

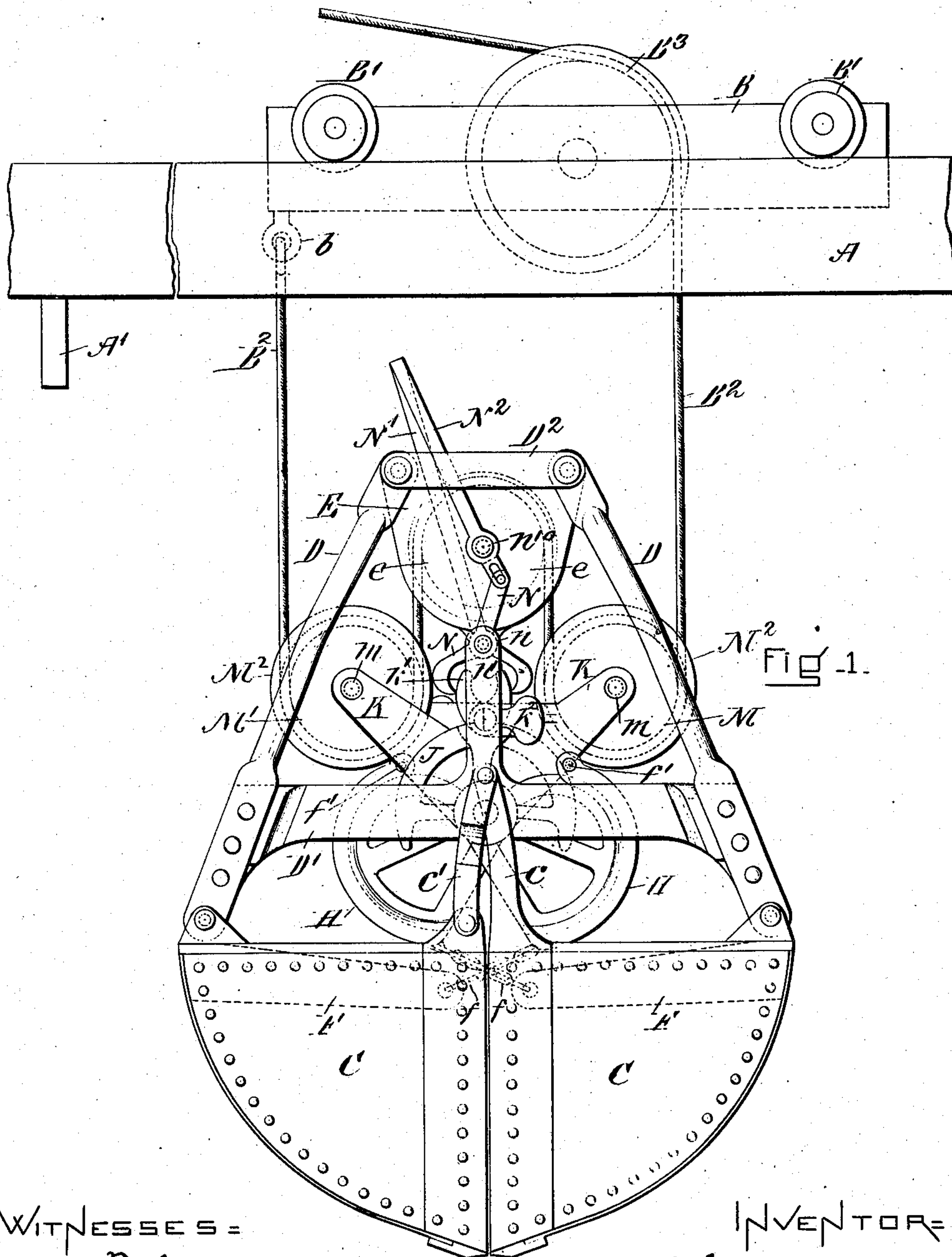
No. 840,525.

PATENTED JAN. 8, 1907.

A. SUCK.
GRAB.

APPLICATION FILED FEB. 26, 1906.

7 SHEETS—SHEET 1.



WITNESSES =

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7 SHEETS—SHEET 2.

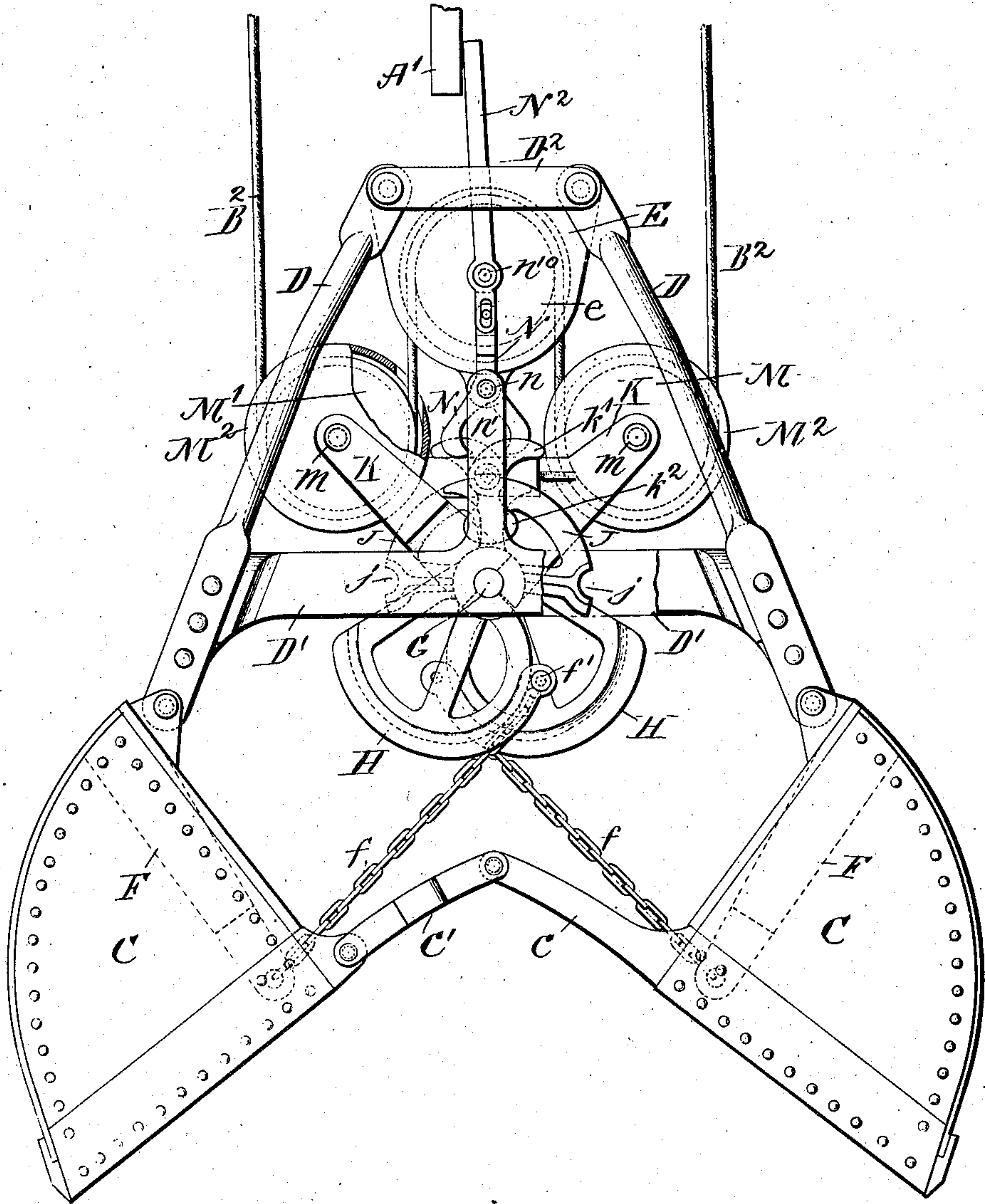


FIG. 2.

