

No. 749,330.

PATENTED JAN. 12, 1904.

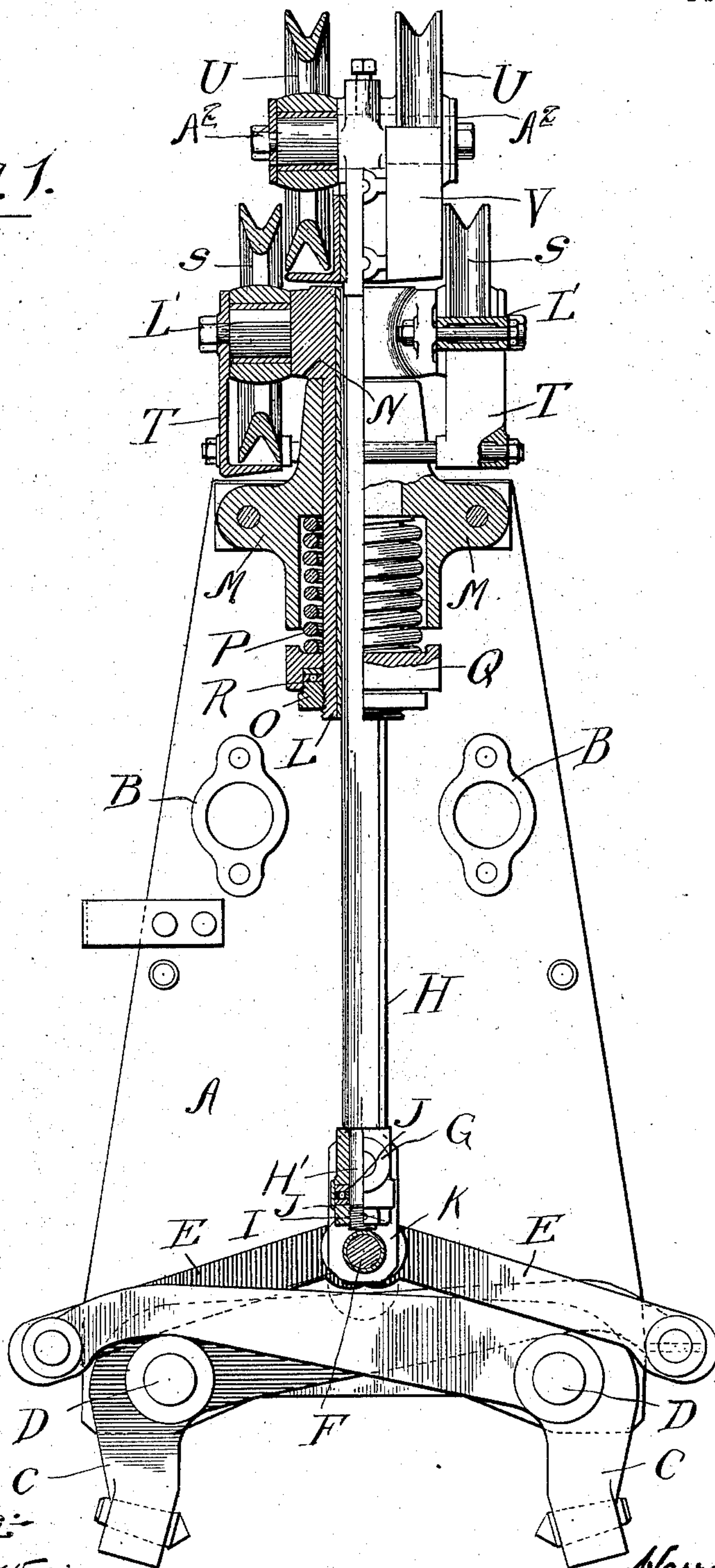
H. SAWYER.
TONGS OR GRAPPLE.

APPLICATION FILED SEPT. 1, 1903.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
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Inventor:
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2 SHEETS—SHEET 2.

Fig. 2.

