

No. 673,920.

Patented May 14, 1901.

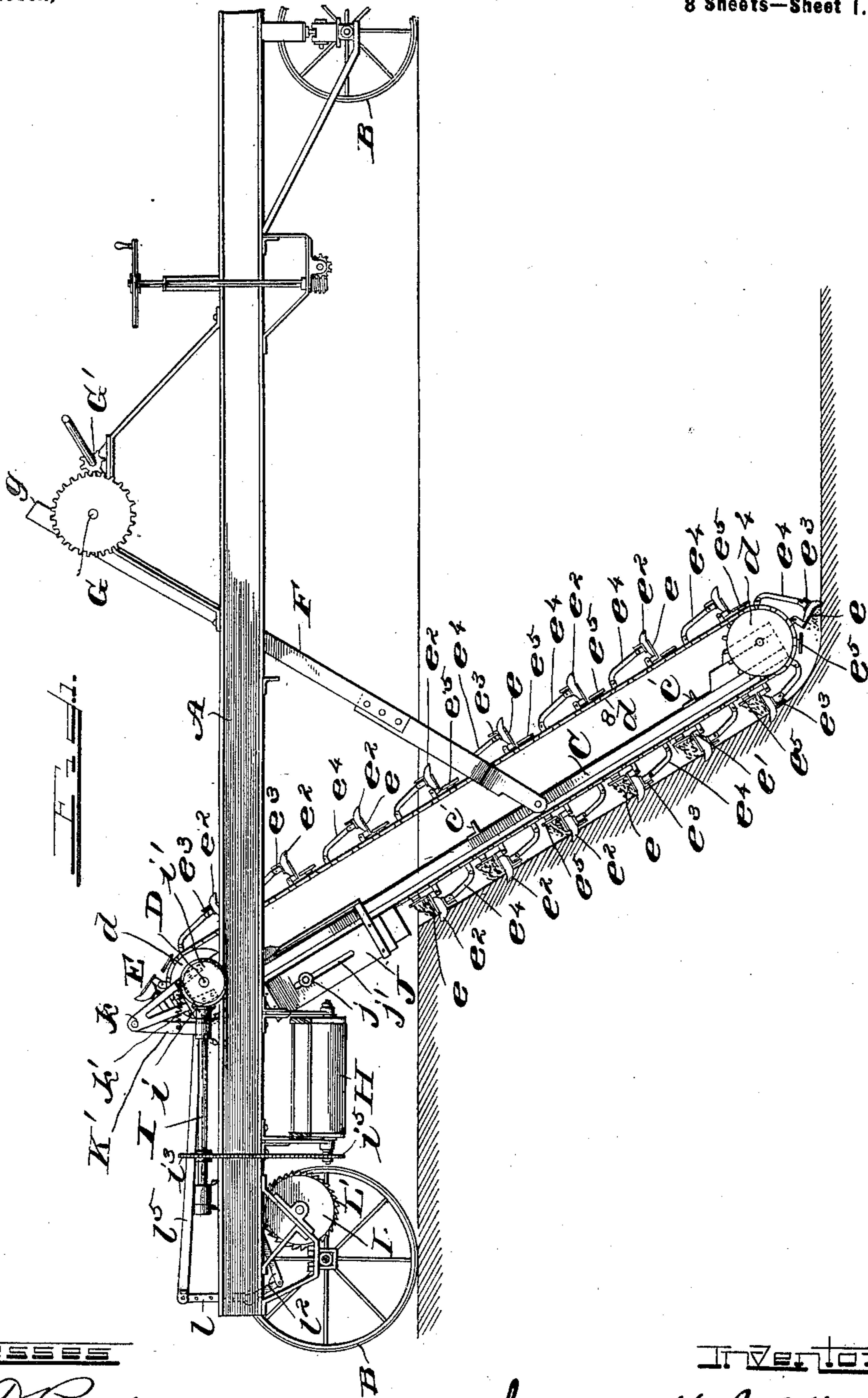
J. H. McKEE.

EXCAVATING MACHINE.

(Application filed May 9, 1900.)

(No Model.)

