J. W. GREEN.

DRILLING MACHINE.

APPLICATION FILED AUG. 27, 1906.

939,907.

Patented Nov. 9, 1909.

2 SHEETS—SHEET 1.

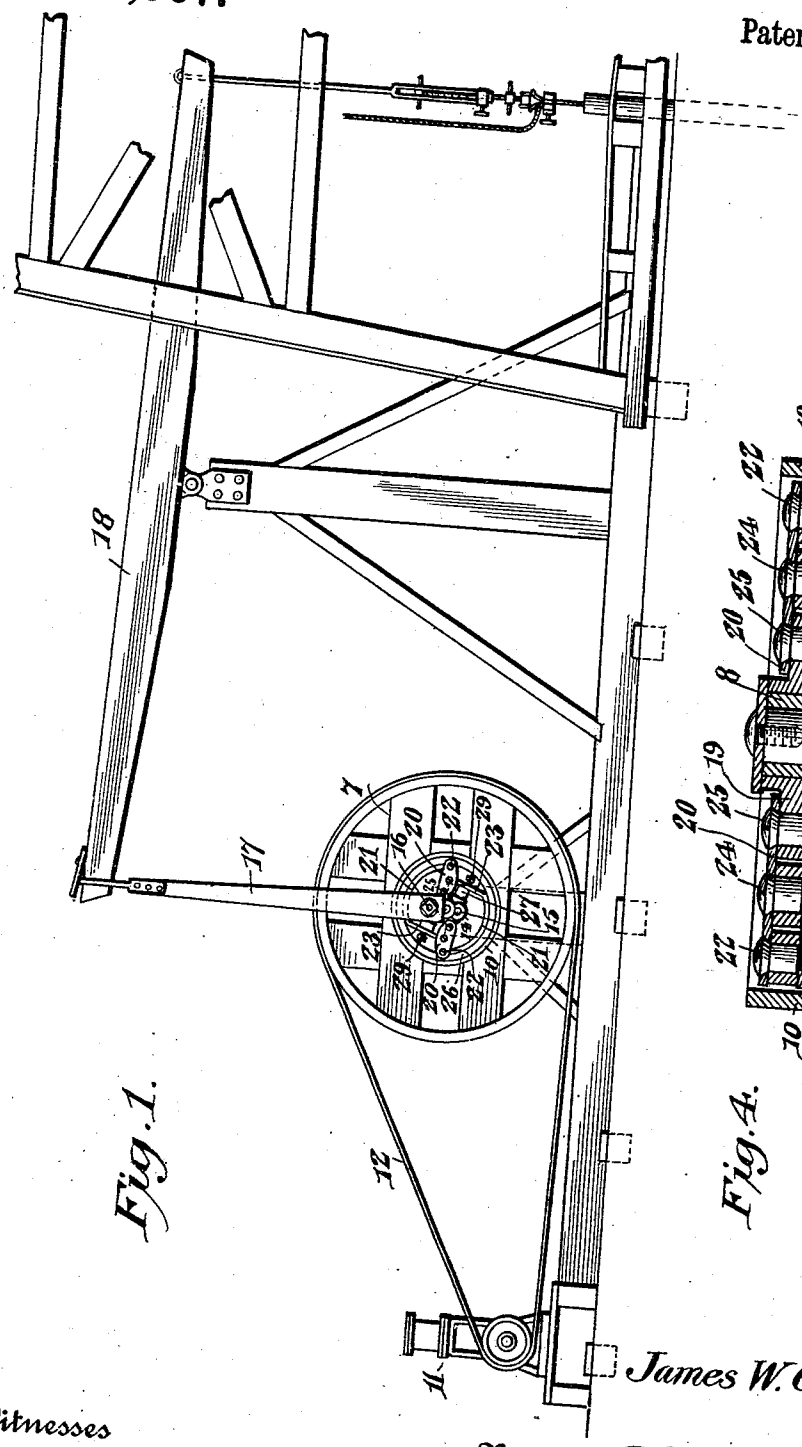

Fig. 1.

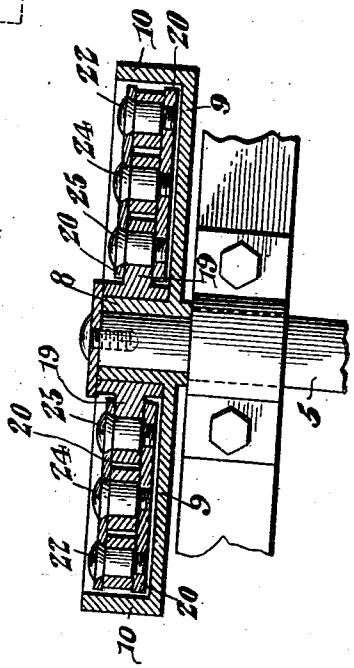

Fig. 4.