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7 SHEETS—SHEET 3.

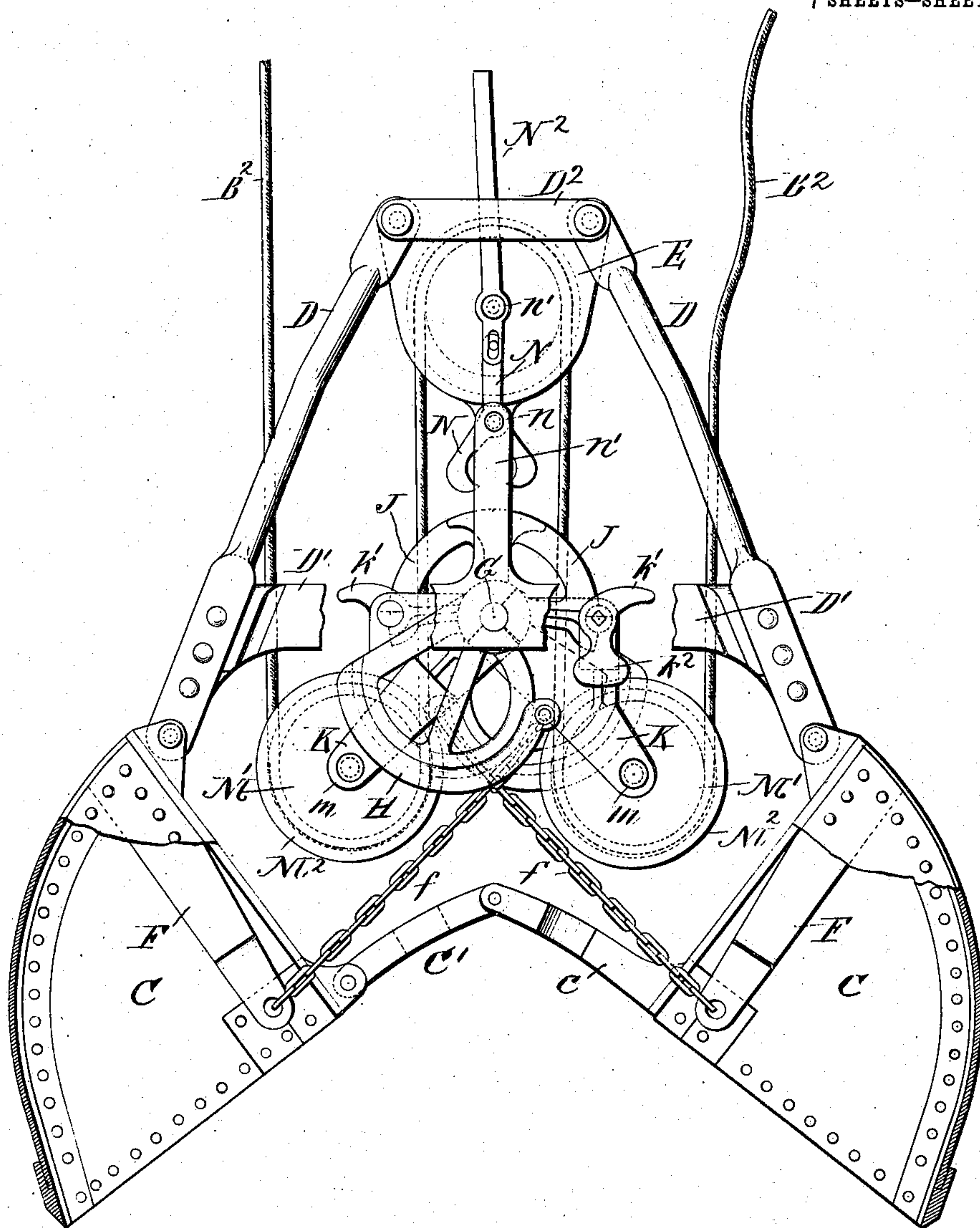


FIG. 3.

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7 SHEETS—SHEET 4.

