No. 730,838. PATENTED JUNE 9, 1903.

S. S. O'CONNOR.

PIPE DRIVING ATTACHMENT.

APPLICATION FILED JAN. 20, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 2.

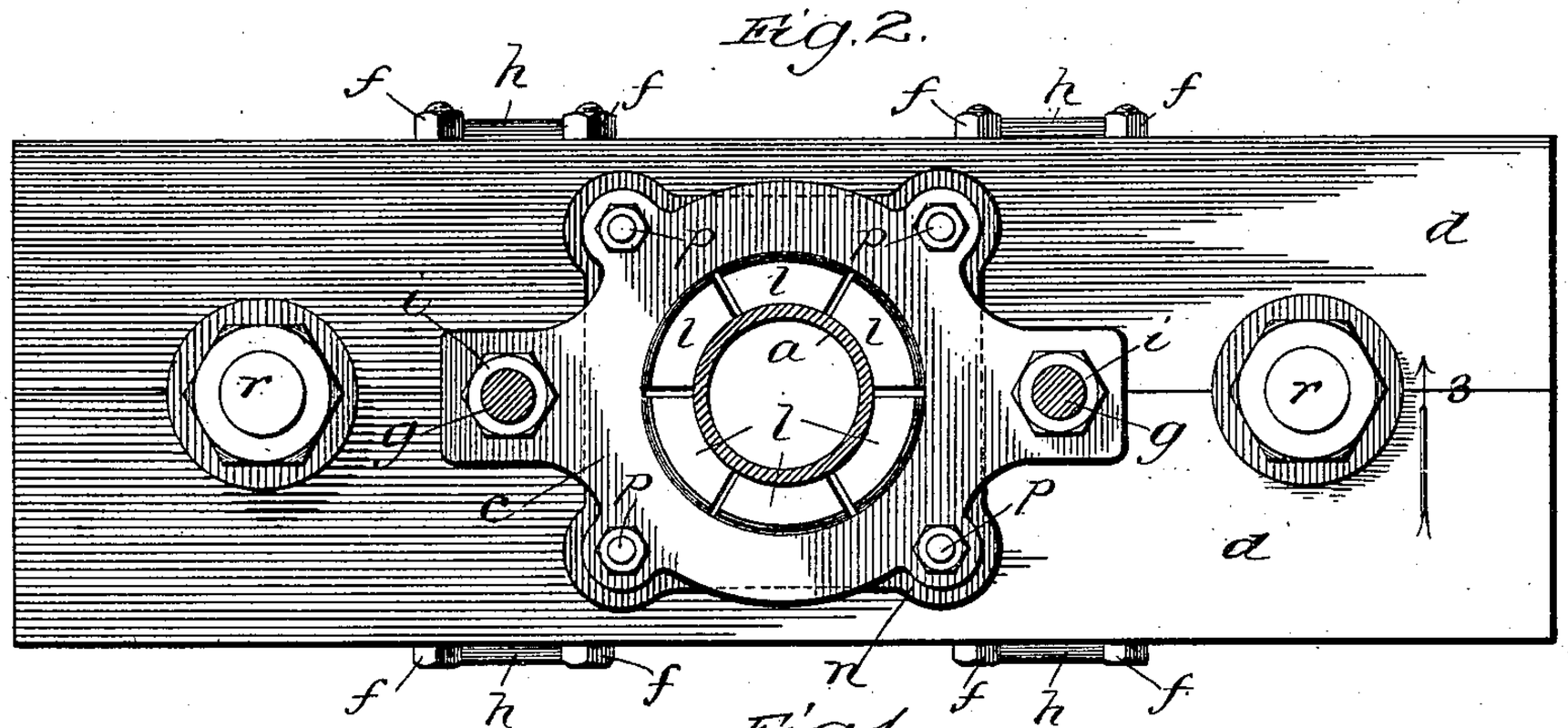
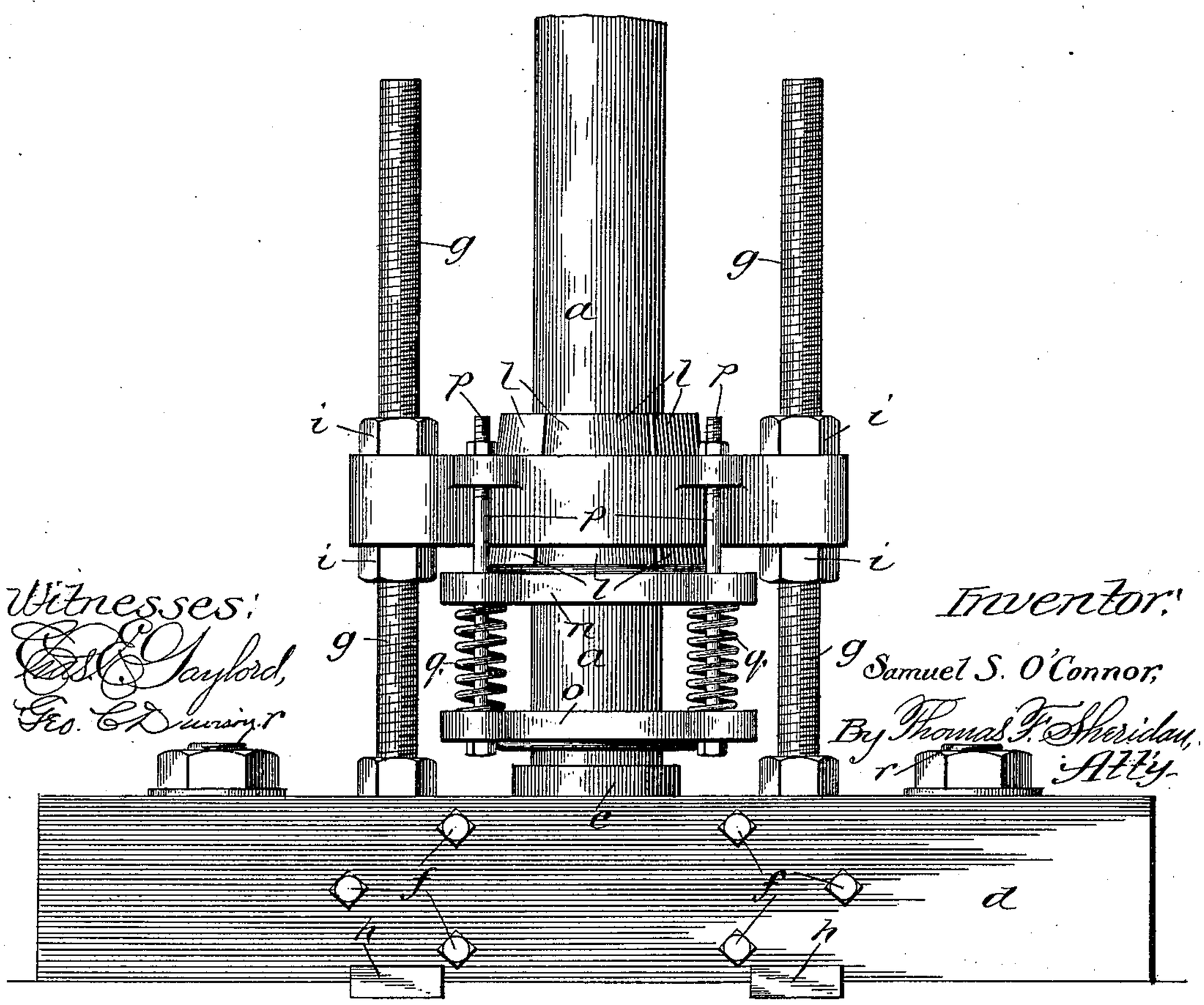