Witnesses

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2 SHEETS—SHEET 2.

Fig. 3.

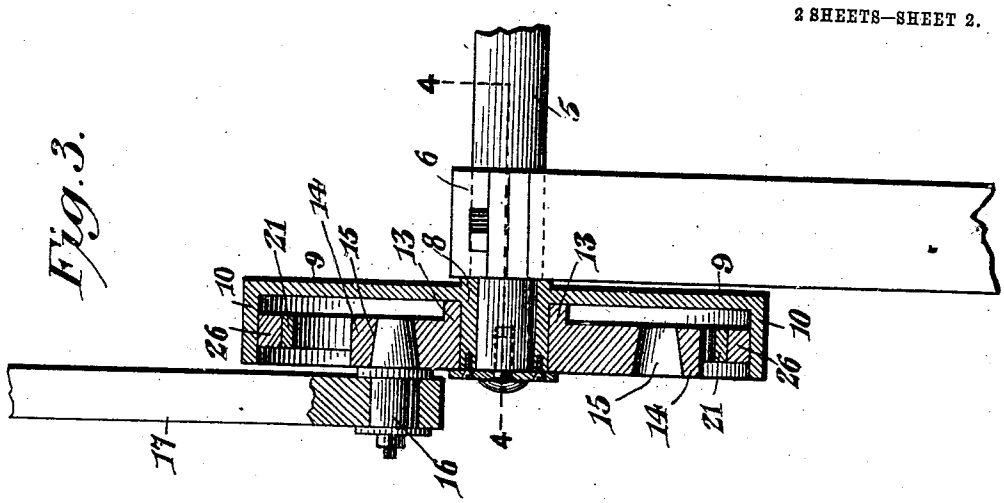
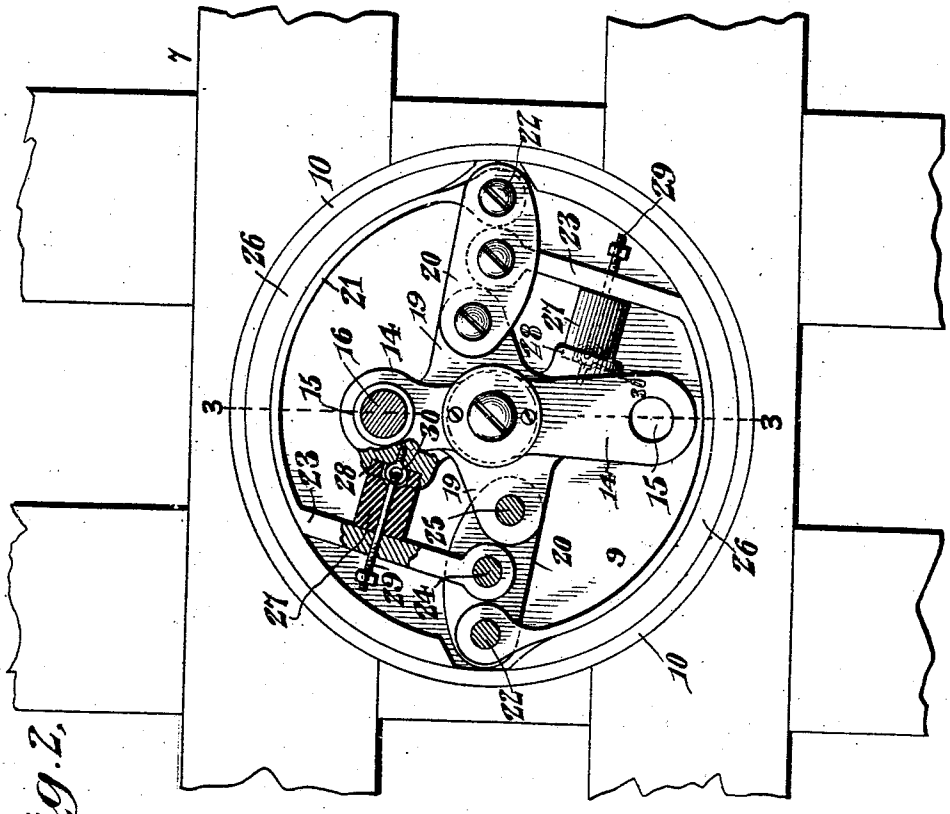


Fig. 2.



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UNITED STATES PATENT OFFICE.