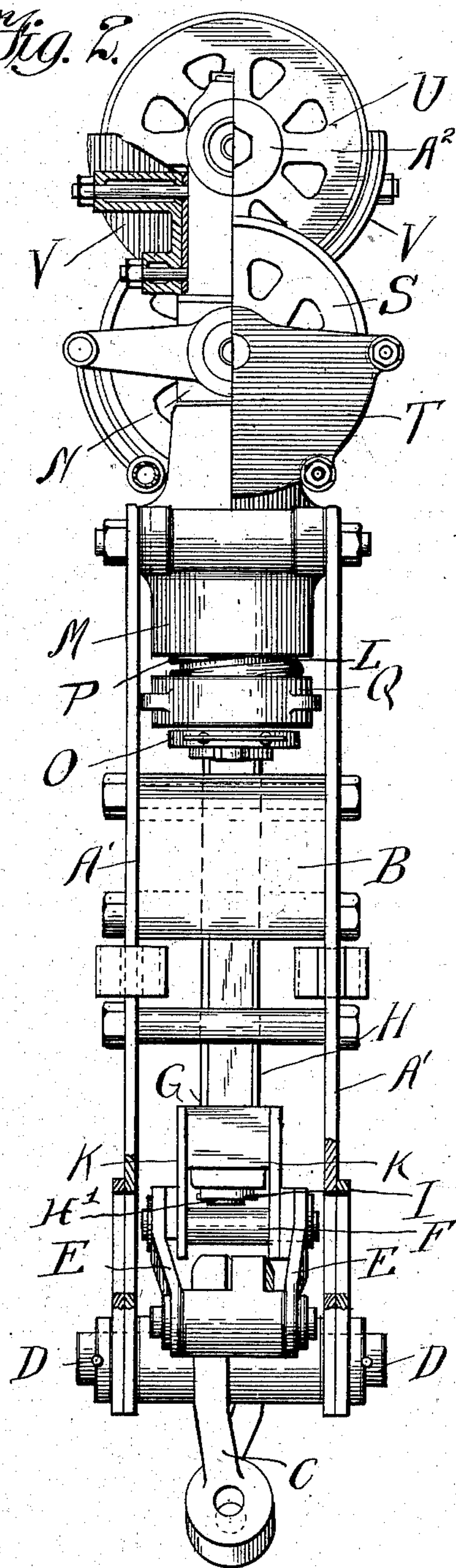
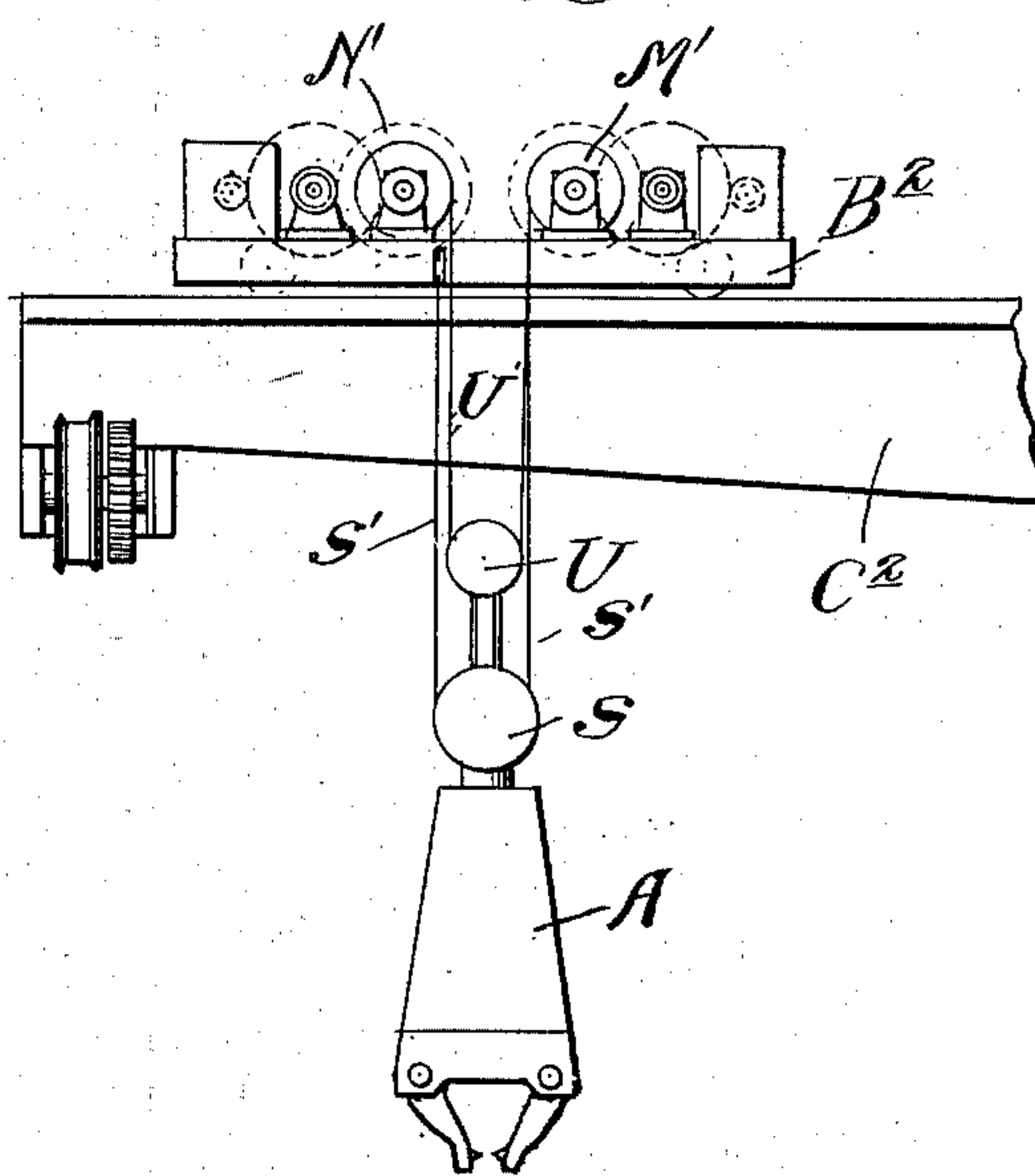