Fig. 1.




Witnesses:
Chas. E. Gaylord,
Geo. C. Dunning.

Inventor:
Samuel S. O'Connor,
By Thomas F. Sheridan,
Atty.

No. 730,838. PATENTED JUNE 9, 1903.

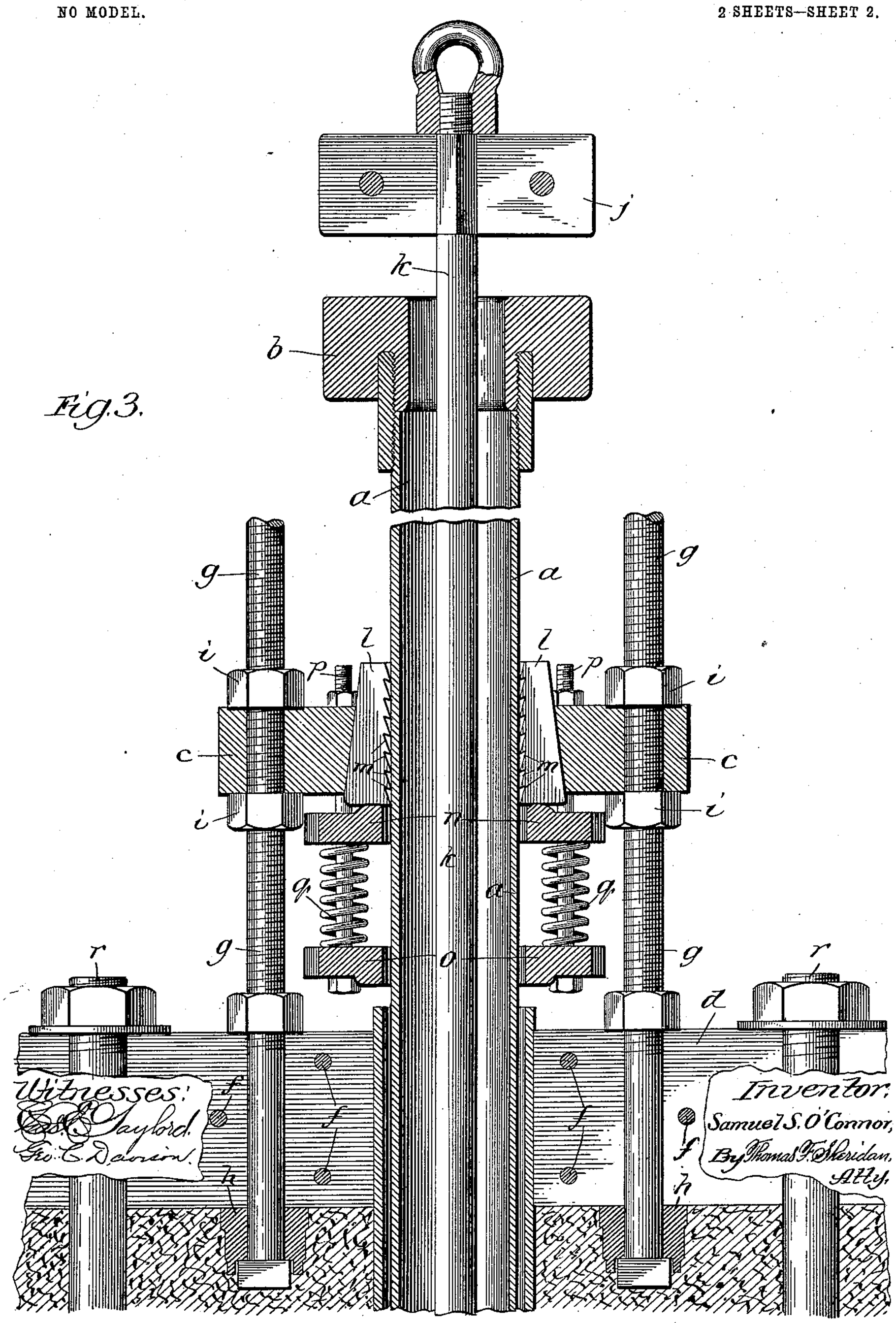
S. S. O'CONNOR.

PIPE DRIVING ATTACHMENT.

APPLICATION FILED JAN. 20, 1902.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.



No. 730,838. Patented June 9, 1903.

# UNITED STATES PATENT OFFICE.

SAMUEL S. O'CONNOR, OF GENEVA, INDIANA, ASSIGNOR OF ONE-HALF TO CARL K. MACFADDEN, OF GENEVA, INDIANA.

## PIPE-DRIVING ATTACHMENT.

SPECIFICATION forming part of Letters Patent No. 730,838, dated June 9, 1903.

Application filed January 20, 1902. Serial No. 90,521. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL S. O'CONNOR, a citizen of the United States, residing at Geneva, in the county of Adams and State of Indiana, have invented certain new and useful Improvements in Pipe-Driving Attachments, of which the following is a specification.

This invention relates particularly to attachments to be used in connection with the driving of pipes used in the sinking of wells for water, oil, or gas, and particularly to the means by which the "drive-pipe" is prevented from "giving" back, all of which will be more fully hereinafter set forth.

The principal object of the invention is to provide a simple, economical, and efficient pipe-driving attachment.

A further object of the invention is to provide a pipe-driving attachment with means for permitting the pipe to be driven therethrough, but to prevent it from giving back.

Other objects of the invention will appear from an examination of the drawings and the following description and claims.

The invention consists principally in the combination with driving means for holding and guiding a drive-pipe and permitting it to be driven downwardly, but preventing it from giving or returning back.