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DRILLING-MACHINE.

939,907. Specification of Letters Patent. Patented Nov. 9, 1909.

Application filed August 27, 1906. Serial No. 332,190.

To all whom it may concern:

Be it known that I, JAMES WM. GREEN, a citizen of the United States, residing at Portland, in the county of Multnomah and State of Oregon, have invented a new and useful Drilling-Machine, of which the following is a specification.

This invention relates more particularly to the means for effecting the operation of the drilling tools, and the principal object is to provide novel mechanism of a simple nature, whereby the driving mechanism operates in the ordinary manner to lift the tools, but said tools are automatically freed to permit them to drop at a greater rate of speed than that of the driving mechanism, said driving mechanism immediately elevating the tools as soon as the dropping movement has been accomplished, thereby effecting a rapid drilling action without material jars to the machinery and securing the desired "spring-on-the-line" operation.

The preferred embodiment of the invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a side elevation of a portion of a drilling machine having the improvements incorporated therein. Fig. 2 is a view partly in elevation and partly in section on an enlarged scale of the novel mechanism. Fig. 3 is a sectional view on the line 3—3 of Fig. 2. Fig. 4 is a sectional view on the line 4—4 of Fig. 3.

Similar reference numerals designate corresponding parts in all the figures of the drawings.

In the embodiment illustrated, a driving member is employed, comprising a shaft 5, journaled in suitable bearings, one of which is shown at 6, and having a driving wheel 7, mounted thereon. This driving wheel may be of any desired construction, and it includes a hub 8 fast to the shaft 5, said hub carrying a web 9 provided with a peripheral wing 10. The wheel 7 is adapted to be driven from any suitable source of power, as for instance an engine 11 connected to the wheel by a belt 12 that passes around said wheel. It will be evident that any other gear connection may be employed, as desired.

Associated with the driving member or wheel is a driven or crank member, comprising a hub 13, journaled on the hub 8 of the wheel, and having oppositely extending arms 14, provided with sockets 15 that are disposed at different distances from the axes of rotation of the members, which axes are coincident as will be evident. A wrist pin 16 is arranged to be detachably fitted in either socket 15 so that its radius of rotation is variable. The wrist pin has suitable connections with the drilling tool. Thus in the present embodiment, said wrist pin is journaled in the lower end of a pitman 17, the upper end of which is connected to one end of a walking beam 18. The other end of said walking beam supports the drilling tools in a manner well understood. Instead of the walking beam and associated parts, any suitable tool-actuating mechanism may be employed.

The hub 13 of the driven or crank member is provided with oppositely extending ears 19, located between the arms 14, said ears being embraced by the inner ends of sets of links 20 that are located within the rim 10. The links are connected by shoes, each shoe, consisting of an inner or supporting section 21, having a pivotal connection 22 at one end with the outer ends of one set of links, being disposed between the links of the set. The other end of each section 21 is inset in the form of an arm 23, and extends between intermediate portions of the other set of links, to which it is connected by a pivot 24. The inner ends of the links are secured to the ears 19 by the pivots 25. Wearing blocks 26 are secured to the outer sides of the sections 21, and have their outer faces conforming to the curvature of the inner face of the rim 10, as will be evident by reference to Fig. 2. Means are employed for yieldingly urging the shoes outwardly into coaction with the rim. In the present embodiment, the means consists of rubber or other resilient blocks 27, interposed between the arms 23 and the arms 14, the latter being provided with sockets 28 to receive the inner ends of the blocks. Tie bolts 29 extend through the blocks 27 and through the arms 23, the inner ends of these bolts being connected to eyes 30 that are secured to the arms 14.

The operation of the structure is substantially as follows. The wheel 7 is continuously rotated from the motor 11. When the tools are in their lowermost position, the pitman 17 will be raised, and the weight of the tools constitutes a resistance to the rotation

of the crank or driven member. Inasmuch, however, as the blocks 27 yieldingly force the shoes outwardly against the rim 10, the resistance to the rotation of the crank member will cause said shoes to bind against the rim 10, and the driving and driven members will thus be clutched together. As a result, the walking beam 18 will be rocked, and the string of tools elevated. As soon, however, as the wrist pin 16 passes the center of gravity, the weight of the tools will react, and the shoes are so connected to the driven member that the tendency of the additional speed on the part of said driven member, due to the tools, will cause them to loosen their grip upon the rim 10, so that the driven member will rotate at a speed faster than that of the driving wheel, and the tools will drop without material resistance. As soon, however, as the dropping action is accomplished, the shoes will again clutch the rim, so that said tools will be immediately elevated. The result is an excedingly rapid and effective operation of the tools. The rate of rotation of the driven member is greater than that of the driving member. Moreover, the quick action secures the desired "spring-on-the-line" operation, and the immediate reclutching, eliminates to a very material degree the jars and shocks due to the reciprocatory action of the heavy string of tools. It will be observed, moreover that in this construction, there are no ratchet dogs, or like devices, and the parts are not liable to abnormal wear. The mechanism furthermore is very quiet in operation, and experience has demonstrated that the tools will cut much more rapidly than when connected to a wrist pin or crank member that operates at the same speed as the member driving it.

