

(No Model.)

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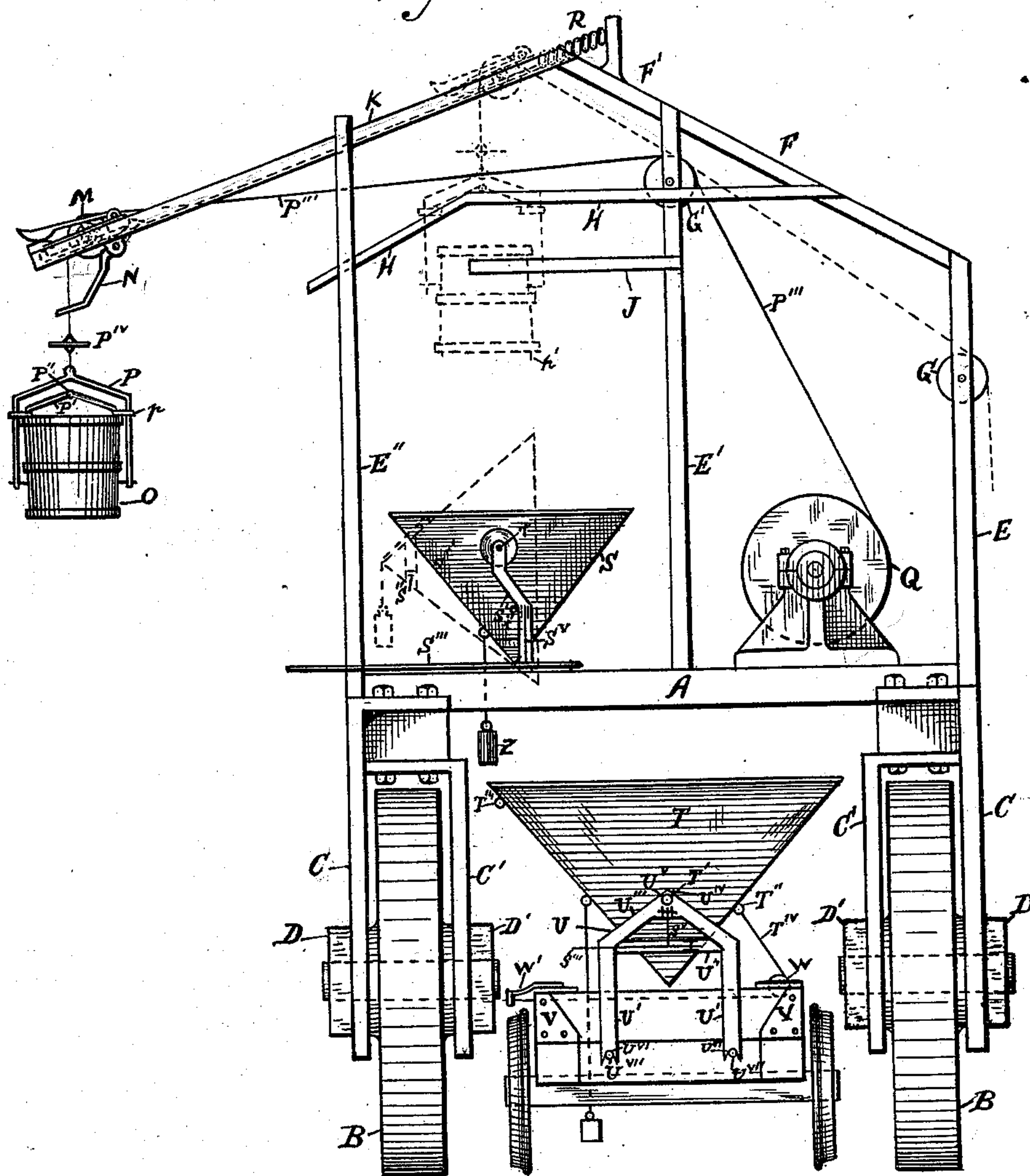
N. E. GREEN.

LOADING AND UNLOADING MECHANISM FOR SEWER EXCAVATORS.

No. 402,016.

Patented Apr. 23, 1889.

Fig. 1.