The invention consists, further, in the combination of gripping mechanism, means for holding the same in position, a tension device arranged under the gripping mechanism so as to permit the same to yield slightly and allow the drive-pipe to pass downward, but prevent its giving or returning back.

The invention consists, further, in the combination, with gripping mechanism, of a head for holding the gripping mechanism, means for anchoring the head in position, and tension devices arranged under the gripping mechanism to permit yielding of the same in a downward manner only.

The invention consists, further, in the combination of a gripping-head, a plurality of bolts securing the same to solid foundation, gripping mechanism movably mounted in the gripping-head comprising a plurality of jaw-sections arranged to form a hollow truncated cone by which the drive-pipe may be guided, a tension device comprising a movable platen upon which the gripping-jaws rest, and a plurality of tension-springs for yieldingly holding the platen in position.

The invention consists, further and finally, in the features, combinations, and details of construction hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a side elevation of a pipe-driving attachment constructed in accordance with these improvements; Fig. 2, a plan view of the same, and Fig. 3 an enlarged sectional elevation taken on line 3 of Fig. 2 looking in the direction of the arrows.

In the art to which this invention relates it is well known that in the drilling of oil-wells in an area in which the first solid-rock formation is overlain by a heavy deposit of glacial drift or surface formation it is customary to drive a special type of iron pipe, known to the trade as "drive-pipe," through this drift formation to the first solid rock. The insertion of this drive-pipe is to prevent the sand, gravel, and clay, which makes up the usual drift deposit, from entering the drill-hole when the rock formation is encountered. It will be evident that inasmuch as this pipe is driven from fifty to four hundred feet through this drift formation, very much after the manner of driving a "spile" with a pile-driver, very heavy pipe must be employed and that the blow which must be given the pipe at its upper end represents a great amount of energy. In practice it has been found necessary to protect the upper end of the drive-pipe with what is known as a "drive-head," which is screwed onto the top end of the drive-pipe, and thus prevent injury to the threads and couplings. The driving is done by means of what is known as a "drive-clamp," which is securely bolted to the upper end of a drill-stem, the main body of the drill-stem hanging below the driving-clamps and in the interior of the pipe. By raising the heavy drilling-stem five or six feet and allowing it to suddenly drop a heavy blow is applied to the top of the drive-pipe. In practice a drill-stem weighing over three thousand pounds will often strike two hundred blows in driving this heavy pipe one inch through the formation, especially when

a long length of pipe has already been inserted. As the drive-pipe is forced downwardly the driving-clamps are frequently taken from the drill-stem, and the stem, with a bit attached at its lower end, is used to clean out the drift formation which has been forced up into the interior of the pipe. This formation, after having been thoroughly mixed with water to form a thin mud, is removed by means of a "sand-pump." Oftentimes it is possible in a clay formation to drill ahead of the pipe by means of the drill-stem a considerable distance, in which case the pipe upon being driven will follow the hole which has been previously opened up ahead of the pipe. Drilling in the new Texas oil-fields, however, has disclosed a condition of affairs which makes it necessary to improve on the older methods in use due to the fact that instead of a maximum of four hundred feet of drift deposit we have on the great coastal plain of the Gulf of Mexico drift deposits which in some places are over three thousand feet in thickness, and in the area which has been found prolific so far as its production of petroleum is concerned a drift deposit of from seven hundred to fifteen hundred feet has been encountered. It has been found that up to a depth of approximately four hundred feet a blow given to the top of the drive-pipe will be transmitted clear to the bottom of the pipe, gradually forcing the pipe through this formation; but beyond this depth the blow is so thoroughly absorbed by the spring or elasticity of the pipe itself that the energy of the blow is practically absorbed without effective work being done so far as the forcing of the bottom of the pipe through the formation is concerned. It is therefore quite evident that if it is possible in some way to take advantage of the energy which is imparted by the blow and which is largely absorbed in the pipe itself it will be possible to drive a greater length of pipe than usual.

The principal object of this invention, therefore, is to provide a simple, economical, and efficient apparatus that will remove the objections and accomplish the desired results as above stated—that is, which will retain the pipe under its maximum compression—in other words, prevent giving back, and thereby assist materially in the sinking of the well, all of which will be thoroughly understood and appreciated by those skilled in the art.