8 Sheets—Sheet 1.



Witnesses

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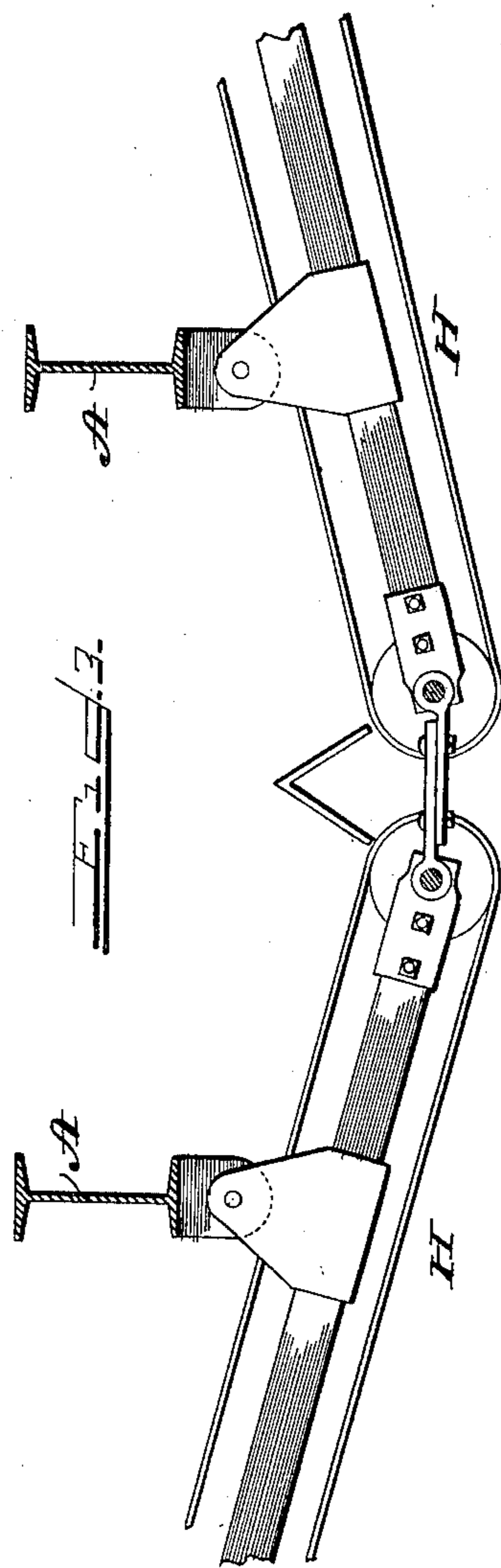
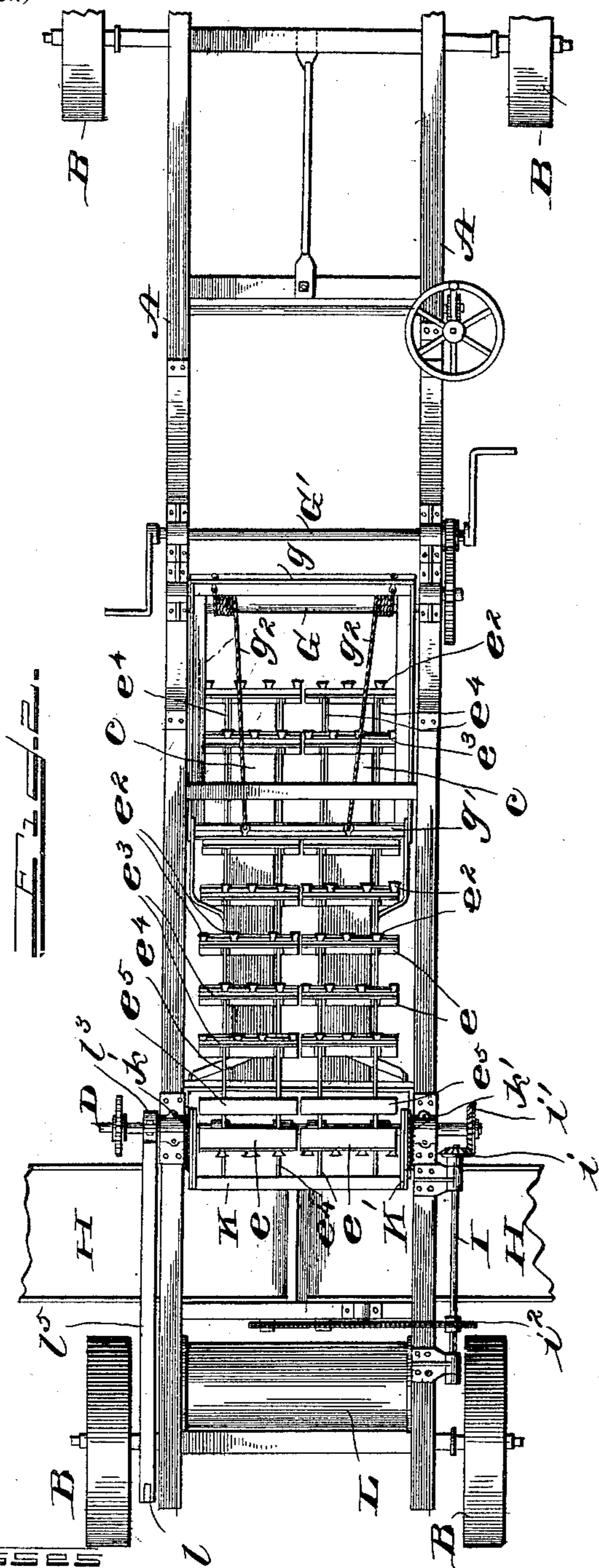
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WITNESSES