WITNESSES

WITNESSES
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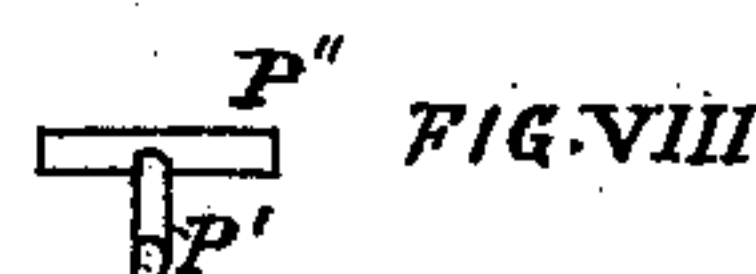
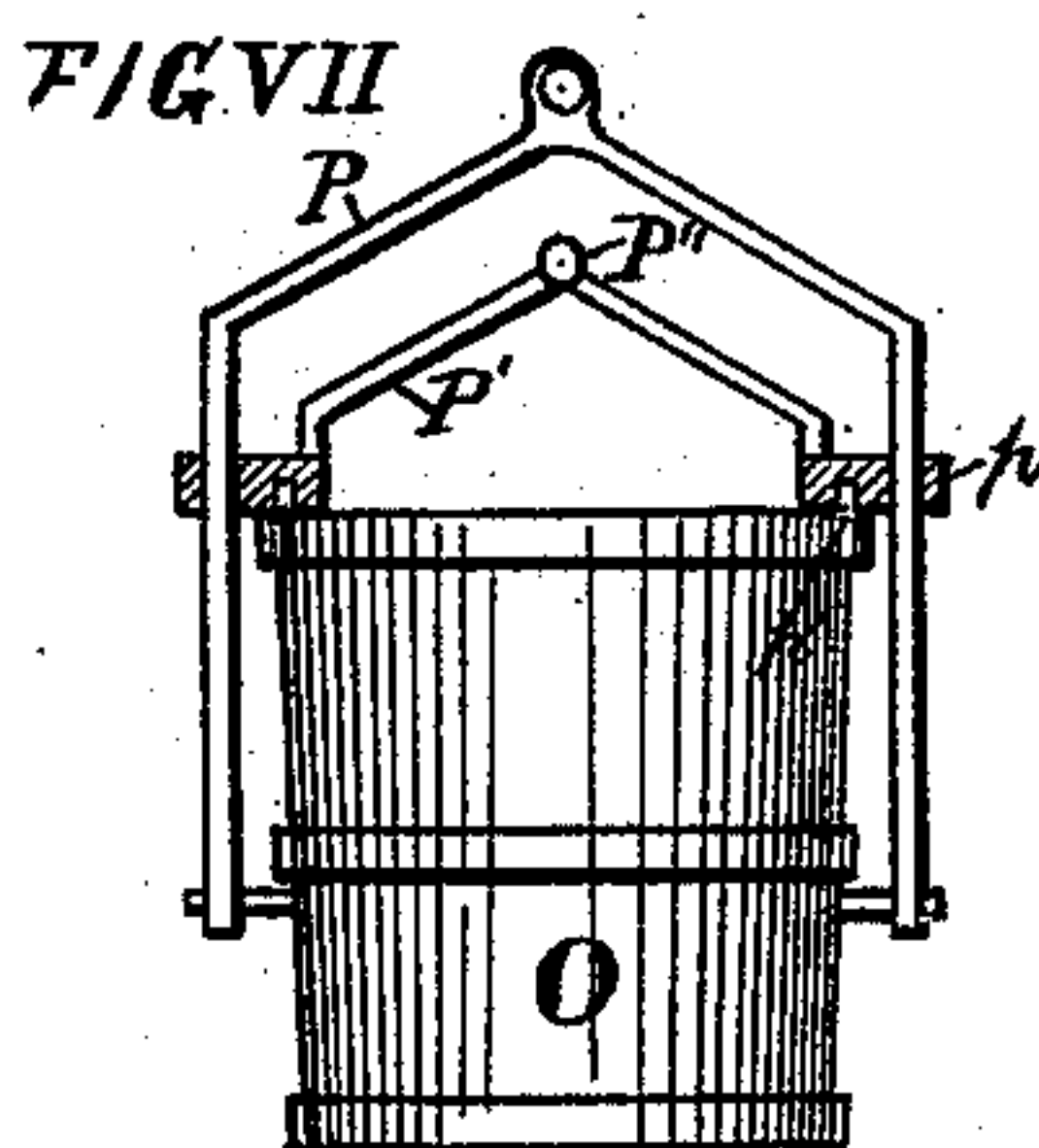