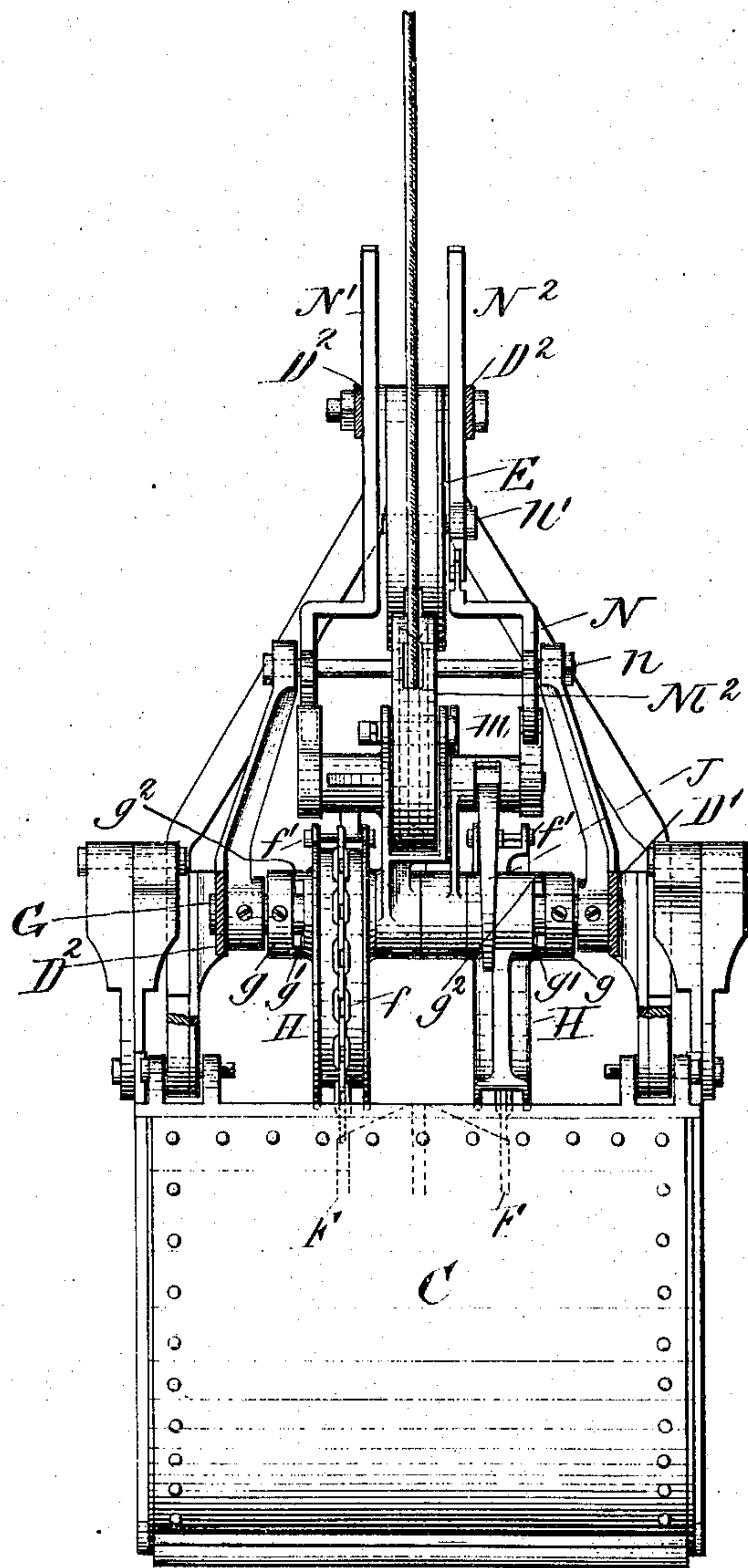


Fig. 4.

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7 SHEETS—SHEET 5.

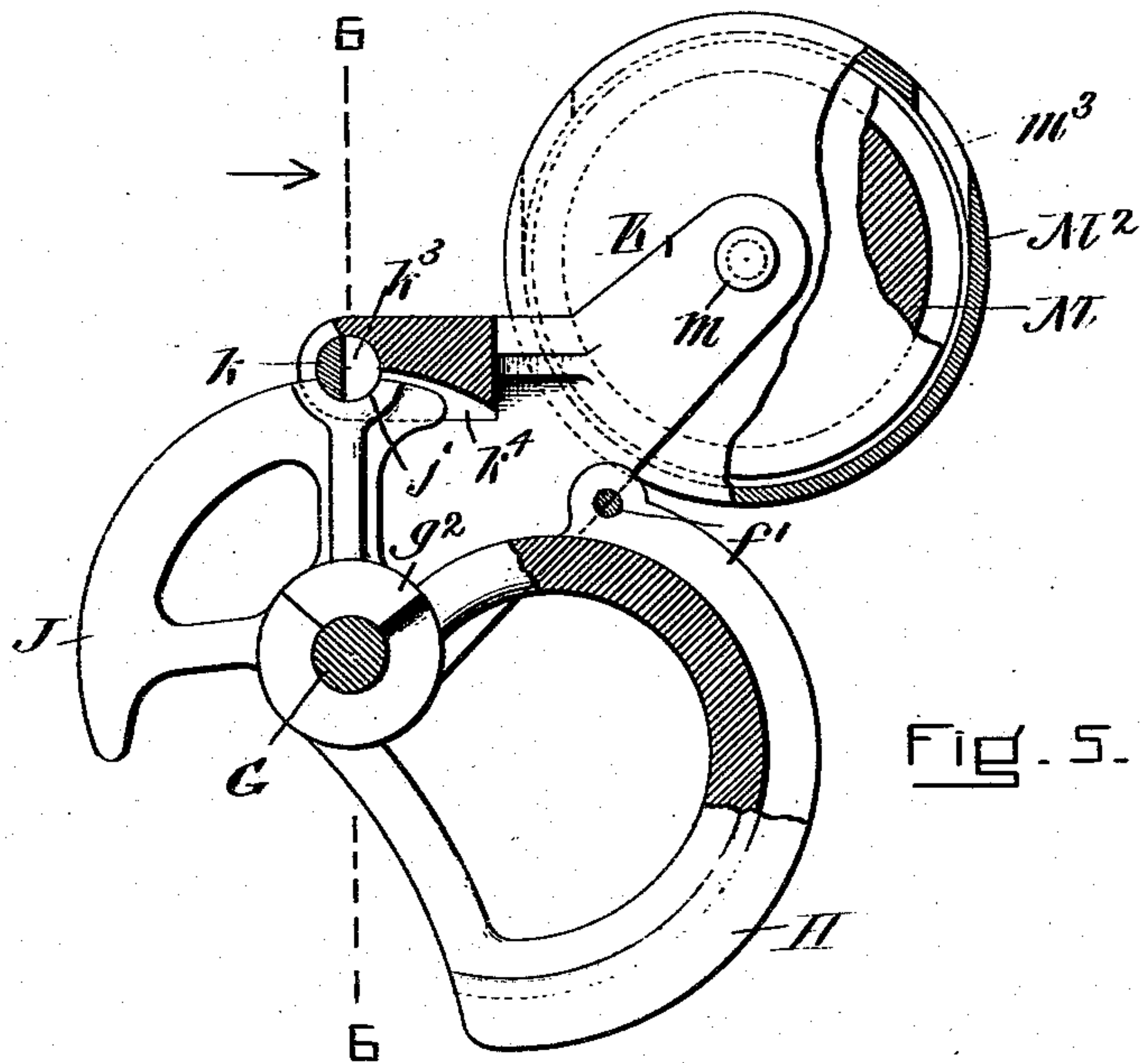


Fig. 5.