Fig. 3.



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UNITED STATES PATENT OFFICE.

HARRY SAWYER, OF MUSKEGON, MICHIGAN.

TONGS OR GRAPPLE.

SPECIFICATION forming part of Letters Patent No. 749,330, dated January 12, 1904.

Application filed September 1, 1903. Serial No. 171,569. (No model.)

To all whom it may concern:

Be it known that I, HARRY SAWYER, a citizen of the United States, residing at Muskegon, in the county of Muskegon and State of Michigan, have invented a new and useful Tongs or Grapple, of which the following is a specification.

This invention relates to tongs or grapples.

The object of the invention is to provide tongs or grapples which are simple in construction, efficient in operation, and economical of manufacture.

A further object of the invention is to provide a construction of gripping-tongs which can be operated by the usual traveling crane and which shall exert a constant gripping force upon the load.

Other objects of the invention will appear more fully hereinafter.

My invention consists, substantially, in the construction, combination, location, and arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawings, and finally pointed out in the appended claims.

Referring to the accompanying drawings, Figure 1 is a view, in part side elevation and part longitudinal section, of a pair of tongs or grapples embodying the principles of my invention. Fig. 2 is a view, partly in side elevation and partly in longitudinal section, taken in a direction at right angles to that of Fig. 1. Fig. 3 is a view in side elevation, showing a portion of a traveling crane and trolley with my improved form of tongs.

The same part is designated by the same reference-sign wherever it occurs throughout the several views.

In the handling of ingots and other objects considerable difficulty is often found in properly attaching the lifting devices in order that the objects may be moved. This is due to their weight and bulky size and shape and also frequently on account of the fact that they are in a heated condition and cannot be approached to attach chains and other fastening devices. Accordingly it has been proposed to provide tongs for this purpose which shall automat-

ically grip and retain the load by virtue of the lifting force. In my prior patent, No. 569,939, I have shown such a construction of tongs or grapples in which the jaws of the tongs are positively opened and closed by mechanical means, but which when lifting a load are firmly pressed together by the tractive force. By the present invention also the tongs are so arranged that they may be initially closed upon the work. At the same time they retain the feature of employing the tractive force to maintain the gripping-pressure and also provide for a swivel-support whereby the ingot may be rotated.

Referring to the accompanying drawings, reference-sign A designates the supporting-frame, comprising a pair of parallel plates A', held in properly-spaced relation by any desired means—as, for example, by means of the usual pivot-bolts of the gripping-jaws, together with the block or head M, which will be later described. B B designate additional supporting-blocks having bolts or other means whereby the plates A' A' are further reinforced in proper relation. C C designate the gripping-jaws constituting the tongs or grapping device proper. These are shown as comprising bell-crank levers fulcrumed on pivot-bolts D D at the lower portion of the frame. E E designate links connecting the ends of the jaw-levers to a common pin F. All this is the ordinary and well-known construction and forms no part of my present invention.

G designates a yoke in the form of a swiveled block at the lower end of the lifting-rod H. This yoke or block may be swiveled in any desired manner—for example, as shown in the drawings, in which it encircles a reduced portion H' at the lower end of the rod H. A nut I, threaded upon such reduced end, serves to retain the block in position.

J J designate the respective members of an antifriction or ball bearing raceway which may be interposed between the nut I and the yoke or block G.

K K designate links connecting the block or yoke G with the pin F.