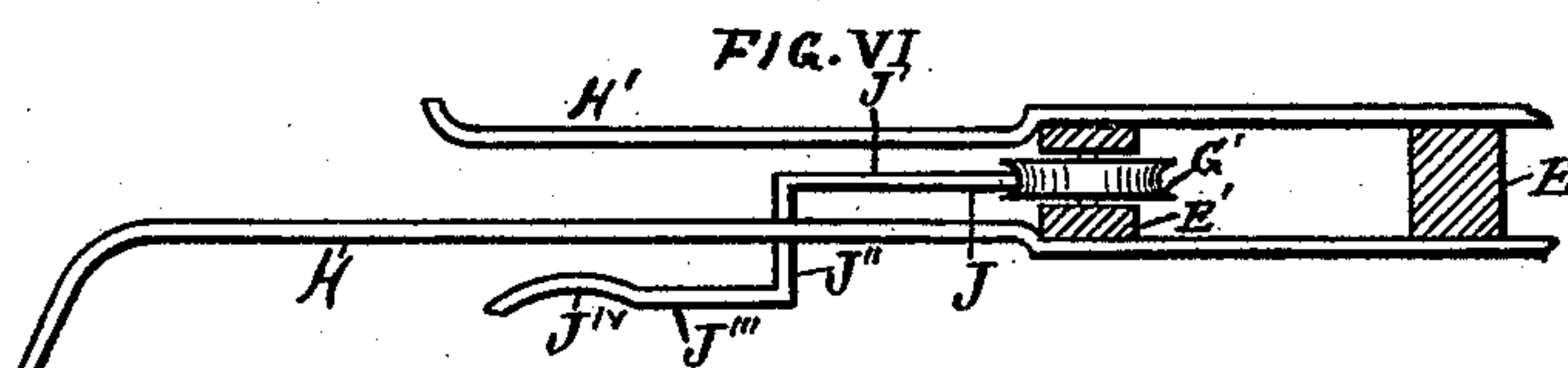
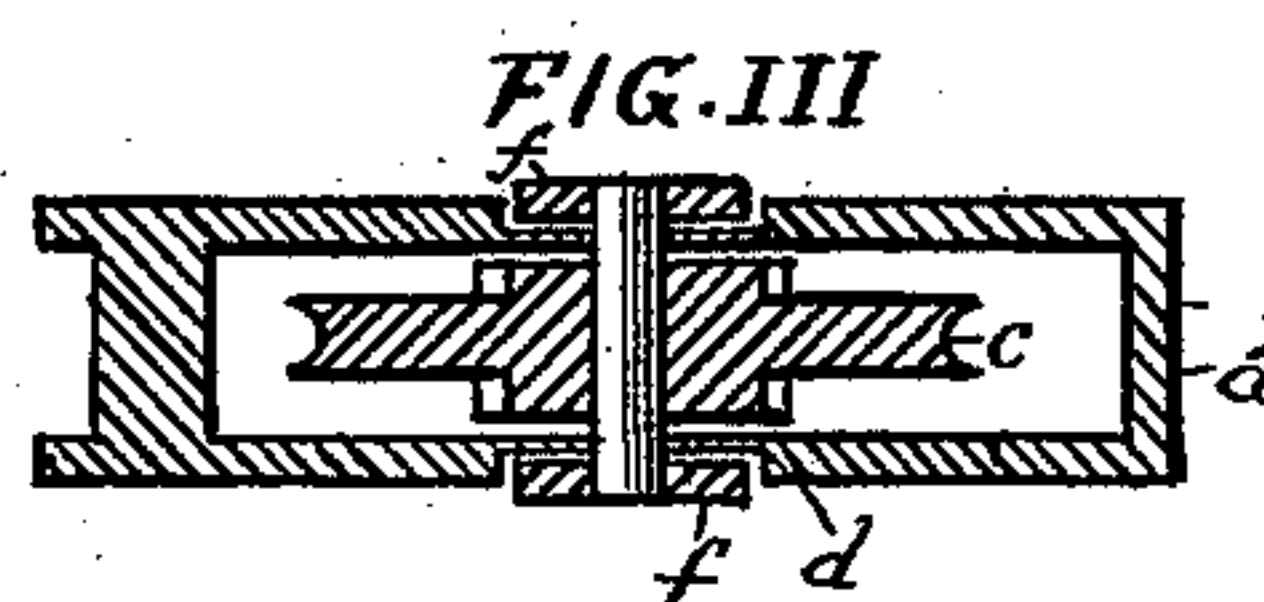
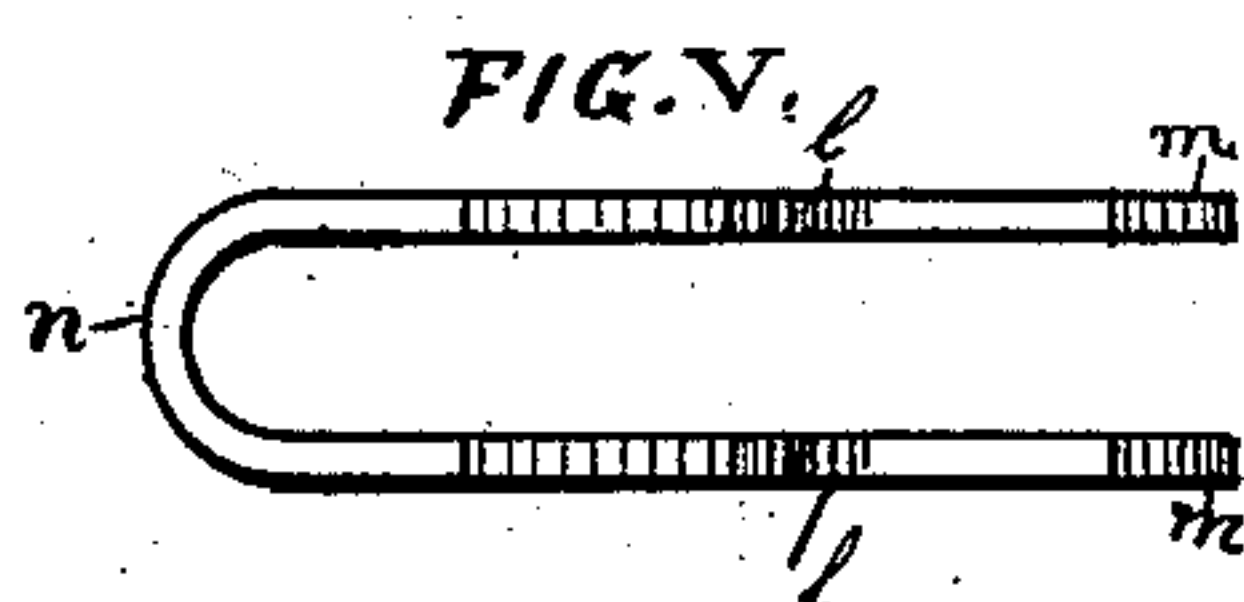
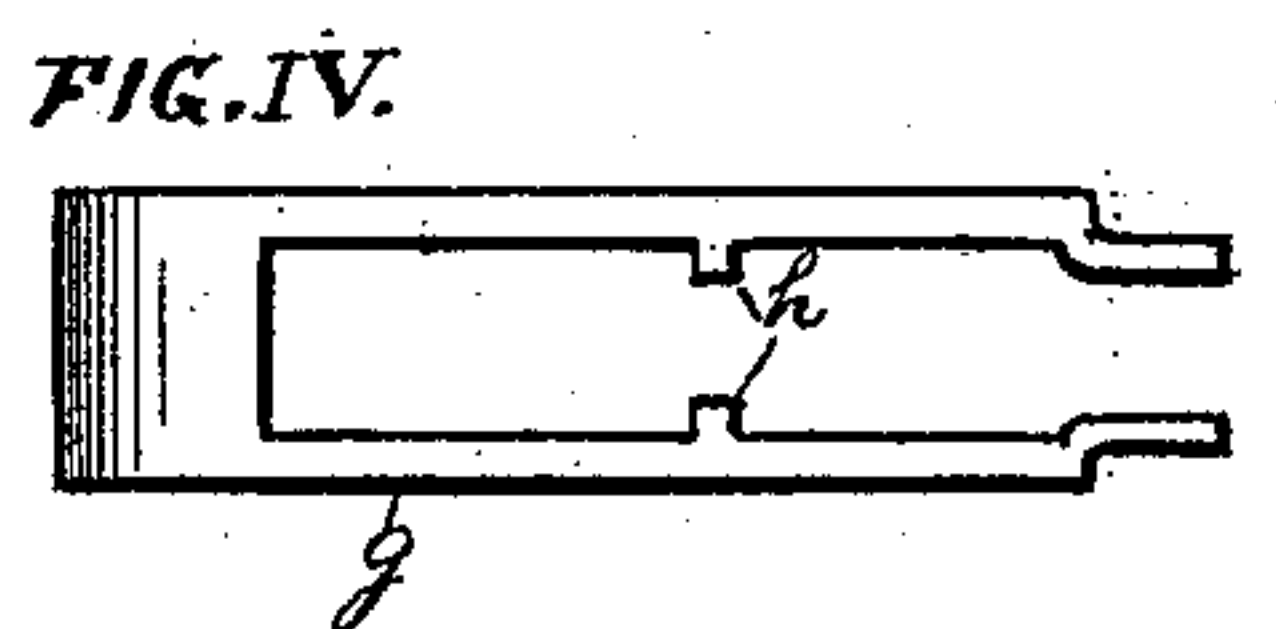
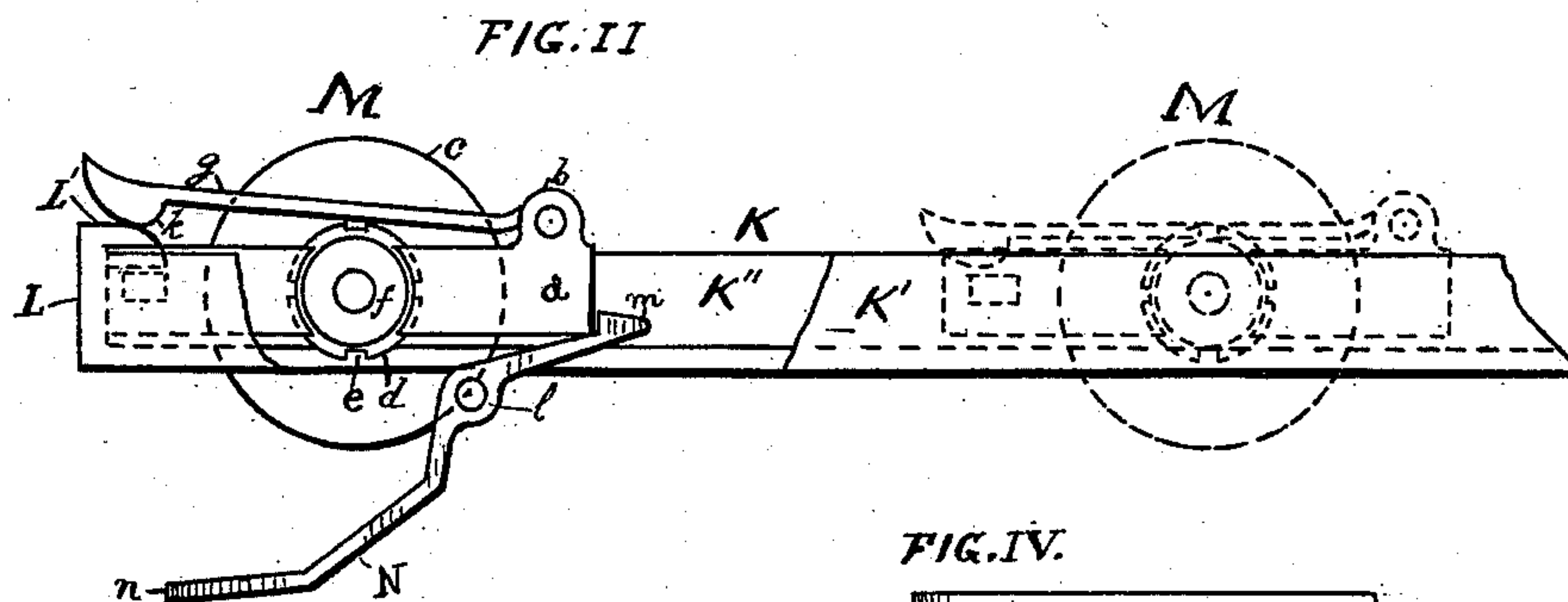