In illustrating and describing this invention I have only illustrated and described so much of that which is old taken in connection with what I consider to be new as will properly disclose the invention and enable those skilled in the art to practice the same, leaving out of consideration other and well-known mechanisms which, if illustrated and described herein, would only tend to confusion, prolixity, and ambiguity.

In constructing a pipe-driving attachment in accordance with these improvements and using it in connection with a drive-pipe *a*, provided with a driving-head *b*, coupled to the upper threaded end of the drive-pipe, I provide a head *c* of the desired size and shape to hold the gripping mechanism, as hereinafter described, and which is adapted to surround and guide the drive-pipe. It is necessary and indeed absolutely essential to the successful operation of the machine that some means be provided for anchoring or holding this holding-head in the desired position and also to permit it to be adjusted as circumstances may require or necessity render expedient. In order to anchor this holding-head in a satisfactory manner, I provide a pair of clamping-timbers *d*, and where they can be so used I clamp or otherwise secure them to a primary drive-pipe *e* by means of clamping-bolts *f*, as shown particularly in Fig. 2. Passed through these clamping-timbers is a pair of tension-bolts *g*, the heads of which rest underneath the clamping-timbers and upon washers *h* and to which they are secured by means of nuts *x*. The free threaded ends of the tension-bolt pass upward through perforations in the holding-head, to which they are secured by means of clamping-nuts *i*, all of which permits the parts to be held in position rigidly when required and to be adjusted as circumstances may demand.

As above suggested, when the drive-pipe is driven downwardly by means of a heavy drive-clamp *j* (with its drill-stem *k* arranged on the interior of the pipe and acting as a guide) the drive-pipe, owing to its great length, is put under elastic compression, so much so that when the heavy drive-clamp is lifted the pipe again expands without being forced into the ground in any appreciable manner. It becomes necessary, therefore, to prevent this giving back of the pipe—in other words, to hold it under compression, so that the next succeeding blow tends to act on the compressed pipe and force it downward through the formation. In order to prevent this giving back, a plurality of gripping-jaws *l* is provided and made in the form of sections of a hollow truncated cone, the inner surfaces of which are serrated, as at *m*. It will be seen from an inspection of Fig. 3 that the holding-head is bored out in a conical manner—that is, the counterpart of the outer cone-shaped surface of the gripping-jaws, so that such jaws may move downwardly to the desired extent with the pipe, but are limited in their upward movement. In order to hold the jaws under tension and in the socket of their holding-head, it is necessary that some additional or tension mechanism be provided that will permit them to yield slightly and downwardly, enough to permit the drive-pipe to pass therethrough, but which will immediately force them back to their position and prevent the giving back or return of the pipe. To accomplish this result, a movable platen *n* is provided, arranged immediately underneath, so as to contact the lower ends of the gripping-jaws. Immedi-

ately below this and in line therewith is a second or relatively rigid platen or plate *o*, held in adjustable engagement with the holding-head by means of bolts *p*, while interposed between the rigid and movable platens is a plurality of helical tension-springs *q*, acting to keep the upper or movable platen at its upper limit of movement, so that the drive-pipe, as above suggested, may be forced down through the gripping-jaws, but is prevented from returning or giving back—in other words, is held under compression—that is, the jaws move downwardly just enough so that they may expand and permit the pipe to pass through, but are pushed upwardly and almost immediately to regrip the pipe and force it either to give downwardly or be held under tremendous compression.

In the above description of construction I have illustrated and described a method for using my improvements in connection with a primary drive-pipe *e*, which is driven into the ground the desired depth or as far as it may be driven without the necessity of any additional mechanisms—say to the distance of four hundred feet—when the second smaller pipe *a* is used for the remaining depth. If it be desired to continue this primary drive-pipe for an indefinite length and dispense with all other pipes, it becomes necessary to anchor the timber to a solid foundation. It will be understood, however, that the bore in the timbers through which the drive-pipe is passed must be of sufficient size to permit such pipe to be passed therethrough easily. A second set of tension-bolts *r* is also provided, which have their body portions extending backwardly and their heads anchored in a body of concrete *s*, which acts to effectually prevent the holding mechanisms from giving back with the pipes. In other words, the parts are anchored in a solid foundation. A perfect illustration of such a construction would be had if the pipe *e* were left out of the drawings, when the pipe *a* could be driven down any desired distance.

I claim—

1. In a pipe-driving attachment, the combination of gripping mechanism, a head for holding the gripping mechanism in position, means for anchoring the head in position, and tension devices arranged under the gripping mechanism to permit a downward yielding of the same, substantially as described.