The lifting-rod H may be splined or formed

of octagonal or other shape, whereby it is longitudinally but not rotarily movable in a sleeve or casing L, swiveled in the head M.

N denotes a flange at the upper portion of the sleeve L, and O denotes a nut or threaded collar, which parts co-operate with the head M and limit the longitudinal movement of the sleeve therein.

P designates a spring interposed between the head M and the part or collar Q and serving to normally support the head M at the upper limit of its movement with relation to the sleeve L.

R denotes an antifriction or ball bearing raceway interposed between the collar Q and the nut O.

Q is provided with lugs which prevent its rotation relative to frame A.

S S designate sheaves or pulleys rotarily mounted upon trunnions or supports L' L' upon the sleeve or casing L.

T T designate guards arranged to co-operate with the sheaves or pulleys to maintain the ropes thereon.

U U denote additional sheaves or pulleys rotarily mounted upon trunnions or supports A² A² upon the upper end of the lifting-rod H.

V V designate guards co-operating with the last-named pulleys.

The operation of this device will be understood from the preceding description. The tongs are suspended from the usual traveling or other crane in the manner shown in Fig. 3. Hoisting ropes or cables U' are passed around the sheaves U U and attached at each end to separate hoisting-drums N' M', carried by a trolley or other suitable device B², mounted to move on the traveling arm C² of any suitable construction of crane. Other hoisting cables S' S' are passed around the sheaves S and attached at one end of the hoisting-drum M' and at the other end are secured to the stationary frame of the trolley. When an object is desired to be lifted, the tongs are moved to the proper position and the drum N' rotated to slacken the cable U'. This allows the sheaves U to fall with relation to the sheaves S, thereby dropping the rod H and opening the jaws C to their widest limit of open position. The spring P exerts its expansive force to support the main frame A normally in its highest position with relation to the sleeve L and the sheaves S. When the jaws are in proper position to inclose the object, the drum N' is again rotated, but in the reverse direction and tightens the cables U', thereby closing the gripping-jaws upon the object to be moved. The drum M' is now rotated to lift the load. Inasmuch as all the sheaves are now raised in unison the tendency of the lifting mechanism is to maintain the gripping-jaws in a certain set relation. It is desirable, however, that the jaws have

exerted upon them a constant closing-pressure, and it is the purpose of the spring P to permit the strain of the lifting force to exert such a constant closing or gripping pressure throughout the time the load is lifted. Accordingly it is arranged in such a way that when the casing L and the rod H move upward in unison, the weight of the load being thrown on the frame A, the latter is free to move downward with relation to the sleeve or casing L, and hence with relation to the rod H, which at this time is in fixed relation to the casing L, the movement being merely opposed by the spring S. The spring S is sufficiently strong to support the weight of the frame A alone, but is not sufficiently strong to support the combined weight of the frame and load and is free to yield by reason of such added weight. Such movement cannot, however, take place without further closing the gripping-jaws upon the load with which they are already in tightened engagement. Accordingly it does not ordinarily take place except through a very small distance; but it serves to insure that a gripping force is constantly applied to the jaws. Of course if the movement of the head M upon the sleeve L extends to the limiting-stop Q the effectiveness of the device is destroyed; but in practice a small movement of the frame is all that usually takes place.

Owing to the splined or octagonal or other suitable form of the rod H, this rod is in fixed rotative relation with respect to the sleeve or casing L, whereby the respective sheaves S S and U U are all held in parallel relations suitably disposed for engagement with their operating-cables. The frame A is, however, free to turn or swivel with relation to the pulleys in any direction, turning on the antifriction or ball bearings J and R. By this means the load is not only movable to any desired point, but may be swiveled to any desired position and without straining or injuring the supporting-cables.

It is obvious that many different ways may suggest themselves to persons skilled in the art of connecting the pulleys to the main frame or casing, whereby the latter may be swiveled with relation to said pulleys and also many specifically different constructions of the sleeve and surrounding frame or head M. I do not desire, therefore, to be limited or restricted to the exact details shown and described; but,

Having now set forth the object and nature of my invention and a construction embodying the principles thereof, what I claim as new and useful and of my own invention, and desire to secure by Letters Patent, is—

1. In a device of the class described, sheaves mounted for movement toward and from each other, and means actuated by the relative

movement of said sheaves toward and from each other to actuate the jaws, as and for the purpose set forth.

2. In a device of the class described, a main frame having gripping-jaws, a plurality of parts capable of longitudinal movement but fixed against rotative movement with respect to one another, and means whereby such relative movement is made effective to open and close the gripping-jaws, as and for the purpose set forth.