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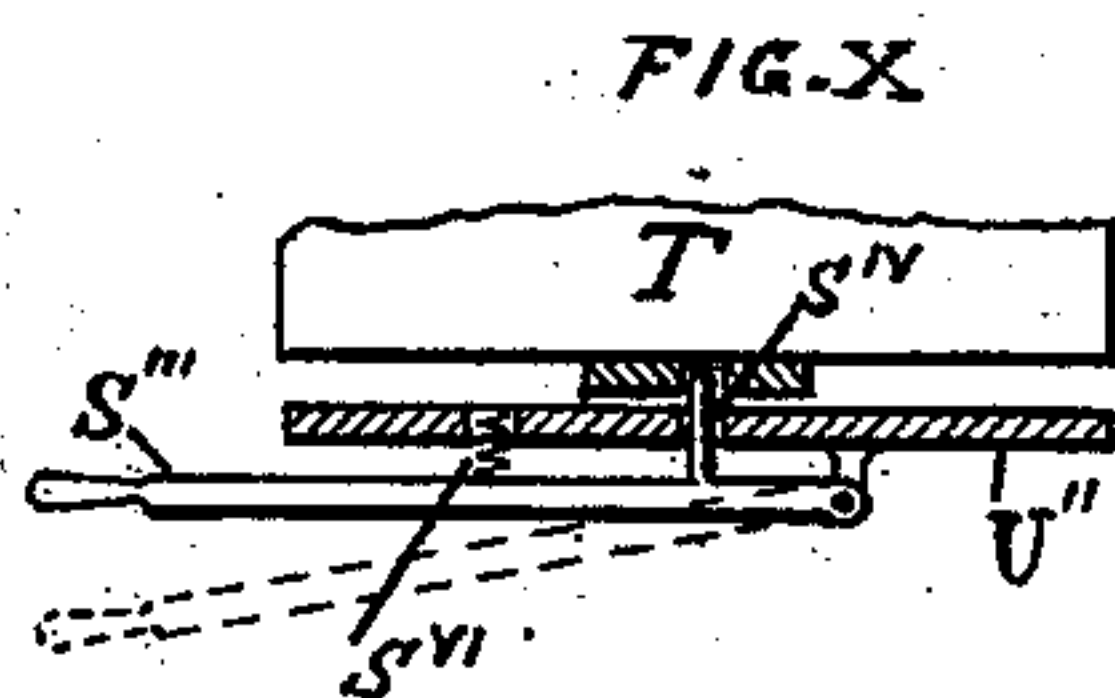
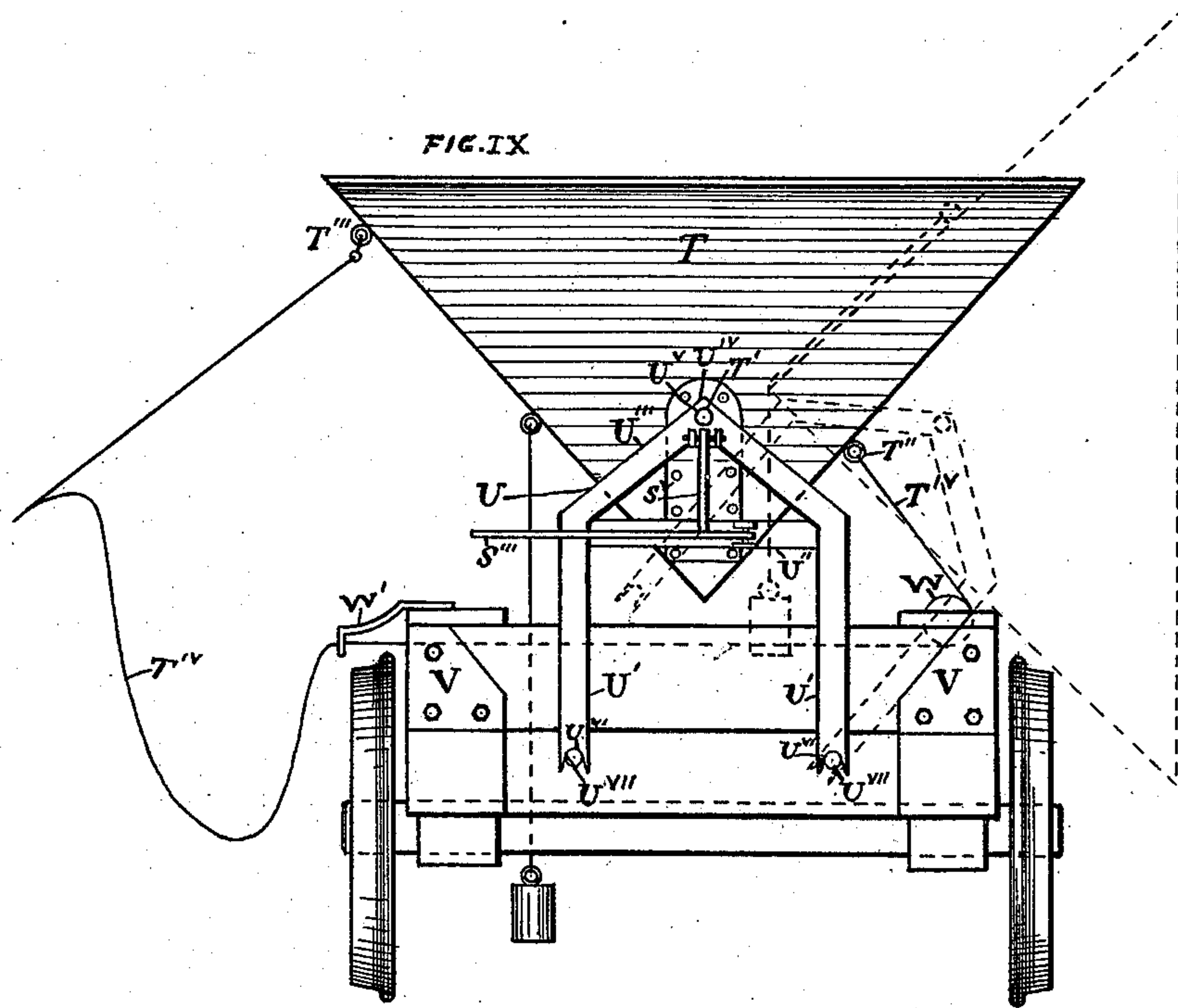
4 Sheets—Sheet 3.