From the foregoing, it is thought that the construction, operation, and many advantages of the herein described invention will be apparent to those skilled in the art, without further description, and it will be understood that various changes in the size, shape, proportion, and minor details of construction, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. In well drilling mechanism, the combination with relatively rotatable driving and driven members, of a circular friction rim carried by one member, a shoe carried by the other member and engaging the rim, and means for yieldingly maintaining the shoe at all times in engagement with the rim, said means permitting the relative rotation of the rim and shoe, when the speed of the driven member exceeds that of the driving member.

2. In well drilling mechanism, the combination with a rotatable wheel, of a rotatable crank member journaled on the wheel, a rim carried by the wheel, a shoe that engages the inner face of the rim, and means for yieldingly holding the same against the rim at all times to effect the clutching action of the two when there is a resistance to the rotation of the crank member, said means permitting a sliding movement of the shoe upon the rim when the crank member's speed exceeds that of the wheel.

3. In well drilling mechanism, the combination with a driving member, of a driven member, a clutch element carried by one member, a coacting clutch element, spaced links connecting the latter element to the other member, and means for urging said latter element into coaction with the first mentioned member.

4. In well drilling mechanism, the combination with a driving member, of a driven member, a rim carried by one member, spaced links pivotally connected to the other member, and a shoe pivotally connected to the links.

5. In well drilling mechanism, the combination with a driven crank member, of a driving wheel having its axis of rotation substantially coincident therewith, a rim mounted on the wheel, a shoe coöperating with the rim, spaced links each pivotally connected at one end to the crank member and at its other end to the end of the shoe, and means for yieldingly urging the shoe into coaction with the rim.

6. In well drilling mechanism, the combination with a driven member, of a driving member, a clutch element carried by one member, a plurality of clutch elements coacting with the first mentioned clutch element, and common means movably securing said plurality of clutch elements to the other member.

7. In well drilling mechanism, the combination with a driving member, of a driven member, a clutch element carried by one member, a plurality of clutch elements coacting with the first mentioned clutch element, a link connected to said plurality of elements and to the other member, and means for urging the said plurality of elements into coaction with the first mentioned element.

8. In well drilling mechanism, the combination with a driven crank member, of a driving wheel having its axis of rotation substantially coincident therewith, a rim mounted on the driving wheel, links pivotally connected to the crank member and located within the rim, shoes pivoted at their ends to the links, each shoe having a connection at one end with the outer end of one link and at the other end with an inter-

mediate portion of another link, and means interposed between the crank member and shoes for urging the latter into engagement with the rim.

9. In well drilling mechanism, the combination with a driving member, of a driven member, a shoe associated with one member, and links pivotally connected to the other member and to the shoe, the distance between the pivotal connections of one link being greater than the distance between the pivotal connections of the other link.

10. In well drilling mechanism, the combination with a driving member, of a driven member, a shoe associated with one member, links pivotally connected to the other member and to the end portions of the shoe, the distance between the pivotal connections of one link being greater than the distance between the pivotal connections of the other link, and yielding means normally maintaining the shoe in coaction with the first mentioned member.

11. In well drilling mechanism, the combination with a rotatable crank member, having sockets located at different distances from and on opposite sides of its axis of rotation, of a wrist pin that detachably engages in the sockets, a rotatable driving member, and clutch mechanism connected to the crank member between the sockets, said clutch mechanism operating to secure the members together when there is a resistance to the rotation of the crank member and permitting a movement of the crank member faster than that of the driving member.

12. In well drilling mechanism, the combination with a rotatable crank member having wrist pin receiving sockets disposed at different distances from its axis of rotation, of a driving wheel journaled upon the crank member, a rim carried by the driving wheel, links pivoted to the crank member between the sockets and arranged within the rim, friction shoes pivotally connected at their ends to the links and operating against the rim, and yielding devices interposed between the end portions of the shoes and the crank member, said devices urging the shoes into coaction with the rim.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JAMES WM. GREEN.

Witnesses:

GEO. A. BRODIE,

HAZEL ABRAMSON.