3. In a device of the class described, a main frame having gripping-jaws, a plurality of supports for sheaves or pulleys capable of longitudinal movement but fixed against rotative movement with respect to one another, means operated by the relative movement of said supports for opening and closing the gripping-jaws, and other means for imparting an additional closing movement, as and for the purpose set forth.

4. In a device of the class described, a main frame having gripping-jaws, a plurality of relatively movable supports, sheaves or pulleys thereon, means actuated by the relative movement of said supports for closing the jaws, and additional yielding means for imparting a gripping-pressure to said jaws, as and for the purpose set forth.

5. In a device of the class described, a main frame having gripping-jaws, a plurality of parts capable of longitudinal movement with respect to one another, means whereby such relative movement is made effective to open and close the gripping-jaws, and means for exerting an additional closing-pressure thereon independent of the relative movement of the sheave or pulley supports, as and for the purpose set forth.

6. In a device of the class described, a main frame having gripping-jaws, a plurality of parts capable of longitudinal movement with respect to one another, means operated by the relative movement of said parts for opening and closing the gripping-jaws, and other means for imparting an additional closing movement, as and for the purpose set forth.

7. In a device of the class described, a main frame having gripping-jaws, a plurality of parts capable of longitudinal movement with respect to one another, means operated by such relative movement for closing the gripping-jaws, the said supports being further capable of movement in unison with respect to the main frame, and connections actuated by said last-named movement for imposing an additional closing-pressure upon the gripping-jaws, as and for the purpose set forth.

8. In a device of the class described, a main frame having gripping-jaws, a plurality of supports for sheaves or pulleys capable of longitudinal movement but fixed against rotative movement with respect to one another, means

operated by such relative movement for closing the gripping-jaws, a sliding connection between said pulley or sheave supports and the main frame, and a spring normally supporting said main frame against downward sliding movement thereon, as and for the purpose set forth.

9. In a device of the class described, a main frame having gripping-jaws, a sheave-support slidably mounted therein and spring-pressed downward, and a second sheave-support slidably mounted in the first-named support and operatively connected at its lower end to the gripping-jaws, as and for the purpose set forth.

10. In a device of the class described, a main frame having gripping-jaws, a sheave-support slidably mounted therein and spring-pressed downward, a pair of sheaves or pulleys mounted thereon and symmetrically disposed with respect to the center line of the tongs, a second sheave-support slidably mounted in the first-named support, and a pair of sheaves or pulleys symmetrically mounted on said second support with respect to the above-named center line, as and for the purpose set forth.

11. In a device of the class described, a main frame having gripping-jaws, actuating-links therefor, a sheave-support rotarily and slidably mounted in said frame and spring-pressed downward, a second sheave-support slidably mounted in the first-named support and rotarily connected to the actuating-links of the gripping-jaws, as and for the purpose set forth.

12. In a device of the class described, a main frame having gripping-jaws provided with actuating-links, a sheave-support rotarily mounted therein, a second sheave-support slidably but non-rotarily mounted in the first-named support, a yoke swivelly mounted at the lower end of such support, and link connections therefrom with the actuating-links of the gripping-jaws, as and for the purpose set forth.

13. In a device of the class described, a main frame having gripping-jaws provided with actuating-links, a sheave-support rotarily and slidably mounted therein and spring-pressed downward, a second sheave-support slidably but non-rotarily mounted in the first-named support, a yoke swivelly mounted at the lower end of such support, and link connections therefrom with the actuating-links of the gripping-jaws, as and for the purpose set forth.

14. In a device of the class described, a main frame having gripping-jaws, a sheave-support rotarily mounted therein and supporting the frame on antifriction-bearings, a second sheave-support slidably but non-rotarily mounted in the first-named support, a yoke swivelly mounted at the lower end of such support and having an antifriction thrust-bearing, and links operatively connecting the same to the gripping-jaws, as and for the purpose set forth.

15. In a device of the class described, a main
frame having gripping-jaws, a sheave-support
rotarily and slidably mounted therein, spring-
pressed downward and supporting the frame
5 on antifriction-bearings, a second sheave-sup-
port slidably but non-rotarily mounted in the
first-named support, a yoke swivelly mounted
at the lower end of such support and having
an antifriction thrust-bearing, and links oper-

atively connecting the same to the gripping- 10
jaws, as and for the purpose set forth.

In witness whereof I have hereunto set my
hand, this 28th day of August, 1903, in the
presence of the subscribing witnesses.

HARRY SAWYER.

Witnesses:

C. H. SEEM,
S. E. DARBY.