N. E. GREEN.

LOADING AND UNLOADING MECHANISM FOR SEWER EXCAVATORS.

No. 402,016.

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WITNESSES.

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(No Model.)

4 Sheets—Sheet 4.

N. E. GREEN.

LOADING AND UNLOADING MECHANISM FOR SEWER EXCAVATORS.

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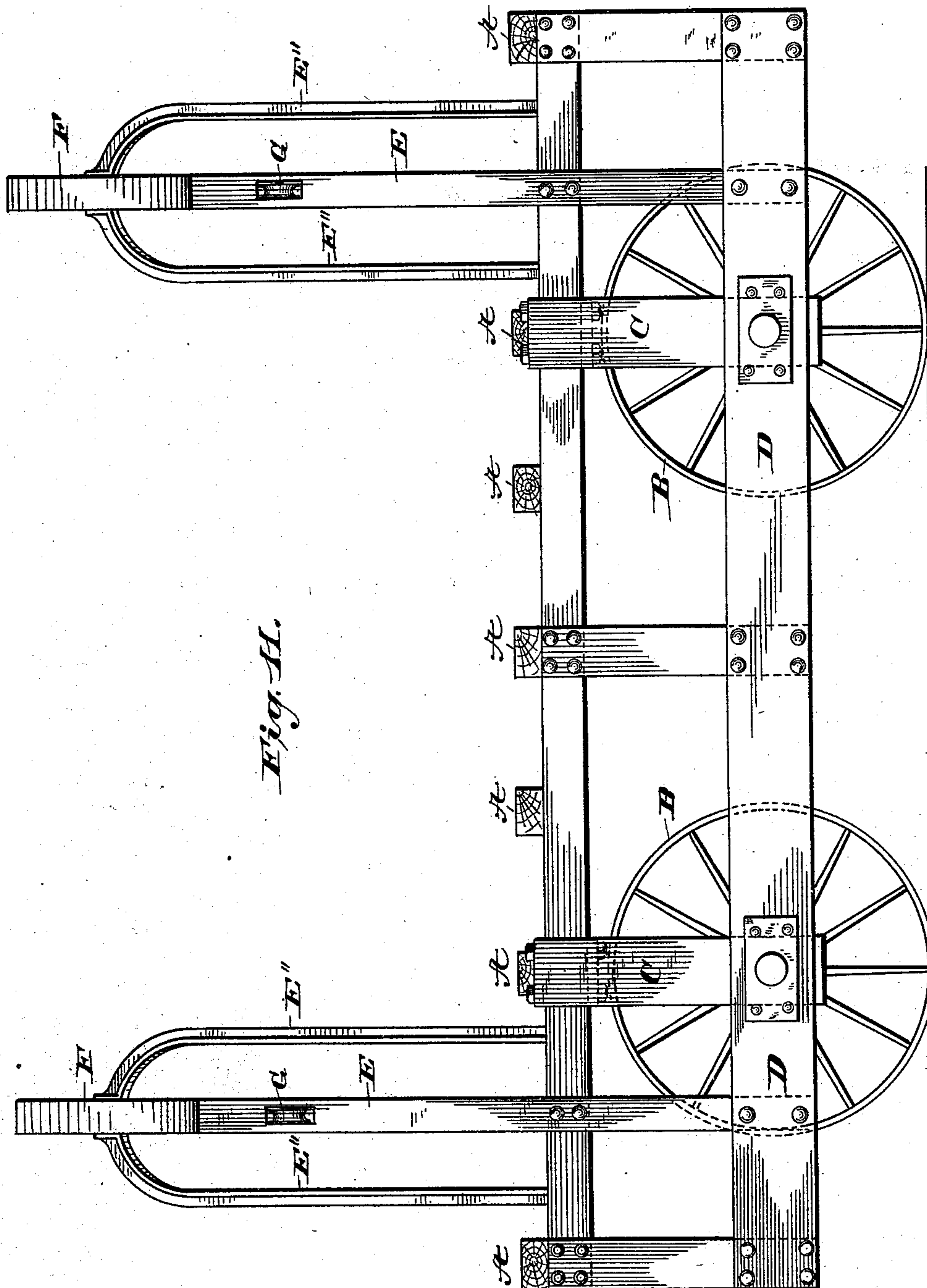


Fig. 11.

Witnesses:

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UNITED STATES PATENT OFFICE.

NELSON E. GREEN, OF MINNEAPOLIS, MINNESOTA.

LOADING AND UNLOADING MECHANISM FOR SEWER-EXCAVATORS.

SPECIFICATION forming part of Letters Patent No. 402,016, dated April 23, 1889.

Application filed January 26, 1887. Serial No. 225,558. (No model.)

To all whom it may concern:

Be it known that I, NELSON E. GREEN, a citizen of the United States, and a resident of the city of Minneapolis, in the county of Hennepin, State of Minnesota, have invented certain new and useful Improvements in Loading and Unloading Mechanism for Sewer-Excavation, of which the following is a specification, reference being had to the accompanying drawings.

The object of my invention is to simplify and improve existing machinery for excavating, so that a great amount of labor may be saved and a greatly-increased amount of work may be accomplished in any given unit of time.

My invention was especially designed for excavating sewers, but is widely applicable to all kinds of excavating, as will be readily understood, such as to digging deep ditches, canals, railway-cuts, and similar purposes.

My invention consists of the construction illustrated in the accompanying drawings, and hereinafter fully described and particularly claimed.