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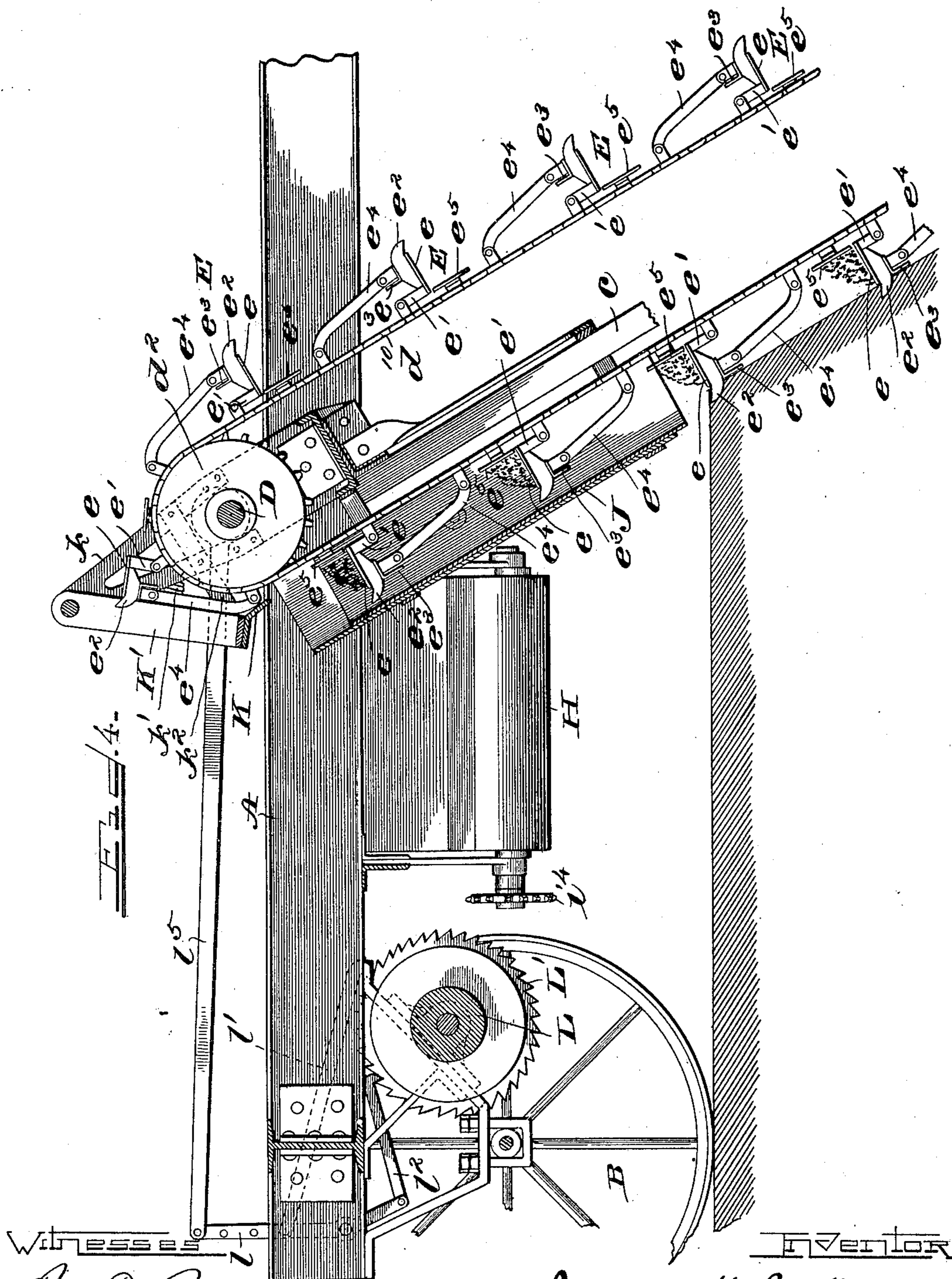
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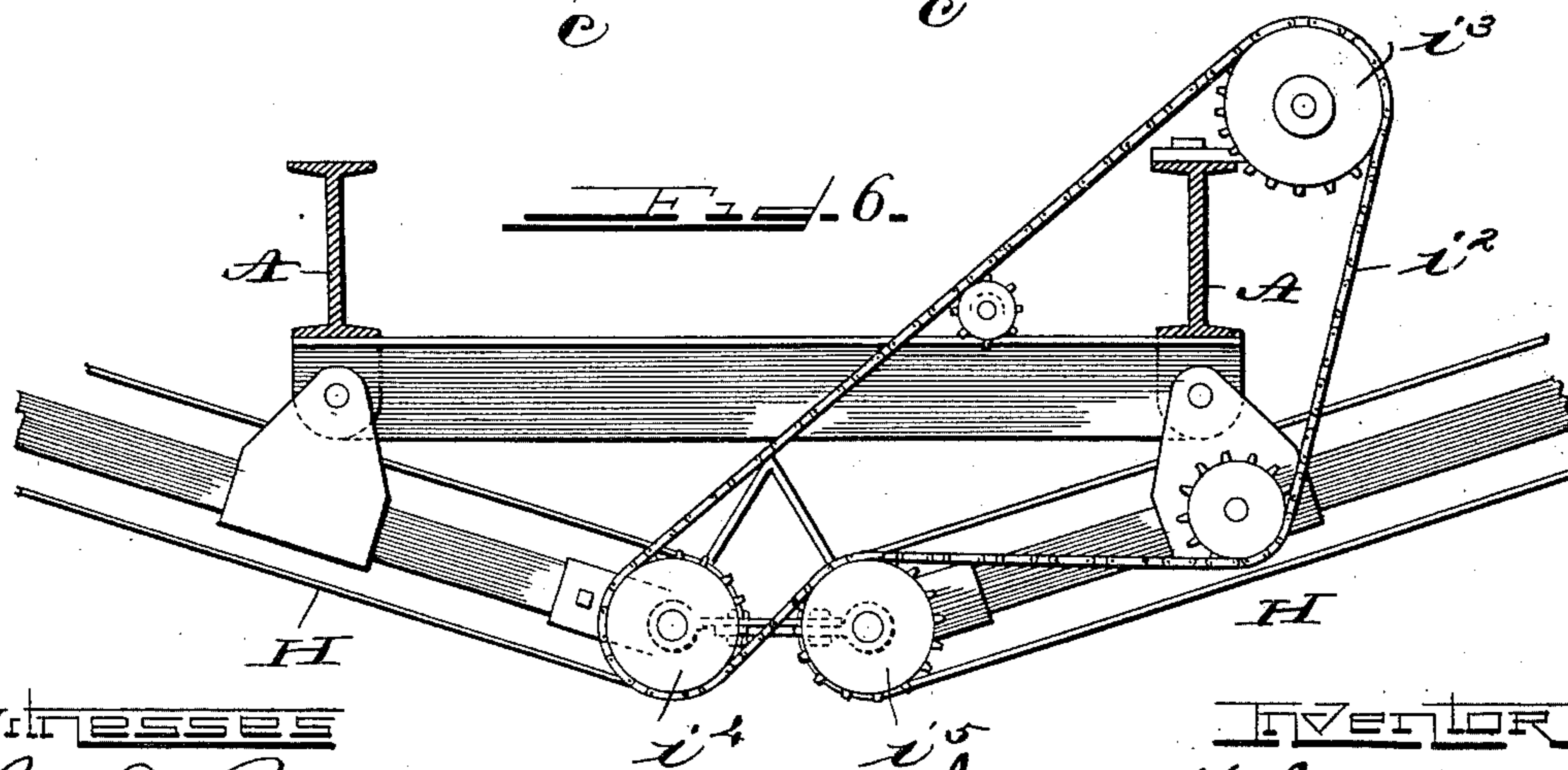
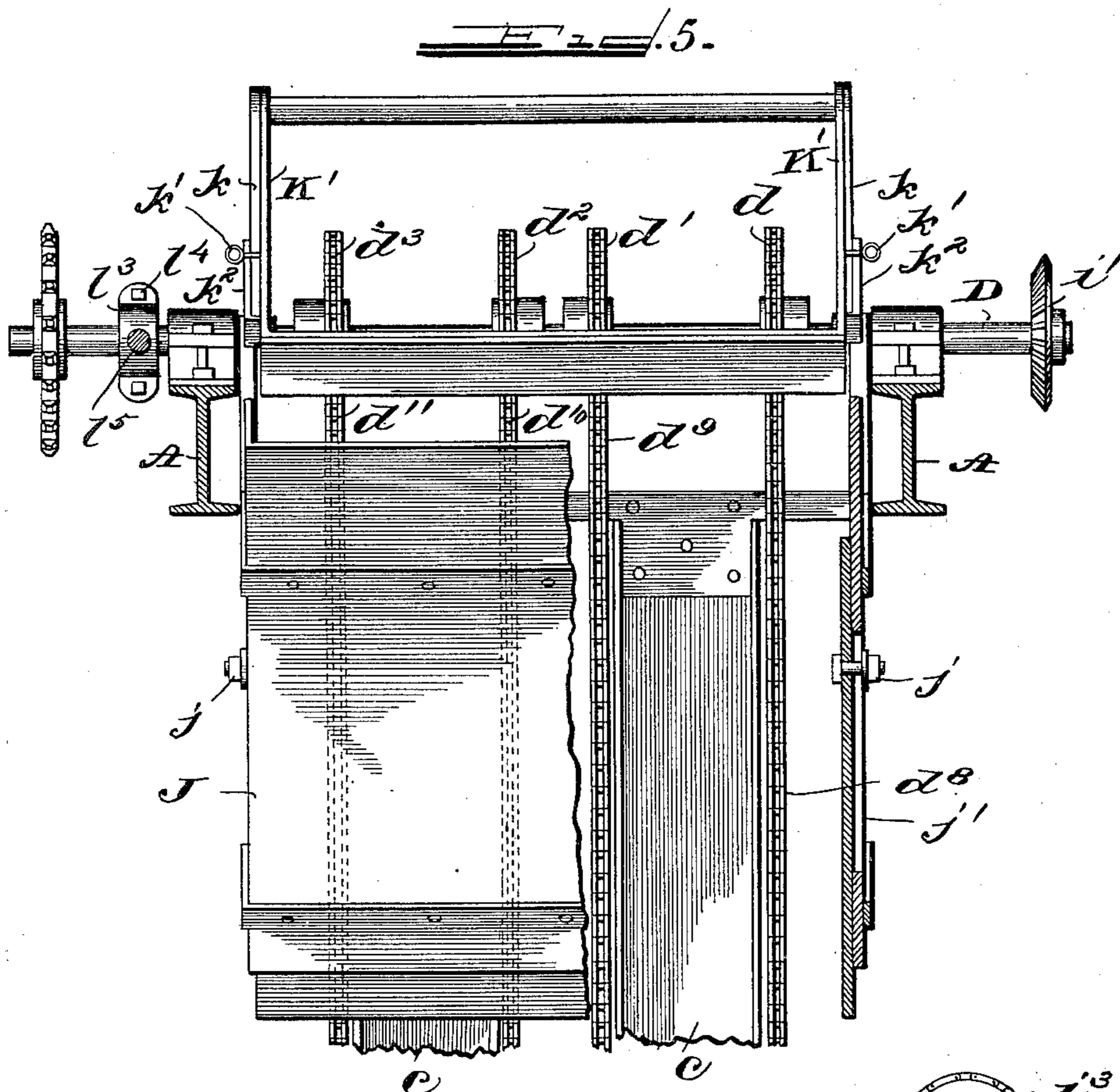
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8 Sheets—Sheet 4.