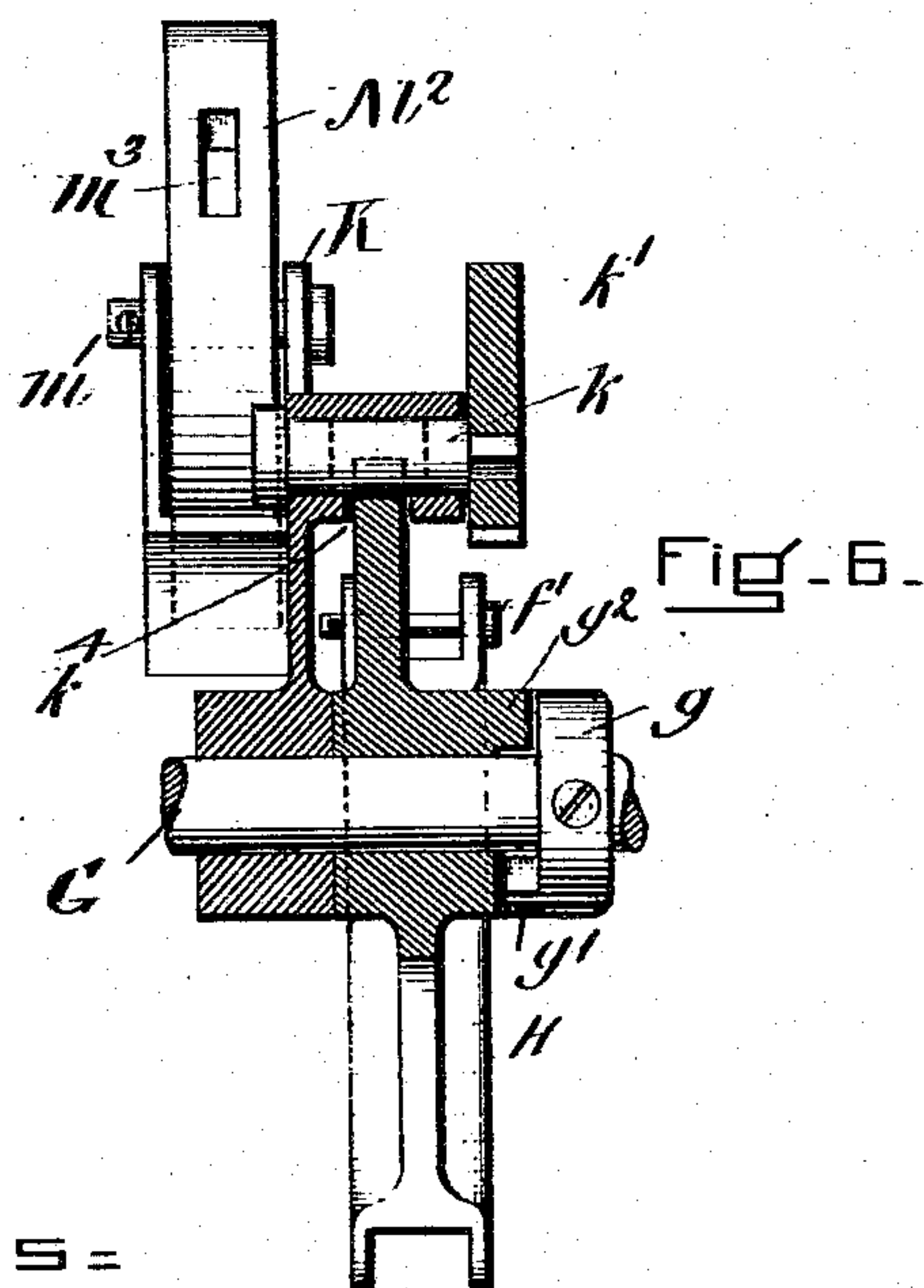


Fig. 6.

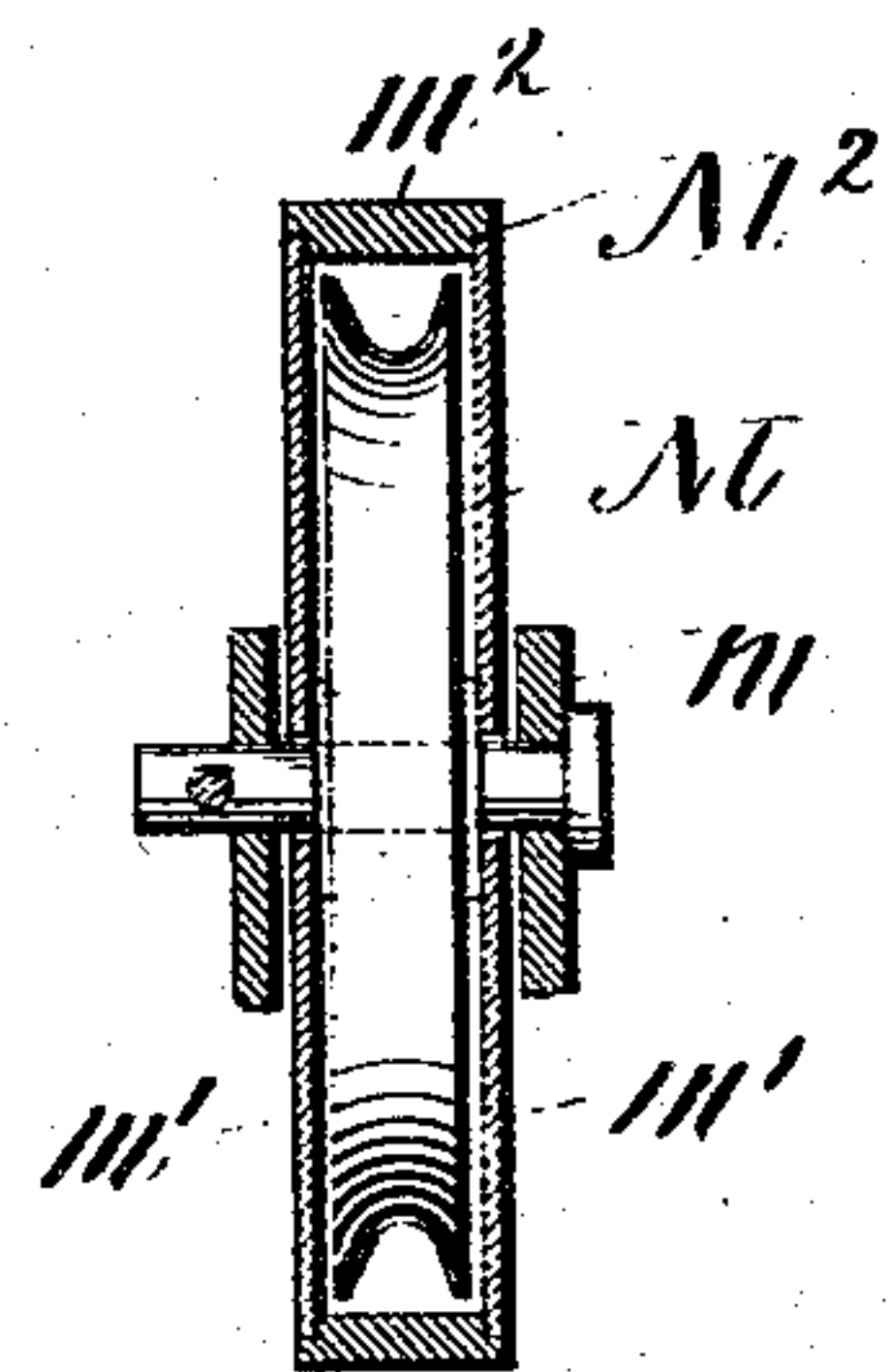


Fig. 7.

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7 SHEETS—SHEET 6.