In the drawings, like letters referring to like parts throughout; Figure I is an end elevation of an excavating-machine embodying my improvements. Figs. II, III, IV, V, and VI are detail views showing my mechanism for supporting and guiding the hoisting-bucket in its various positions, said Fig. II being a side elevation of the little traveling sprocket-wheel carriage or trolley and its connected mechanism, one of its guides being partly broken away, said Fig. III being a plan of the trolley detached with the locking mechanism removed, Fig. IV being a plan of the automatic sheave-lock, Fig. V being a plan of the trolley-lock, and Fig. VI being a plan of the bucket-guides and bucket-dumper. Fig. VII is a central section of the hoisting-bucket parallel with the bails. Fig. VIII is an end view of a section of the keeper-bail, showing the central lugs on the same projecting at right angles to said bail, for a purpose hereinafter named. Fig. IX is an end elevation of my dumping-car. Fig. X is a plan view of a locking-lever which I use on said car, and also on the receiving-hopper shown in Fig. I. Fig. XI is a side view of the principal

parts of the framing and wheel-supporting devices.

A is a rectangular oblong frame composed of suitable longitudinal girders and cross-ties constructed in any suitable way, care being taken to make it firm and strong, which constitutes the platform or principal part of the main frame of the machine. This platform is made, preferably, of sufficient length to support two sets of excavating machinery—one at each end. It may of course be built for one excavator or for more than two.

B are truck-wheels resting on the ground and supporting the frame A. These wheels are all independent of each other. As many are used as may be required to support the platform and machinery. Two at each end will be sufficient for ordinary purposes.

C are heavy flat iron plates several inches wide, provided with a right-angled extension toward the center of the platform, securely bolted to the longitudinal girder and cross-tie of the platform A, and extending downward to the outer face of the hub of the wheel B. C' is a similar plate, bent at right angles toward the outside of the platform, securely bolted to the cross-tie and longitudinal girder, and extending downward to the inner face of the hub of the wheel B. These pendent plates C C' are on the opposite sides of the wheels B, and are provided with bearings in their lower extremities, in which are journaled the axles of the wheels B, the faces of the plates being flush against the faces of the hub of the wheel.

D is a similar longitudinal iron plate, which extends the whole length of the machine on a line with the axles of the wheels, securely bolted to the outside of the plate C. It may have a hole coincident with the axle bearing in the plate C, and the axle may extend through the two plates. D' is an exactly similar plate on the inside of the wheels, extending the whole length of the machine. These plates D D' extend beyond the hubs of the wheels, both to the rear and to the front of the machine, and are braced by pendent vertical iron plates or uprights from the platform. They may be also bolted together. The function of these vertical and horizontal plates C C' D D', embracing the wheels B, is

to form supports for the wheels and to keep the wheels in a true line when the machine is being moved. They also constitute strong and stable bearings for supporting the platform and its machinery. The truck-wheels B must be independent and cannot be coupled by a common axle, in order to give working room for the car.

EE'E'' are upright posts securely attached to the main platform A. F is a top plate secured to posts EE', and provided with an extension, F', in the direction of post E''. In the uprights EE' are journaled sheaves G G', for guiding a hoisting-cable.

Near the top of post E', at a suitable point with reference to the other co-operative mechanism, are attached on the opposite sides of the post a pair of bucket-guides, H and H', (shown in plan in Fig. VII,) extending in the direction of the post E''. Both guides extend outward on a level for a short distance, then downward at the same angle, then curve away from each other in opposite directions. Of the two, the guide H is much the longer and its outer extremity extends farther at an angle to its length than the guide H'. These guides are made of metal. The function of these guides H and H' is to assist in directing and dumping the hoisting-bucket. The curved portion of one of the guides extending farther outward than the other, the bail first comes in contact with that and will be partially or nearly swung into the position desired. It will at least be brought so nearly into alignment with the narrow portion of the guideway that it will not catch or jam, as would otherwise be the case. I regard this as an important feature of my construction.

On the post E', at a suitable distance below H and H', is placed a bucket-dumper, J, extending in the direction of the post E''. It is composed of the part J', attached to post E', the part J'', at right angles to the same in the horizontal plane, the part J''', at right angles to J'', and the curved extensions J^{iv}. J is of metal and springs at J'. The function of this dumper J is to stop the bucket in its proper position and force the bucket to dump always in one direction.

K is a railroad or trolley-track consisting of a pair of guides, K' K'', rigidly attached to F' and to post E'', and extending downward and outward several feet beyond the truck and main frame of the machine, preferably far enough to bring its extremity directly over the center of the ditch. The guides K' and K'' are securely attached together at their outer extremity by a suitable end piece, L, provided with a raised and inwardly-curved or cam-shaped top surface, L'; or L' may be a separate piece of metal, shaped as described, attached to top of L. The guides K' K'' have (in the construction shown) inwardly-projecting flanges at right angles to their sides. These flanges constitute a track for a little traveler or trolley, M, and its connected mechanism. K' K'' are metallic. This trolley M

is composed of a frame, a, provided with ears b, a sheave, c, having an extended hub, d, provided with notches e on its periphery, anti-friction rollers f, and the pivoted lock g. The axle of the sheave-wheel extends through holes in the side bars of the frame a, and its extremities are journaled in the anti-friction rollers f.

The lock g is composed of a solid front piece and two rearwardly-extending arms inclosing the sheave, which at their extremities are pivotally attached to the ears b. These arms are provided with lugs h on their inner or under side for engaging the notches e on the hub of the sheave-wheel.

The lock g has a curved or cam-shaped under surface, k, on its solid front portion for co-operation with cam-surface L'. The sheave c, with its hub, is rigidly attached to its axle; hence when the lugs h are in the notches e the sheave-wheel cannot turn. When the lock is raised by cam k coming in contact with cam-surface L', the sheave-wheel is free to turn.

N is an automatic lock for securing and releasing the trolley M at the outer extremity of the guides K' K'. It is pivoted at l to ears projecting from the under sides of the guides K' K''. It is composed of a pair of arms inclosing the lower half of the sheave, solidly united in front and provided with hooks or shoulders m on their extremities. The arms curve downward, outward, and forward from the pivotal point to their point of union n, and extend rearward and upward beyond the pivotal point l, terminating in the hooks m. The hooks m work through slots in the flanges of the guides K' K'' and catch behind the trolley-frame when it is in its outermost position, holding it there firmly until the hoisting-bucket strikes the point n, when the hooks are released, and the trolley is free to travel up the guides.

O is a hoisting-bucket. P is the bail of the same, pivotally attached to the sides of the bucket below the center of the same.

On the bail P are vertically-sliding keepers p, to which an inner and lighter bail, P', is attached. On the upper rim of the bucket are vertical lugs p'. The keepers p, when in their lowermost position, fit over the lugs p' and keep the bucket from dumping. On the bail P', at its central point and at right angles to the bail, is a cross-bar, P'', rigidly attached to the same, projecting several inches each way. This co-operates with the guides H and H' at the proper time to release the keepers p from the lugs p' and dump the bucket.