WITNESSES

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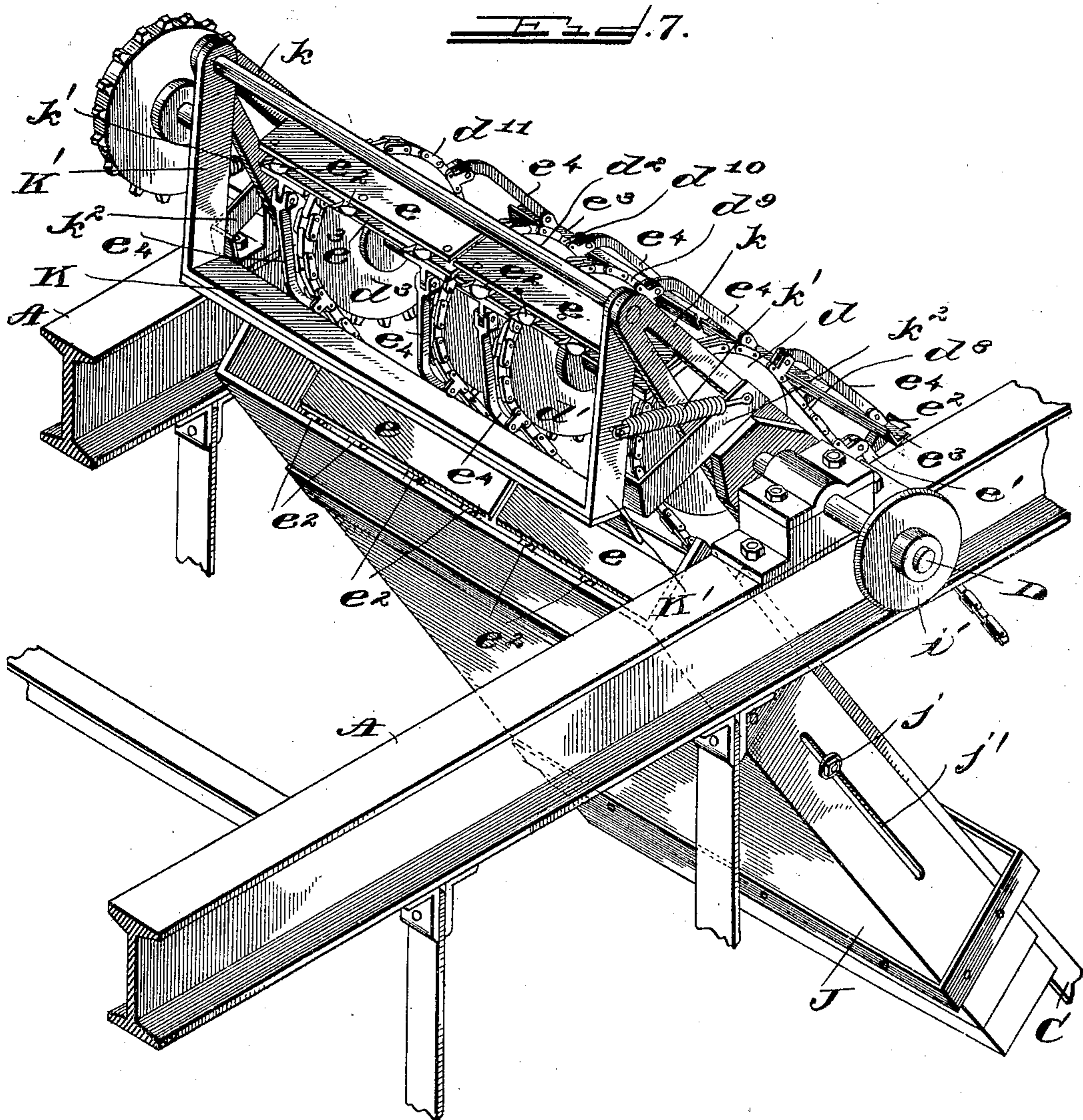
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8 Sheets—Sheet 5.