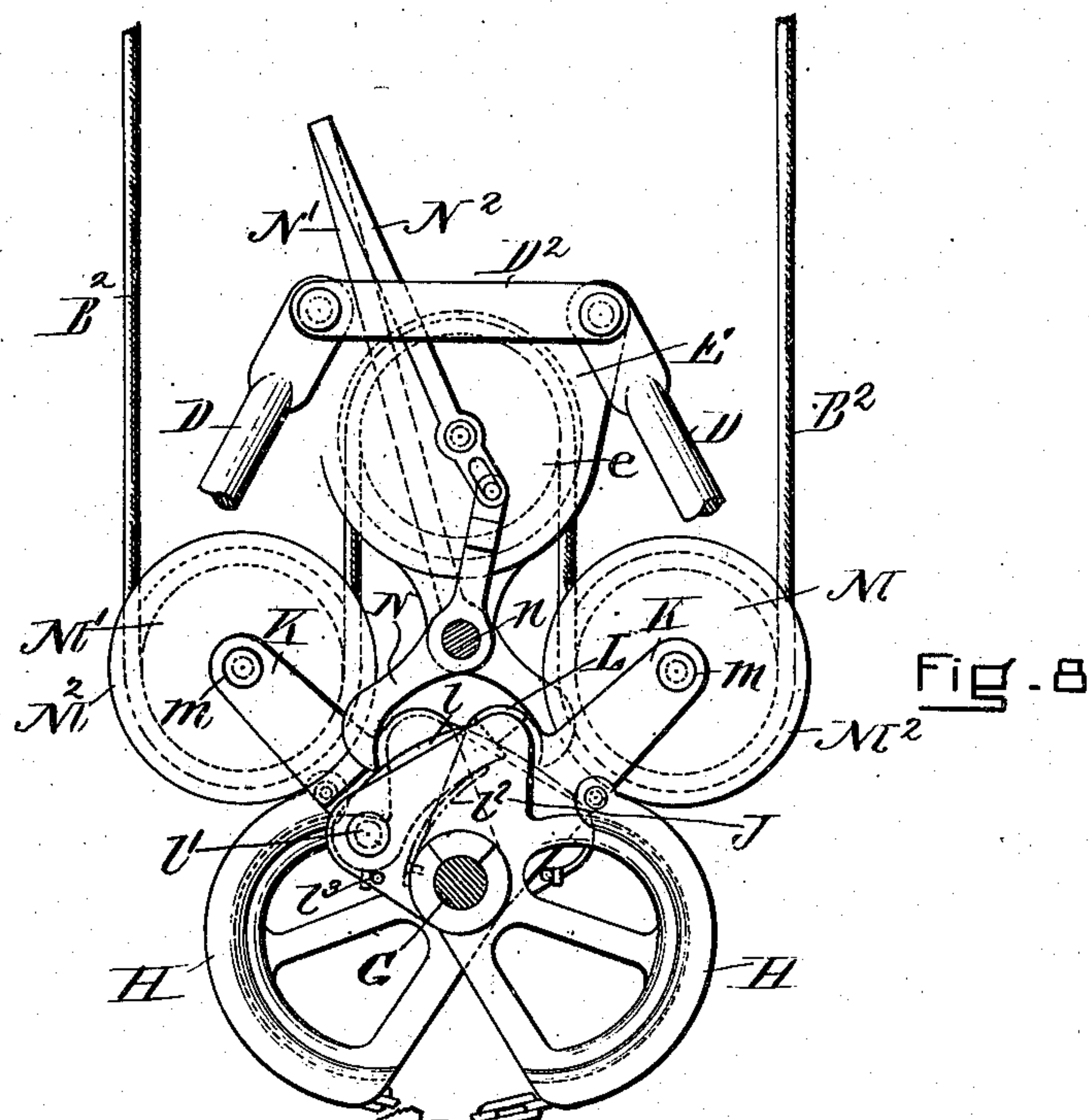


Fig. 8

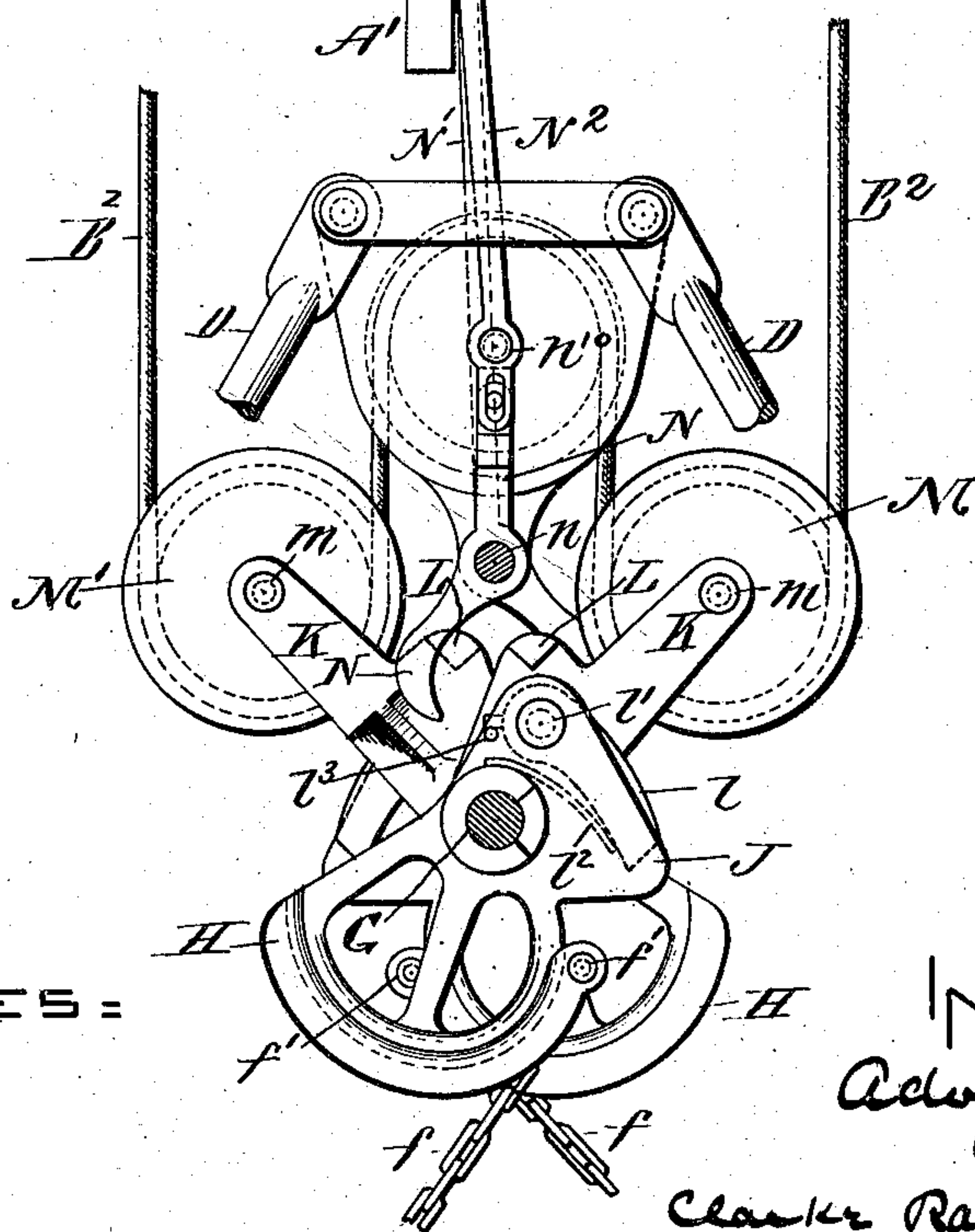


Fig. 9

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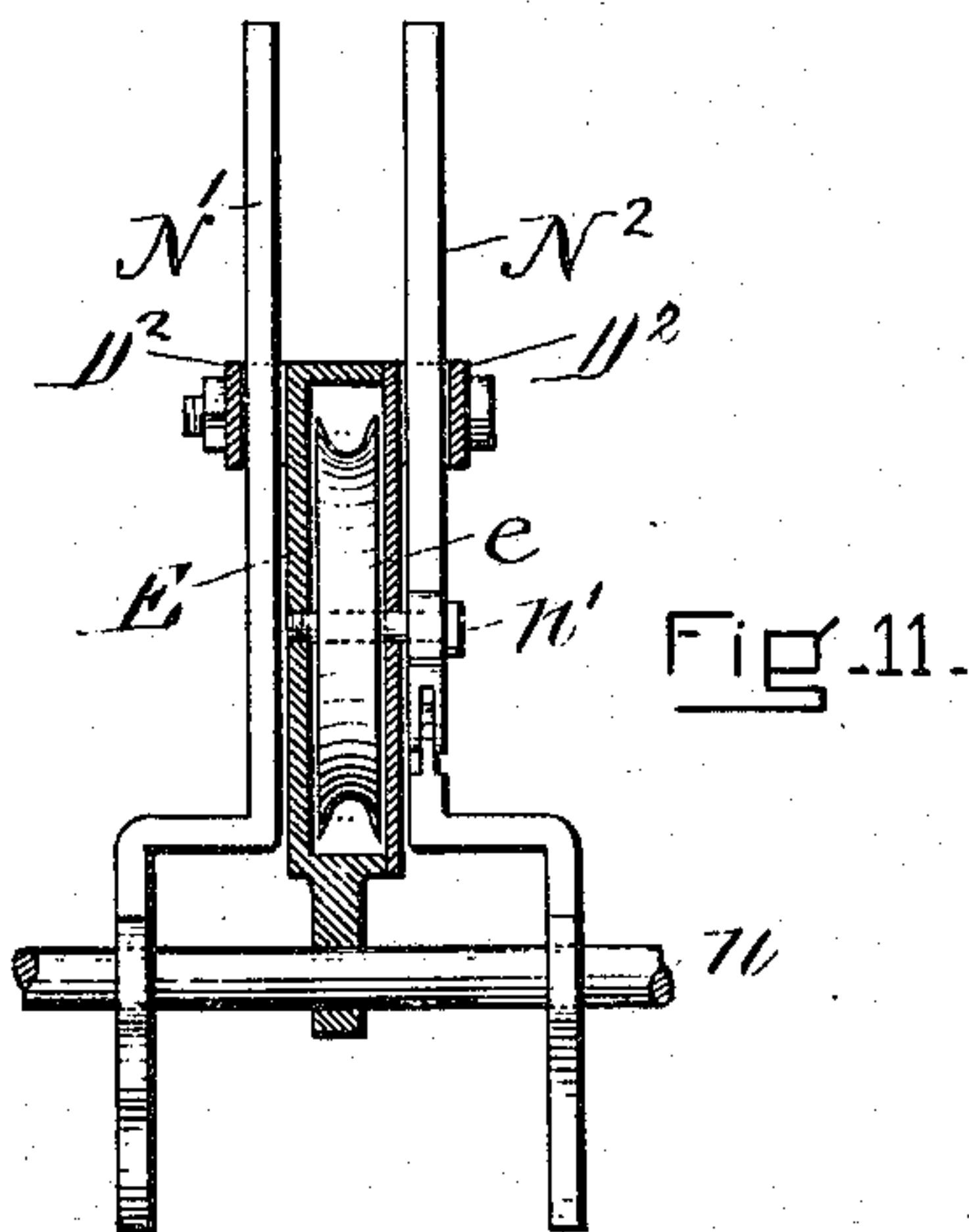
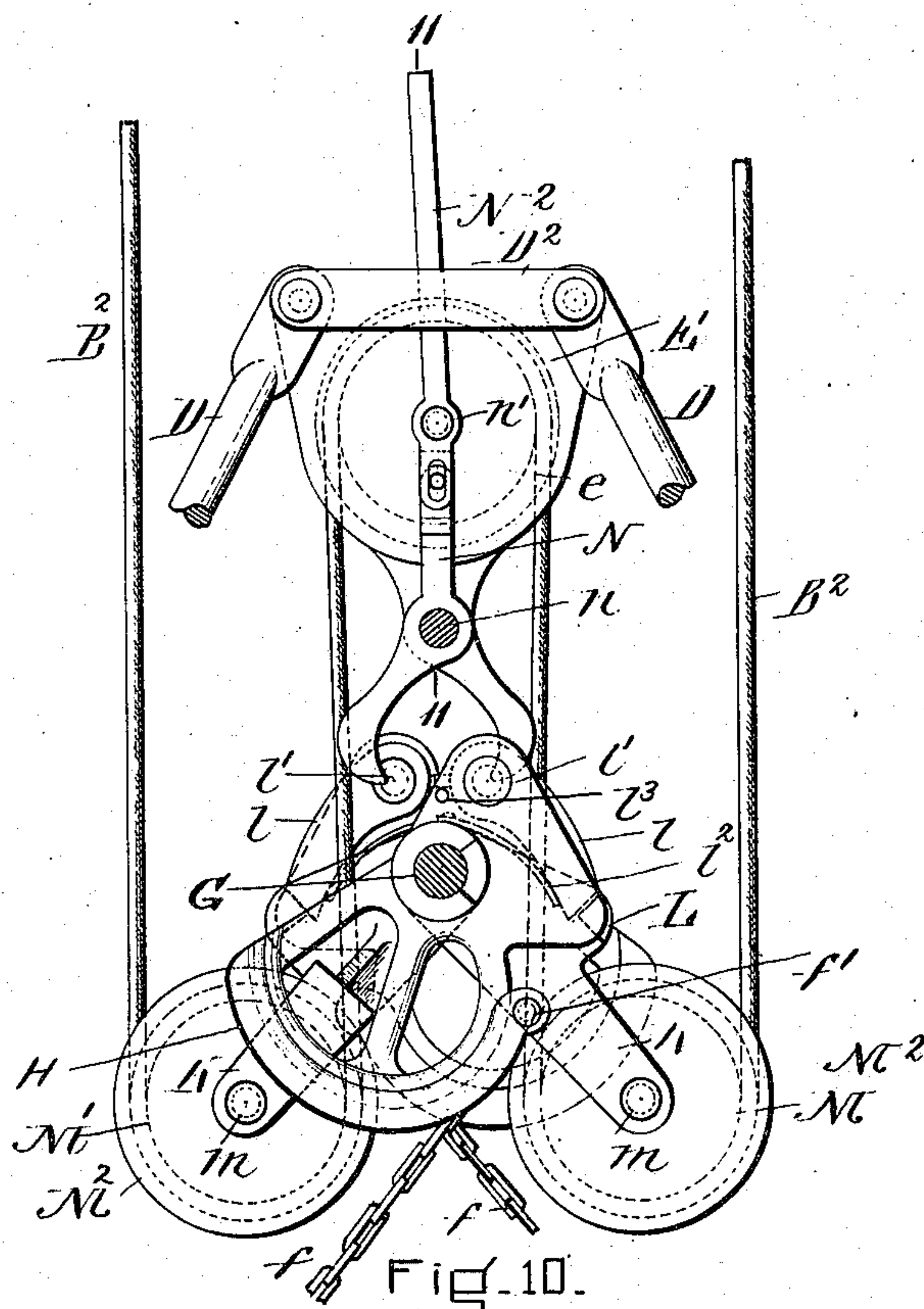
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7 SHEETS—SHEET 7.



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UNITED STATES PATENT OFFICE.

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GRAB.

No. 840,525.

Specification of Letters Patent.

Patented Jan. 8, 1907.

Application filed February 26, 1906. Serial No. 302,828.

To all whom it may concern:

Be it known that I, ADOLPH SUCK, a citizen of the United States, and a resident of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Grabs, of which the following is a specification.

My improvement is intended to render it possible to hang and operate a grab, such as is used in coal-hoisting apparatus and other like machinery, by means of a single rope, the grabs shown in the drawings being so operated; but I do not mean to limit my invention to mechanism in which only one rope is used.