P''' is a hoisting rope or cable, preferably a link-belt chain. It is attached to the bail P, passes up through the lock N, over the sheave c, thence over the sheave G', and down to a winding-drum, Q, fixed on the platform A; or, in case horse-power is used, it may pass out and down over the sheave G. On the cable P''', just above the bail P, is fixed a

disk or otherwise suitably-shaped stop-plate, P^{IV}. When the cable has been wound up far enough, this disk strikes the lever-lock N and sets free the trolley M.

5 R is a resistance-spring placed at the upper end of the guides K' K'', operating against the trolley M when its uppermost limit of movement has been reached, thus preventing too great a jar or shock, and also serving to
10 start the trolley downward the instant the cable begins to unwind.

On the platform A, directly under the guides H H' and the dumper J, is placed a receptacle, S. It is in end view or cross-section of
15 shape like an equilateral triangle, or, taken as a whole, it is a hollow prism with one of the sides removed for the top and the apex of the other two sides constituting the bottom. This prism-shaped receptacle is provided with
20 trunnions or journals r on its ends at a point above and to one side of the center of gravity. By these trunnions r the receptacle is pivotally attached to the posts S', which are firmly bolted to the platform A. These posts S' extend
25 vertically for a short distance, with their outer edges along the vertical line of the center of gravity of the receptacle, and then turn at an angle toward the outside of the machine until in vertical line with the trunnions
30 r, and then extend vertically to the desired height. On the end of the receptacle, below and on the line of the center of gravity, is placed a projecting pin, r', constituting a stop to the swing of the top of the receptacle to-
35 ward the outside of the machine.

On the end of the receptacle, near the bottom, is also a cross-cleat having a vertical groove, S''. In a corresponding position on the standard S' is a vertical slot. To the main
40 frame is fulcrumed a hand-lever, S''', provided with a tongue, S^{IV}, working through the slot in the standard and into the groove of the cleat S''. To insure its always working in its true position, the lever S''' may also
45 have a swinging arm, S^V, attached to the standard S' above the slot in the same.

A coiled spring, S^{VI}, serves to hold the lever in its locking position—viz., to keep the tongue S^{IV} in the groove S'' and the receptacle
50 cannot dump. The instant the tongue S^{IV} is withdrawn the receptacle will automatically dump inward in virtue of the location of its pivotal bearings and the balance of weight. The lever used on this receptacle is substantially the same as that used on the car, and is
55 shown in detail in Fig. X.

On a suitable car-truck running on rails placed upon the ground under the platform and between the wheels B is mounted a dumping
60 car-body, T. This car-body is similar in shape to the receptacle S, but is differently mounted. It is provided with trunnions or journals T' on its ends, placed in the vertical line passing through the center of gravity, but
65 located below said center. U is a tilting support for sustaining the car T in such a manner that the car-body can be thrown sidewise to a

considerable distance and be dumped to one side of and clear from the truck and the track. There are two of these tilting supports, one at
70 each end. Each support is composed of a pair of vertical standards, U', tied together rigidly at their tops by a cross-bar, U'', and provided with converging extensions U''', meeting at a common apex, U^{IV}. At the apex U^{IV}
75 is a journal-box, U^V, or bearing for the trunnions T'. The feet of the standards U' are hollowed out or made concave on their under sides into box-like bearings U^{VI}, which rest on
80 horizontal projecting rods U^{VII}, securely attached to the frame of the car-truck. On the end of the car-body is a grooved cleat, and a lever provided with a tongue is fulcrumed to the cross-bar U'' and by a swinging bar to the
85 apex U^{IV}, held in locking engagement by a coiled spring, said tongue working through a slot in bar U'', all of precisely similar character to the lever and locking mechanism before described as applied to the receptacle S.

Securely attached to the frame of the car-
90 truck inside the wheels and in the same vertical plane with the tilting support U are rest-plates V, having an inclined interior face corresponding in width to the standards U'. These rest-plates are for the purpose of sus-
95 taining the tilting supports U and the car-body T when thrown over into the dumping position.

T'' T''' are eyebolts attached to the car in proper positions for fastening a dumping-
100 rope, T^{IV}, according to the side of the truck on which it is desired to throw the dirt. Sheaves W and rope-guides W' are placed on the truck-frame in suitable positions for directing the dumping-rope to the point where the
105 power is applied to the same. By this means the supports U, with their suspended car-body, are thrown to either side at will into the position shown in dotted lines, when the attendant draws back the lever S''' and gravity does the
110 rest, swinging the mouth of the car-body out over the wheels and dumping the dirt at a considerable distance from the truck.

The receiving-hopper S is provided with a counter-balance, Z, on the side nearest its piv-
115 otal bearings, whereby it is restored automatically from its dumping to its filling position.

The cleat having the groove S'' is provided with a cam-shaped surface; hence the tongue
120 S^{IV}, through the spring S^{VI} and lever mechanism, will catch in the groove automatically and lock the hopper S in filling position. The car T is also counterbalanced in a similar way, so that it will be returned automati-
125 cally and locked in its filling position.

I drive my hoisting-drums by power from an engine placed on the truck itself.

The operation of my machine is as follows: The machine is placed in position on the bank
130 of the sewer, with the outermost end of the trolley-track K directly over the center of the ditch, and the various parts of the machinery in the relative positions shown in

Fig. 1. The bucket, having been filled by workmen in the bottom of the ditch, is locked in its upright position by sliding the keepers p over the lugs p' . The hoisting-drum Q being then started, the cable P''' is wound around the drum, raising the bucket vertically until the disk P^{IV} strikes the lever trolley-lock N . Then the trolley is released and starts up the track, when the sheave-lock g instantly falls into locking position, with its lugs h in the notches e , preventing the sheave-wheel from turning. The trolley travels up the track, with the bucket suspended at a fixed distance, and continues until it reaches the stop-spring R . The bucket is met outside or at the post E'' by the guides $H H'$, against which strikes the bail P , turning the bail parallel with and keeping it between the same. When the uppermost limit is reached, the cross-bar or lug P'' , which is long enough to overhang the guides $H H'$, strikes the top surface of the guides, raising the bail P , releasing the lugs p' from their keepers p . Simultaneously therewith the sides of the bucket strike the stop portion J'' and the dumping portions $J''' J^{IV}$ of the bucket-dumper J . The co-operation of these parts and the force of gravity dump the bucket instantly and always in one direction, the dirt falling into the receptacle S . The drum Q is then reversed. The trolley is instantly started back by the spring R , and continued by gravity until the outermost limit is reached. At that point the trolley-lock, by its hooks m , locks the trolley in fixed position, the sprocket-lock g is raised by cam-surfaces k and L' , the sheave-wheel turns, and the bucket descends vertically to its original filling position. When the receptacle S is full, the attendant pushes back the lever S''' , and the force of gravity dumps the receptacle, as before described, into the car-body T . This car, when full, is removed wherever desired by power from the engine, and is dumped, as described.