WITNESSES

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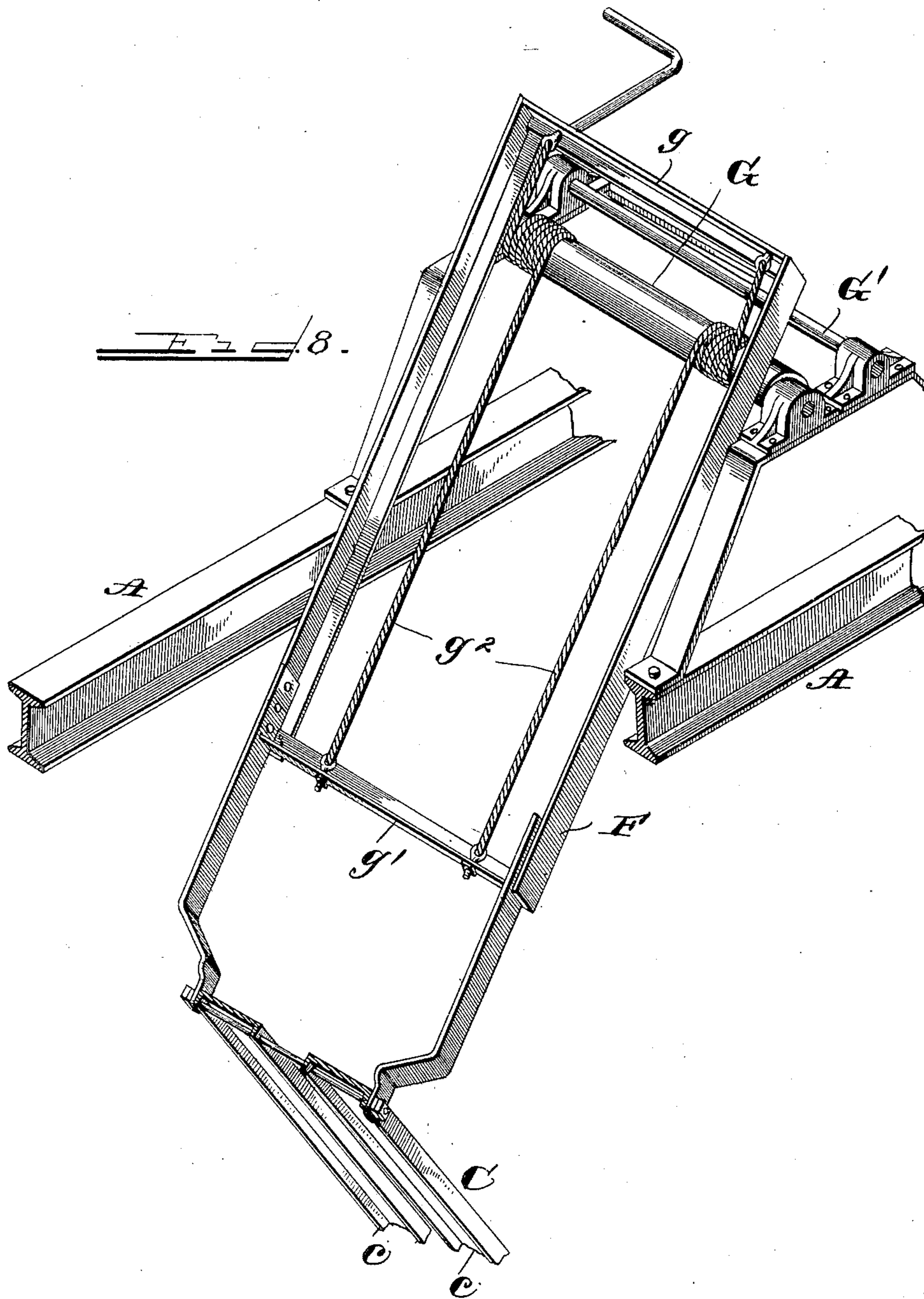
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WITNESSES