My invention will be understood by reference to the drawings, in which—

Figure 1 is a side elevation of the preferred form of construction embodying my invention and showing also the trolley from which the grab is supported and the rail upon which the trolley runs in side elevation. Fig. 2 shows in side elevation, partly broken away, the grab in its open position just after it has discharged its contents. Fig. 3 is a side elevation, partly broken away, of the grab still in its open position and resting upon the pile of coal from which it is about to take its load, its hoisting-rope being relaxed. Fig. 4 is an end elevation of the grab in the position shown in Fig. 1. Fig. 5 is a detail of the latch mechanism; Fig. 6, a section on line 6 6 of Fig. 5. Fig. 7 is a section of the housing inclosing one of the hoisting-sheaves. Figs. 8, 9, and 10 are views of a modification of my operating apparatus corresponding, respectively, to Figs. 1, 2, and 3, the jaws themselves being omitted. These figures will be understood from description given below. Fig. 11 is a detail of the tripping mechanism.

In both forms of the grab shown in the drawings the general construction is the same to this extent, that each jaw is provided with means for closing it and that there is a hoisting mechanism which may be latched to said jaw-closing mechanism for the purpose of closing the jaws and holding them closed and may be detached therefrom for the purpose of allowing the jaws to open to dump the load and to take up the new load.

The difference between the two forms of my invention hereinafter described lies in the difference between the forms of latch shown. The mechanism is also shown as operated by a single rope, which serves both as a hoisting-

rope and as a means for causing the grab to secure its load and also to a certain extent may operate the trolley to cause the operation of the latch-tripping mechanism.

Turning now to the drawings, in Fig. 1, A is the trolley-rail, on which runs the trolley B, the trolley-rail also carrying a stop A', which is located over the point where the discharge of the grab is to be effected. It is so constructed as to engage with the tripping mechanism of the grab, as below described. The trolley B, in addition to its supporting-wheels B', has an eye b at its forward end, to which is attached one end of the hoisting-rope B², and it also has a large sheave B³, over which the hoisting-rope passes after running through the various sheaves in the grab mechanism. The grab itself in the form shown consists of two jaws C C, each pivotally supported from a pyramidal frame composed of rods D, connected by braces D' D' near their base and at their top by the brace D² and also attached to the housing E for the sheave e. The jaws of the grab are connected together by arms c c', which arms are pivoted together, one of the arms c' being also pivoted to its jaw C, so that while the jaws can only open a given distance there may be otherwise perfect freedom of movement between them. In addition each jaw has mounted upon it means, such as an arm F and a chain f, by which it is connected to its operating mechanism.

G is a tie-rod which is mounted in the braces D' D'. On this tie-rod are carried two segments H H. Each segment is free to turn on the tie-rod and has attached to it by the pin f' the other end of the chain f, these parts being so arranged that the rotation of the segment in one direction winds its chain f upon it, and so draws the corresponding jaw in a closing direction, (see Figs. 1, 4, and 8,) and the releasing of the segment allows the jaw to open by its own weight, dragging the segment into the position shown in Figs. 2, 3, 9, and 10. Each segment also carries a latching-arm J, which in the form of my invention shown in Figs. 1 to 7, inclusive, is segmental in shape and is notched at j, (see Figs. 2 and 5,) the notch forming one member of a latch, the other member of which comprises a pin k, grooved at k³ and mounted in bearings in an arm K, also mounted upon and free to swing about the shaft G, (see Fig. 6,) these bearings being slotted at k⁴. Each pin k carries a dog k',

fast to it and weighted at one end k^2 , so that each dog tends to turn its pin into the position shown in Figs. 5 and 6, where it will be seen that the pin is in engagement with the notch j . The groove k^3 in the pin is sufficiently wide and deep to ride over the curved periphery of the arm J when the pin is unlatched from the notch j in the arm J. The mechanism for turning the dogs k' from their latching position to cause the unlatching of the pins from the notch j will be described below.

In addition to its latch each arm K carries bearings m for a sheave $M M'$, each carried in a suitable housing M^2 . This housing is provided with openings, through which the hoisting-rope B passes. As shown in the drawings, the hoisting-rope passes from the eye b down into the housing M^2 of sheave M' and around the said sheave, then up and around the sheave e , down again into the housing M^2 for the sheave M and around that sheave, and up again around the sheave B^3 , and from it to the hoisting-engine.

The tripping mechanism comprises two levers $N N'$, one on each side of the grab, and each of which swings on a pin n , carried on an upright n' , forming part of or mounted on one of the braces D' . Each lever is suitably shaped at the bottom to engage one of the dogs k' and when properly moved to cause the dog to turn its pin k , so as to disengage it from its notch j , and hence release the segment H, the periphery of the latching-arm J as it moves passing through the groove k^3 in the pin k . One of these levers being located on each side of the grab and it being necessary to move them in opposite directions to perform the unlatching operation, I provide one of them, N , with an operating-lever N^2 , mounted to turn on the pin n^{10} , which forms the axle for the sheave e , the lower end of this arm being connected to the lever N by an ordinary pivoted slotted connection. By thus making it possible to trip the latches by moving the upper end of the lever N' and the operating-lever N^2 in the same direction I am enabled to utilize the movement of the trolley toward the stop A' for the purpose of tripping the latches and dumping the load.

The operation of the apparatus is as follows: The grab having been filled, as below described, it is hoisted by the rope B^2 , which passing over the various sheaves $M e M'$ keeps the various parts in the position shown in Fig. 1 by the weight of the load. The trolley is drawn over toward the stop A' , which is located over the dump-pile, when the levers $N N^2$ will strike the stop and disengage the latches, so that the parts will fall into the position shown in Fig. 2, being impelled thereto by their own weight, as well as the weight of the coal which the grab is carrying, thus dumping the coal. The grab is then returned to its original position over

the coal to be moved and is dropped by releasing the rope B^2 , so that it lands on the coal pile. The rope B^2 being still further relaxed, the arms K and the parts carried by them fall into the position shown in Fig. 3, the dogs k' being thus brought into such position that when the slack of the rope B^2 is taken up the sheaves $M M'$ and their bearings m , together with the arms K and the dogs $k' k'$, are drawn up into the position shown in Fig. 1, the engagement of each pin k with its notch $j j'$ causing the temporary uniting of the arm K with the segments H and their rotation in unison with the arms K and the consequent winding up of the chains f on the segments H and the closing of the jaws, the jaws thus gathering between them their load of coal. The continuing pull upon the rope B^2 then hoists the grab, and the operations as above described are repeated.

