability of becoming inoperative through failure of its parts to function properly and the joint breaker, while not in service, in no wise interferes with the operation of the winding drum or spool 15.

It will be understood that minor changes in the size, form and construction of the various parts of my improved joint breaker may be made and substituted for those herein shown and described without departing from the spirit of our invention, the scope of which is set forth in the appended claims.

I claim as my invention:

1. The combination with a constantly rotating member having a clutch face, of a chain carrying sheave loosely mounted on said constantly rotating member and provided with a clutch face that is adapted to engage the clutch face on said constantly rotating member, a manually operable member for moving the sheave toward the clutch face on the constantly rotating member so as to effect a driving engagement between said member and sheave, a spring associated with said manually operable member for normally holding the sheave out of engagement with the constantly rotating member, fixed stops located adjacent to the outer portion of the sheave and combined cam and stop lugs on said sheave and adapted to engage said fixed stops for limiting the movement of the sheave in one direction and for automatically moving said sheave so as to disengage the clutch face thereon from the clutch face on the constantly rotating member.

2. The combination with a constantly rotating member having a clutch face, of a sheave loosely mounted on said member and provided with a clutch face that opposes the clutch face on said member, means for moving said sheave lengthwise on said member to effect an engagement of the clutch faces, a spring for resisting the movement of the sheave toward the clutch face on the constantly rotating member and means including combined cam and stop lugs on said sheave and fixed stops with which said lugs are adapted to engage for automatically moving the sheave lengthwise upon said member to effect a disengagement of the clutch faces at the termination of a predetermined degree of rotation of said sheave and for stopping the sheave at a predetermined point when reversely rotated.

3. The combination with a constantly ro-

tating member having a clutch face, of a sheave loosely mounted on said member and provided with a clutch face that opposes the clutch face on said member, means for moving said sheave lengthwise on said member to effect an engagement of the clutch faces, a spring for yieldingly resisting the movement of the sheave toward the clutch face on the constantly rotating member, means comprising combined cam and stop lugs on said sheave and a pair of fixed lugs for automatically moving the sheave lengthwise upon said member to effect a disengagement of the clutch faces at the termination of a predetermined degree of rotation of said sheave and for stopping the sheave when reversely rotated to a predetermined point and guard fingers arranged between the fixed stops and the inner end of the constantly rotating member.

4. The combination with a constantly rotating shaft, of a spool fixed on said shaft, the inner end of said spool being provided with a clutch face, a hub extending inwardly from said spool, a sheave arranged for sliding movement on said hub, a clutch face formed on the hub of said sheave, which clutch face opposes the clutch face on the spool, manually operable means for moving the sheave toward the spool to effect an engagement of the clutch faces, a spring for resisting the movement of the sheave toward the spool and means comprising combined cam and stop lugs on the sheave and a pair of fixed lugs with which said combined cam and stop lugs are adapted to engage for automatically shifting the sheave away from the spool to effect a disengagement of the clutch faces at the termination of a predetermined degree of rotation of said sheave and for stopping the sheave when the same has been reversely rotated for a predetermined degree.

5. The combination with a constantly rotating shaft, of a member carried by said shaft and provided with a clutch face, a sheave loosely mounted on said shaft and provided with a clutch face that is adapted to engage the clutch face on said rotating member, means for moving said sheave so that the clutch face thereon engages the clutch face on said rotating member, a pair of oppositely disposed combined cam and stop lugs on the side face of the sleeve and a pair of fixed stops with which said lugs are adapted to engage.

6. The combination with a constantly rotating shaft, of a spool carried by said shaft, a clutch face on the inner end of said spool, a sheave mounted for sliding movement toward and away from said spool, a clutch face on said sheave that is adapted to engage the clutch face on the spool, a pair of fixed stops arranged on opposite sides of said shaft, a pair of combined cam and stop lugs on the face of said sheave and adapted to engage said fixed stops for holding the sheave against rotation in one direction and for automatically moving said sheave away from the spool to effect a disengagement of the clutch faces on said sheave and spool when said sheave is reversely rotated, manually operable means for moving the sheave toward the spool and fixed guards arranged adjacent to the inner end of said spool.

In testimony whereof I affix my signature.

PEXTON F. MURRAY.