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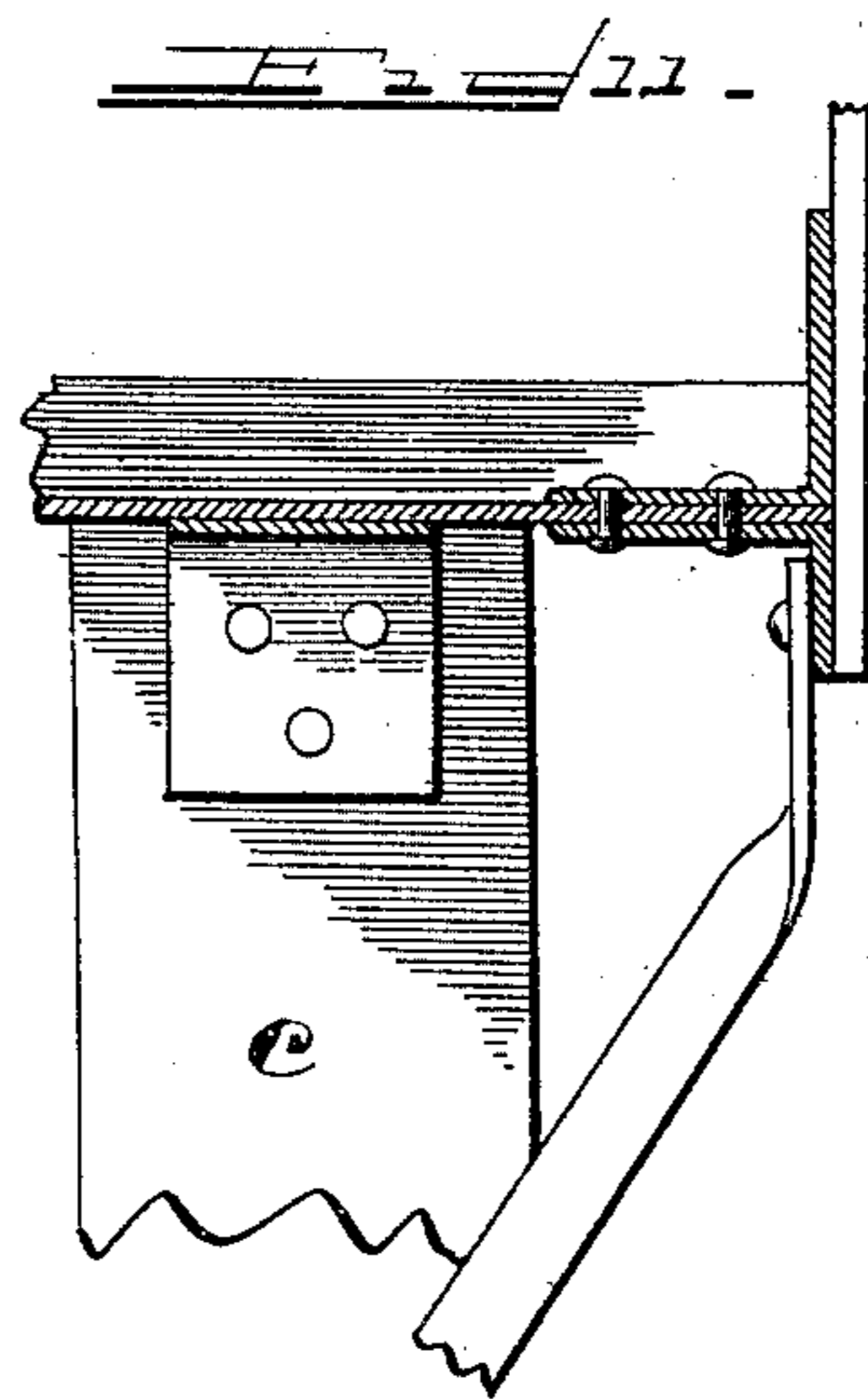
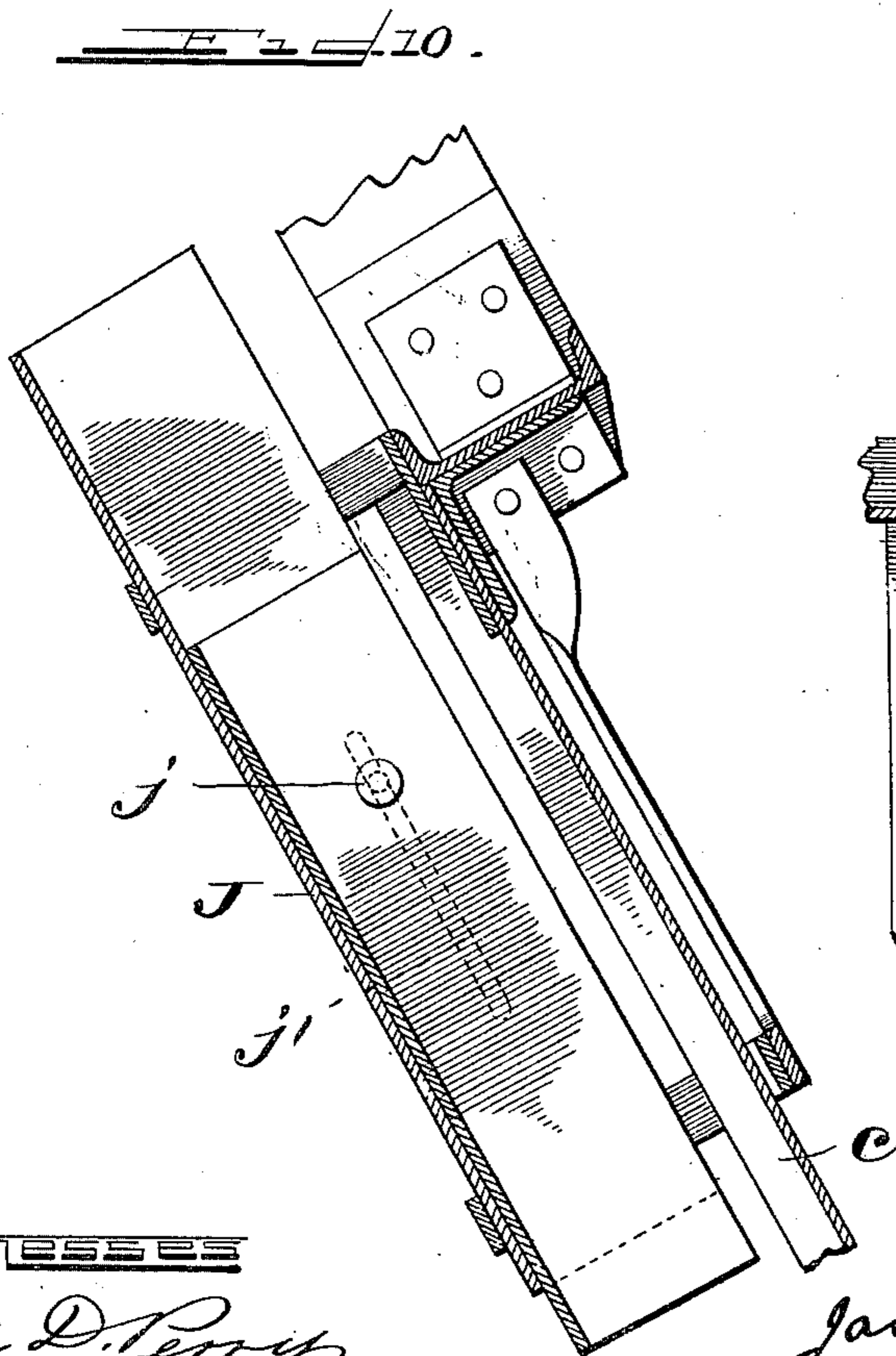
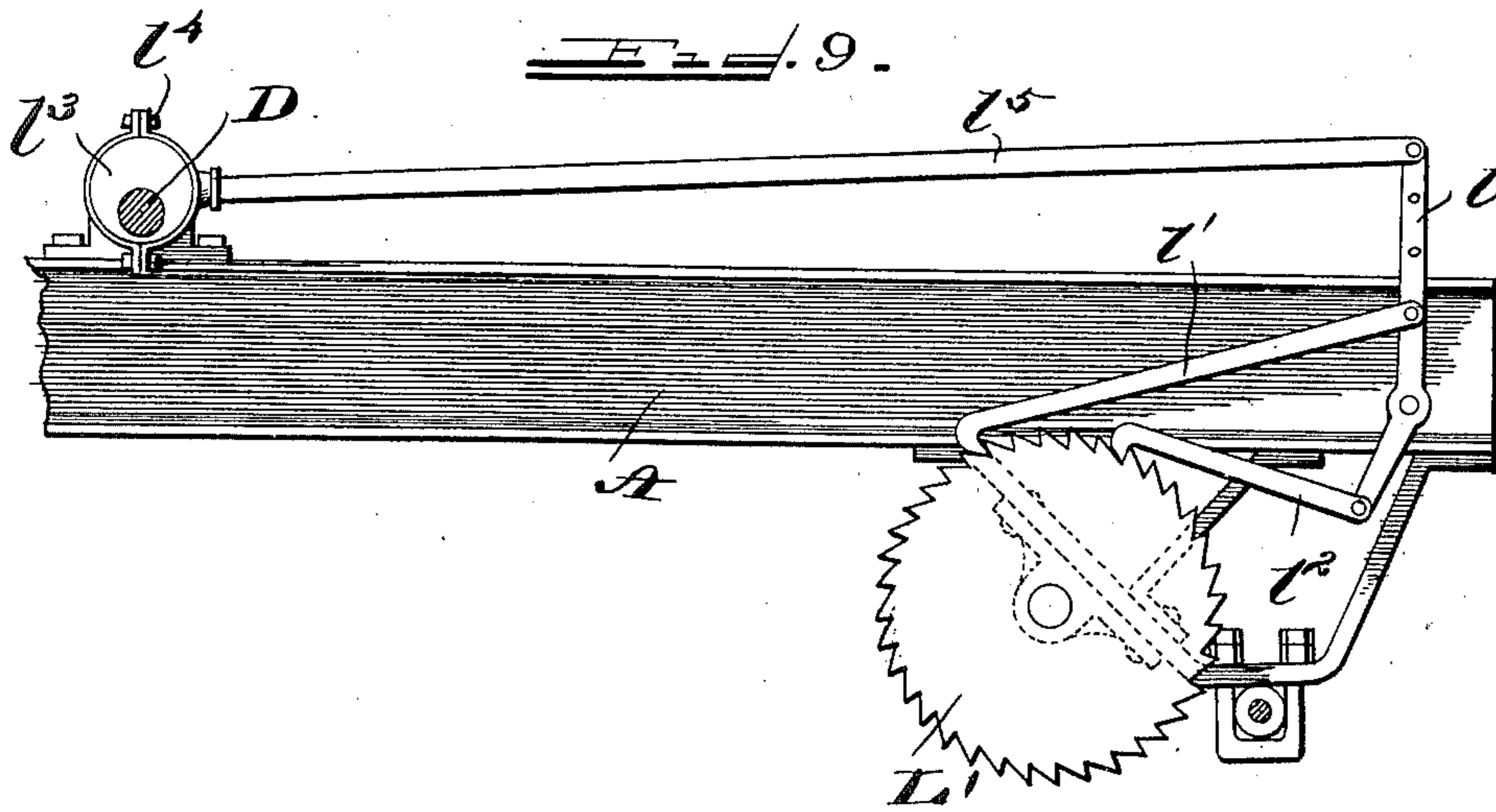
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