I have shown in Figs. 8, 9, and 10 a form of construction which is similar in many respects to that above described, the main difference being that the latches instead of being positive in their operation are spring-latches. For this purpose the arms J are not necessarily curved, as in the form of device first above described, nor are they notched; but each carries a spring-latch l , each latch being pivoted at l' to one of the arms J, its free end being pushed upwardly by means of a spring l^2 , also attached to said arm J, each spring-latch being provided with a suitable stop—for example, a pin l^3 —to prevent it from being thrown out too far by its spring. In this form of my invention each arm K carries a projection L , located to engage the end of the spring-latch l when that spring-latch l is in its outward position. When, however, the latch has been depressed against the force of the spring, this projection is enabled to ride over the outer edge of the latch, so that the weight of its jaws is no longer sustained by it. In order to depress the latches at the proper time, so as to open the grab, mechanism is provided similar to that referred to above—viz., a cross-pin n , mounted in uprights n' , and similarly-shaped levers $N N'$, mounted thereon, the lever N being provided with an operating-lever N^2 , as above described. It will be seen that this construction is really simple, and, as it now appears to me, an important feature of it is that a single rope serves as a hoisting-rope and also causes the operation of latches which connect parts otherwise disconnected, so that when all the parts are in active coöperation the grab is closed and is kept closed by the weight of its load until the hoisting function of the rope is completed, when its dragging function is utilized to trip the latches, so as to dump the load, and later it is relaxed to enable the latches to be reset and the grab to take its load, and thus to close the grab and hoist the load. So far

as I know, this cycle of operations has never been possible in any grab operated by a single hoisting-rope, and it is evident to those skilled in the art that the simple and easy locking and unlocking of a grab is a great assistance to it commercially, especially when it can be accomplished with a simplicity such as is shown in the accompanying drawings, and it is also apparent that the invention may be embodied in other forms and may be accomplished by two ropes, one on each side, as well as one.

I have shown in Fig. 7 a cross-section of one of the sheaves $M M'$ and its housing M^2 . From this view and from Fig. 5 it will be seen that the housing comprises not only side disks m' , but a peripheral casing m^2 , in which are two slots m^3 , one on each side, to allow the rope to pass down and around the sheave, up, and out again. By this means the rope is kept centered in the groove in the sheave, and the mechanism is also more or less protected from dust. The important feature is, however, to so protect the rope and keep it in the sheave that it or parts of it cannot catch as it wears between the sheave and the interior of the housing, especially when the rope is relaxed. The same construction is adopted in regard to the sheave e and its housing E , the housing in this case also serving as a means for bracing the upper part of the frame formed by the rods D , the cross-bar D^2 serving, if necessary, as a stop or buffer to engage the under surface of the trolley.

What I claim as my invention is—

1. A grab having jaws, means by which said jaws may be operated, a hoisting mechanism operatable by a single rope and connecting to automatically engage with said means by which the jaws of the grab may be operated, and connecting means by which such automatic engagement may be obtained.

2. A grab having jaws, means by which said jaws may be operated, hoisting mechanism operatable by a single rope and connecting with said mechanism by which the jaws of the grab may be operated to close said jaws and hold them closed during the act of hoisting, and means by which such connection may be obtained.

3. A grab having jaws, means by which said jaws may be operated, hoisting mechanism operatable by a single rope and connecting to automatically engage with said means by which the jaws of the grab may be operated and become released therefrom, connecting means by which such automatic engagement may be obtained, and means whereby a release thereof may be obtained.

4. A grab having jaws, means by which said jaws may be operated, hoisting means operatable by a single rope connecting with to automatically engage said means by which the jaws of the grab may be operated to close

and hold closed said jaws while the hoisting-rope is under stress, means by which such automatic engaging connection may be obtained, and means whereby said jaws of the grab may be released to open when said grab has reached a predetermined position.

5. A grab having jaws, means by which said jaws may be operated, a hoisting mechanism operatable by a single rope, means whereby said hoisting mechanism may automatically be connected with said means by which said jaws of the grab may be operated to close, for closing said jaws and holding them closed during the act of hoisting, and means whereby said jaws may automatically be released to open, when said grab has reached a predetermined position.

6. In a grab having jaws, a hoisting mechanism, a jaw-operating mechanism, and means operated by said hoisting mechanism adapted to engage said jaw-operating mechanism to close and hold closed said jaws during the act of hoisting, and means adapted to disengage said engaging mechanism whereby said jaws are allowed to open as set forth.

7. A grab having jaws adapted to assume a normally open position, means whereby said jaws may be closed, hoisting mechanism independent of said means, releasable means adapted automatically to connect said hoisting mechanism and the said means by which said jaws may be closed, for closing said jaws, and means for automatically releasing said releasable means whereby said jaws may assume their normal open position.

8. In a grab having jaws, a jaw-operating mechanism, a hoisting mechanism, latches adapted automatically to engage said jaw-operating mechanism with said hoisting mechanism, and means for tripping said latches whereby said parts will be disengaged as set forth.

9. In a grab having jaws, means by which said jaws may be operated, movable arms carrying pulleys adapted to receive a hoisting-rope, latches adapted to connect said arms with said means by which the jaws may be operated, whereby strain upon the hoisting-rope moving said arms will operate to close said jaws, and means whereby said latches may be released to allow said jaws to open.

10. In a grab having jaws, jaw-operating mechanism comprising segments and chains connecting said segments with said jaws, and means for operating said segments comprising swinging frames carrying hoisting-pulleys and latches adapted to engage with said segments upon the beginning of the hoisting operation and lock said segments and said hoisting mechanism during the hoisting operation, and means adapted to unlock said latches to allow said jaws to open as described.

11. In a grab having jaws and means for operating them such as segments and chains,

swingable arms carrying latches adapted to engage said jaw-operating means and also carrying sheaves whereby a hoisting-rope may be reeved through said sheaves and the draft upon it may be utilized to cause the closing of said jaws as well as the movement of said grab.

12. In a grab having jaws, means connected therewith by which said jaws may be operated, movable sheave-carrying members adapted to have operative engagement with said means by which the jaws may be operated, releasable means by which such engagement is made when said sheave-carrying members have assumed a predetermined position and which releasable means is adapted to hold such engaging position during a predetermined movement of said sheave-carrying members whereby said jaws are closed and held closed, and means for obtaining the release of said jaws to open.

13. In a grab having jaws, a stationary sheave and pivoted arms each carrying a sheave through which a hoisting-rope is adapted to run, means by which the jaws of the grab may be operated, means for latching said movable sheave-carrying arms to said means by which the jaws may be operated, and means for obtaining the release thereof.

14. In a grab having jaws adapted to swing to a normally open position, means connecting therewith by which said jaws may be closed, pivoted arms bearing sheaves for receiving a hoisting-rope, said arms being adapted when said hoisting-rope is relaxed to assume a position by which they may engage with said means by which the arms may be operated, releasable latch-

forming means by which said engagement may automatically be obtained, whereby upon lifting the grab said hoisting-rope will move said arms, closing said jaws and holding them closed, and means for releasing said latch-forming means by which said jaws may be released to open.

15. In a grab having jaws adapted to assume a normally closed position, means connecting therewith by which said jaws may be closed, a stationary sheave, pivoted arms bearing sheaves through all of which sheaves a hoisting-rope is adapted to run, said arms being adapted when said hoisting-rope is relaxed to assume a position by which they may engage with said means by which the jaws may be operated, releasable latches adapted to assume normally engaging positions and connecting said arms with said means by which the jaws may be operated when said hoisting-rope is relaxed as aforesaid and to assume such position during the subsequent movement of said arms, whereby said jaws are closed and held closed during the hoisting of the grab, and means adapted to release said latches when the grab has been lifted to a predetermined position.

16. In a grab mechanism, a sheave provided with a housing comprising disk-like sides and a peripheral rim having slots therein through which the rope passes to the sheave, said slots serving to center the rope with relation to the groove in the sheave.

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