I am not the first to mount a dumping car or box pivotally on standards (without regard to their form) which are pivotally connected to and supported by a car-truck, and I do not herein make any claim to that broad invention.

What I claim, and desire to secure by Letters Patent of the United States in this application, is as follows:

1. The combination, with a carriage adapted to receive a car beneath the same, of a pivoted automatic dumping-receptacle mounted in fixed bearings on said carriage and adapted to empty its contents into a car beneath the carriage, substantially as described.

2. The combination, with a carriage adapted to receive a car beneath the same, of a pivoted automatic dumping-receptacle mounted in fixed bearings on said carriage and adapted to empty its contents into the car beneath the carriage, and a hoisting-bucket adapted to automatically dump into the pivoted receptacle, substantially as described.

3. The combination, with a carriage adapted to receive a car beneath the same, of a dumping-receptacle pivoted above and to one side of the center of gravity of the said receptacle and adapted to discharge into a car beneath the carriage, and a counter-balance for said receptacle, substantially as described.

4. In combination, the hoisting-bucket having a bail pivoted to the same below the center of gravity, keepers sliding on the bail, said keepers being connected by a bridge or bail provided with a cross-bar projecting at right angles to the bridge or bail, and guides for the bucket-bail having inclined portions, substantially as described.

5. The combination, with a hoisting-bucket, of the rigid bucket-dumper J , located at one side of and slightly within the path of the bucket-body in its dumping position and at one side of the pivotal axis of the bucket, whereby the bucket is brought into contact with said dumper in its emptying position and is forced to turn always in one direction to discharge its contents, substantially as described.

6. A trolley consisting of a frame having a sheave provided with a notched hub, a gravity sheave-lock consisting of a pivoted bar having a projection on its under side in position to engage the notched hub, and a cam, in combination with a trolley-track having a projection and a lock for the trolley separate from the other parts named, substantially as described.

7. A bail-guide for a hoisting-bucket, consisting of two guiding-bars of unequal length having outer curved portions, substantially as described.

8. The combination, with a hoisting-bucket provided with a bail, of a movable support for the bucket, a guide for the movable support for the bucket, and a bail-guide consisting of two guiding-bars having at one end outwardly-curving portions, said curving portions being located at different distances from the other end of the guide, substantially as described.

9. In combination, the bucket O , provided with the lugs p' , the bail P , pivoted below the center of gravity to said bucket, the false bail P' , having the keepers p , sliding on the bail P , and provided with the cross-bar P'' , the combined guides and tripping-bars $H H'$, the metallic spring bucket stop and dumper J , attached to the post E' , provided with the bends J'' , J''' , and J^{IV} , and suitable mechanism, substantially as described, for removing said bucket from its filling to its emptying position.

10. In combination, the trolley M , consisting of a frame, a grooved sheave, c , provided with the notched hub d , anti-friction journal-rollers f , the gravity sheave-lock g , provided with the lugs h and cam-surface k , guide K , provided with cam-surface L' , the gravity trolley-frame lock N , pivoted at l to the under side of the guide K , and provided with the

cam-faced hooks *m*, and the downwardly and outwardly extended loop-shaped portion *n*, the cable *P'''*, provided with the disk *P^{IV}*, and the winding-drum *Q*, substantially as described, for the purpose set forth.

11. In combination, the sheave-carrying trolley *M*, the trolley-track *K*, the hoisting-bucket *O*, the cable *P'''*, and the bucket-guides *H* and *H'*, fixed to the main frame above the receiving-receptacle and extending outward and downward on opposite sides of the path of the bucket-bail and provided with laterally-curved extremities, as set forth, whereby the bucket-bail is always caught lengthwise between the guides, and the bucket is directed truly to its dumping position.

12. In an apparatus of the class described, the main platform, in combination with the vertical braces *C C'*, the horizontal braces *D D'*, connected with the truck-platform, and independent wheels journaled in said horizontal braces, as set forth.

13. The herein-described carriage for loading and unloading mechanism, provided with horizontal braces *D D'* for the wheels of the carriage, substantially as described.

14. The apparatus comprising a hoisting device and the supporting-platform therefor, the said hoisting device extending beyond the platform at one side, parts depending from each side of the platform with a clear space between through which a car may be passed, wheels mounted in the depending parts, horizontal braces for said wheels, and an automatic dumping-receptacle on said platform adapted to receive material from the hoisting device and to dump the same into a car beneath the platform, substantially as described.

15. In combination with a hoisting-cable, a dumping hoisting-bucket provided with a bail and connected to said cable, a suitable support adapted to sustain said bucket and cable in their movement from the bucket's filling position in one vertical plane to its dumping position in another vertical plane, and a bail-guide consisting of two guiding-bars of unequal length extending from beyond said

dumping-plane outward toward said filling-plane, both bars curving away from each other at their outer ends, the curved portion of one bar being nearer the filling-plane than the curved portion of the other, substantially as and for the purpose set forth.

16. In combination with the automatically-dumping hoisting-bucket provided with a bail, a support for said bucket adapted to sustain the same in its movement from its filling to its emptying position, a bail-guide for said bucket, consisting of two guiding-bars of unequal length having outer curved portions, said curved portions being located at different distances from the other end of said bail-guide, and a bucket-dumper located adjacent to the bucket in its emptying position, adapted to force said bucket always to dump in one direction, substantially as described.

17. The apparatus comprising a carriage adapted to receive a car beneath the same, a pivoted automatic dumping-receptacle mounted on said carriage and adapted to empty its contents into the car beneath the carriage, a hoisting-cable, an automatically-dumping hoisting-bucket provided with a bail attached to said cable and adapted to empty its contents into said pivoted receptacle, a suitable support adapted to sustain said bucket and cable in their movement from the bucket's filling position to its emptying position, a bail-guide consisting of two guiding-bars of unequal length having outer curved portions, said curved portions being located at different distances from the other end of said bail-guide and adapted to direct said bucket to its dumping position, and a bucket-dumper located adjacent to the bucket in its dumping position and adapted to force said bucket always to dump in one direction, all substantially as described, and for the purpose set forth.

NELSON E. GREEN.

In presence of—

JAS. F. WILLIAMSON,
EMMA F. ELMORE.