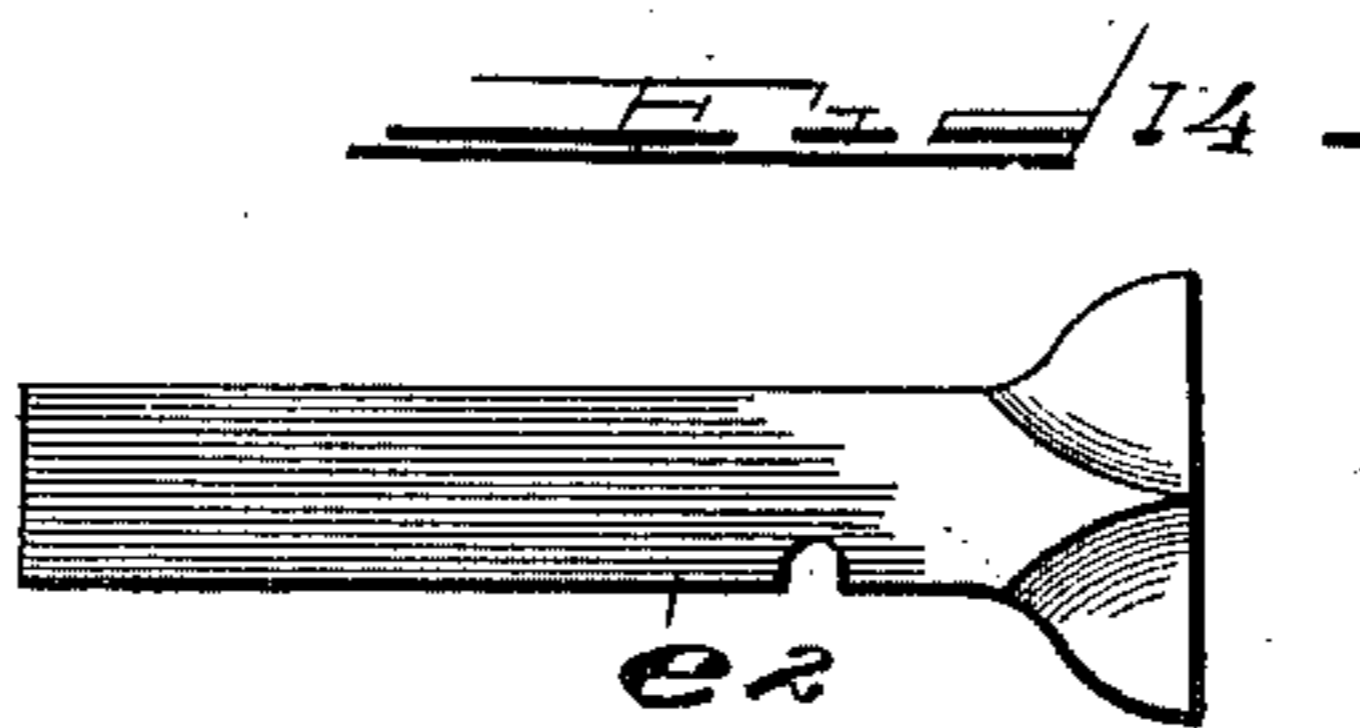
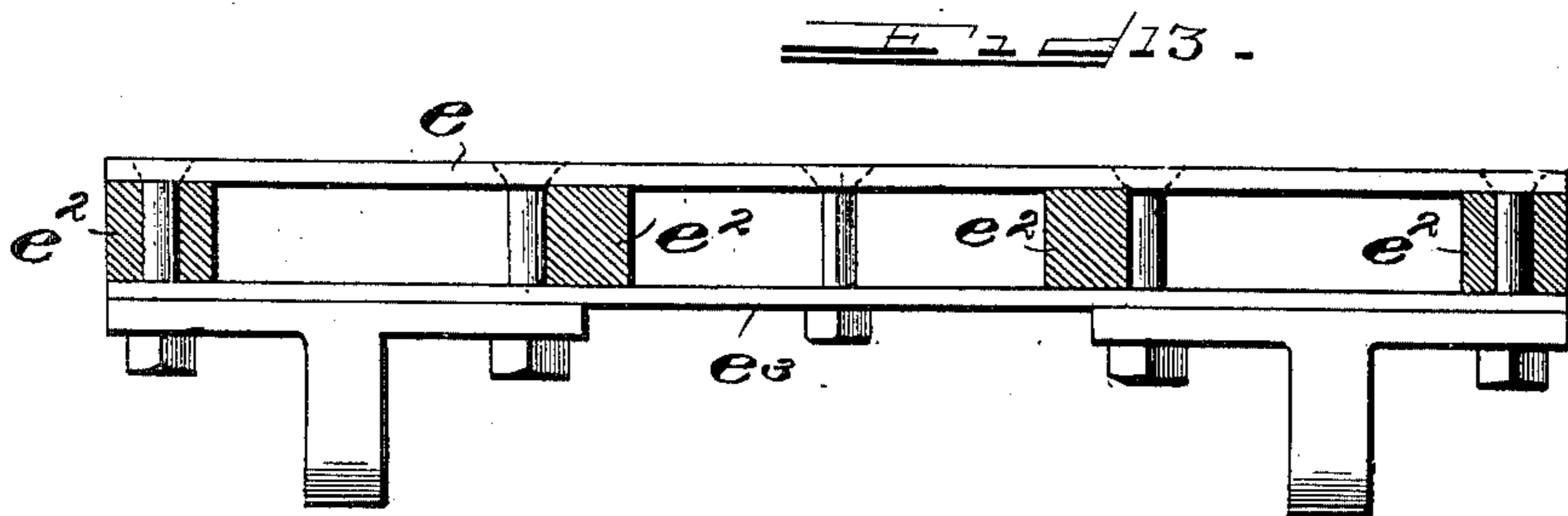
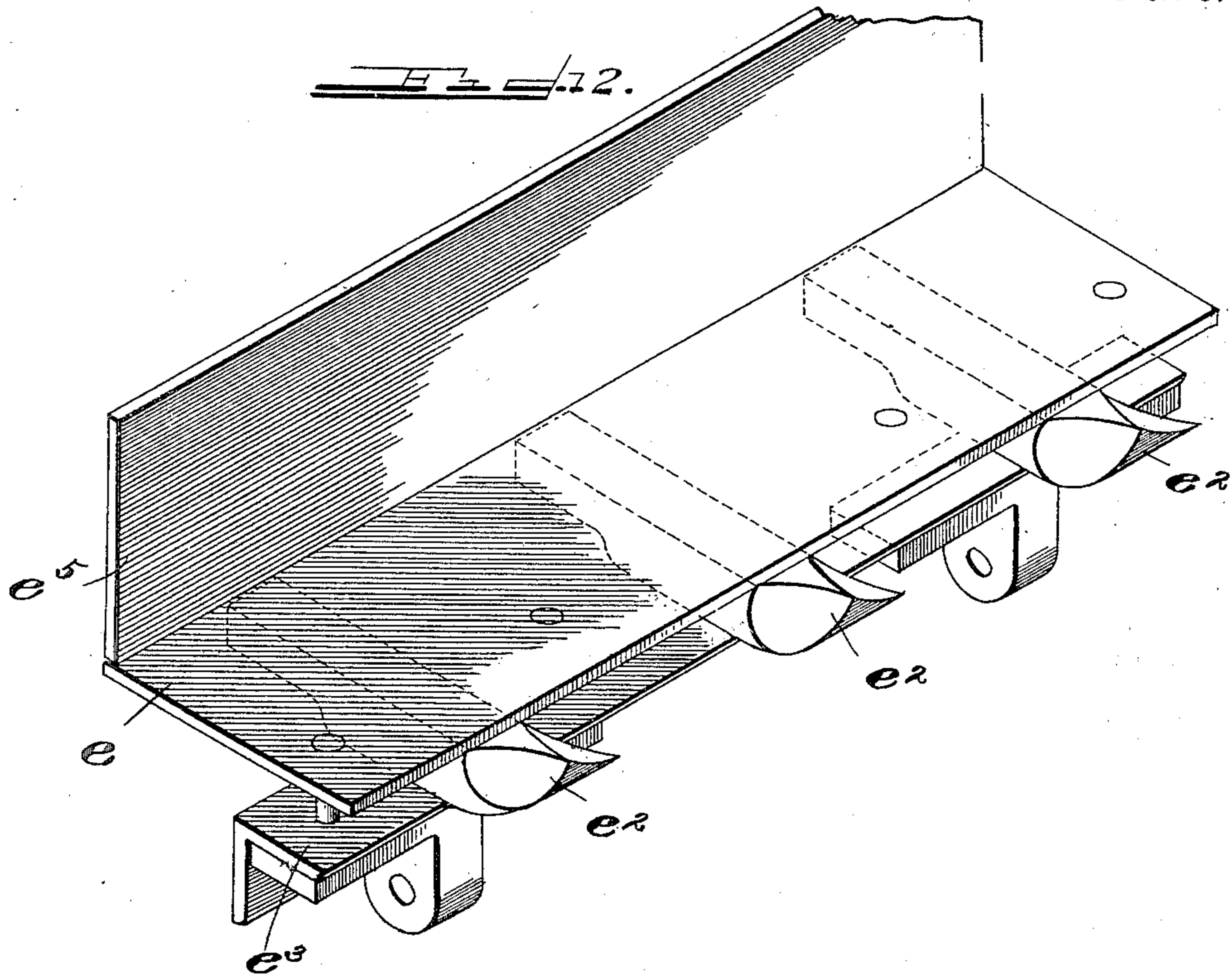
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UNITED STATES PATENT OFFICE.