2. In a pipe-driving attachment, the combination of gripping mechanism, means for holding the same in position, a tension device arranged under the gripping mechanism so as to permit the same to yield slightly and allow the drive-pipe to pass downwardly but prevent its "giving" or returning back, substantially as described.

3. In a pipe-driving attachment, the combination of a holding-head, means for anchoring it in position, gripping mechanism movably mounted in the head comprising a plurality of sectional jaws adapted to guide a drive-pipe, and tension devices arranged under the gripping mechanism to permit yielding of the same in a downward manner only, substantially as described.

4. In a pipe-driving attachment, the combination of a holding-head, means for anchoring it in position, gripping mechanism movably mounted in the head comprising a plurality of sectional jaws forming a hollow truncated cone adapted to guide a drive-pipe, and tension devices arranged under the gripping mechanism to permit yielding of the same in a downward manner only, substantially as described.

5. In a pipe-driving attachment, the combination of a holding-head, a plurality of bolts anchored in a solid structure to which the gripping-head is adjustably secured, gripping mechanism movably mounted in the holding-head comprising a plurality of sectional jaws arranged to form a hollow truncated cone by which the drive-pipe may be held and guided, a tension device comprising a movable platen upon which the gripping mechanism rests, and a plurality of tension-springs for yieldingly holding the platen in position, substantially as described.

6. In a pipe-driving attachment, the combination of a holding-head, means for anchoring it in position, gripping mechanism movably mounted in the head comprising a plurality of sectional jaws forming a hollow truncated cone and provided with serrated teeth on their inner surface, and a plurality of helical springs arranged underneath the jaws to permit a slight yielding of the same in a downward manner only, substantially as described.

7. In a pipe-driving attachment, the combination of a holding-head, a plurality of anchoring-bolts to which the head is adjustably secured, gripping mechanism movably mounted in the holding-head comprising a plurality of sectional jaws arranged to form a hollow truncated cone, a movable platen contacting the lower ends of the movable jaws, a rigid platen arranged below the movable jaws and secured to the holding-head, and a plurality of tension-springs interposed between the movable and rigid platen, substantially as described.

8. In a pipe-driving attachment, the combination of a holding-head, bolt mechanism for adjustably holding the head in position, gripping mechanism movably mounted in the holding-head comprising a plurality of sectional jaws arranged to form a hollow truncated cone and provided with teeth on their inner jaws, a movable platen contacting the ends of the gripping-jaws, a rigid platen adjustably secured to the holding-head, and a plurality of tension-springs interposed between both of the platens, substantially as described.

9. In a pipe-driving attachment, the combination of a holding-head, a pair of clamping-

timbers, bolt mechanism for tying the timbers together, bolt mechanism secured to the timbers upon which the holding-head is adjustably mounted, a second set of bolt mechanism for anchoring the timbers in a solid foundation, gripping mechanism comprising a plurality of sectional jaws arranged to form a hollow truncated cone movably mounted in the holding-head, a movable platen arranged to contact the lower ends of the sectional jaws, a rigid platen adjustably secured to the holding-head, and a plurality of tension-springs interposed between such platens, substantially as described.

10. In a driving-pipe attachment, the combination of a set of gripping-jaws, a head in which such jaws are movably mounted, anchor mechanism in engagement with the head and tension mechanism in engagement with the gripping-jaws, substantially as described.

11. In a pipe-driving attachment, the combination of a set of downwardly and outwardly movable gripping-jaws adapted to receive and hold a well-pipe between them, a head in which such jaws are movably mounted provided with means for limiting their upward movement, and tension mechanism in engagement with such jaws for moving them upward and holding them yieldingly in position, substantially as described.

12. In a pipe-driving attachment, the combination of a holding-head, a set of jaws slidably mounted in such head, means for limiting the upward movement of such jaws, spring mechanism in yielding engagement with the jaws for moving them upward and holding them yieldingly in position, and anchor mechanism in engagement with the head, substantially as described.

13. In a pipe-driving attachment, the combination of a holding-head provided with an annular opening having an upwardly and inwardly inclined wall, a set of jaws each provided with an upwardly and inwardly inclined outer side movably mounted in the annular opening of the head, spring mechanism in operative engagement with such movable jaws for moving them upward and holding them yieldingly in position, and anchor mechanism in engagement with the head, substantially as described.

SAMUEL S. O'CONNOR.

Witnesses:
C. K. MACFADDEN,
FREDERICK GRUMME.