JAMES H. McKEE, OF CHICAGO, ILLINOIS, ASSIGNOR TO FREDERICK C. AUSTIN, OF SAME PLACE.

EXCAVATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 673,920, dated May 14, 1901.

Application filed May 9, 1900. Serial No. 15,994. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. McKEE, a citizen of the United States, residing at Chicago, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in Excavating-Machines, of which the following is a specification.

My invention relates to a construction of excavator involving a wheeled body-frame and a swinging frame suspended therefrom and provided with sprocket-chains carrying plates or diggers which loosen and carry the soil upward to a point of discharge.

The object of my invention, generally stated, is to improve the construction and increase the efficiency of this type of machine. Certain special objects are to improve the construction of the traveling excavating devices or diggers, to provide improved means for raising and lowering the swinging frame which carries the said excavating devices, to provide an improved and highly-effective form of guard for preventing a premature discharge of the dirt from the excavating devices or diggers while traversing the space between the surface of the ground and the point of discharge, to provide an improved form of scraper for automatically cleaning the excavating devices, and to provide certain details and features of improvement tending to increase the general efficiency and to render a machine of this character serviceable and reliable.

To the attainment of the foregoing and other useful ends, my invention consists in matters hereinafter set forth and claimed.

In the accompanying drawings, Figure 1 is a side elevation of an excavating-machine embodying the principles of my invention. Fig. 2 is a plan of the machine shown in Fig. 1. Fig. 3 is a detail of the two belt conveyers which receive and discharge the soil at each side of the machine. Fig. 4 is central, vertical, and longitudinal section through a portion of the machine. Fig. 5 is a front view of the upper portion of the swinging frame, the excavating-plates on the chains not being shown and one side of the extensible trough or guard being broken away. Fig. 6 is a detail of the mechanism

for driving the two belt conveyers. Fig. 7 is a perspective of the guard, the upper portion of the swinging frame, and adjacent parts. Fig. 8 is a perspective of the device for raising and lowering the swinging frame. Fig. 9 is a detail of the device for rotating the drum or windlass by means of which the machine is moved forward. Fig. 10 is a vertical and longitudinal section through the extensible guard which prevents the dirt from falling off from the excavating-plates. Fig. 11 is a detail illustrating the construction of the upper portion of the swinging frame. Fig. 12 is a perspective of the plates, knives, &c., constituting one of the excavating devices. Fig. 13 is an edge view of one of the excavating-plates, showing the manner of securing the knives or rooters between this plate and a bar or angle-iron. Fig. 14 is a detail of one of said knives or rooters.

As thus illustrated my invention comprises a body-frame A, mounted upon suitable wheels B, and a swinging frame C, mounted to swing about an axis coincident with the rotary shaft D. The said shaft is arranged transversely and provided with four sprockets d , d' , d^2 , and d^3 , the shaft being supported in suitable bearings on the body-frame. Four sprockets d^4 , d^5 , d^6 , and d^7 are mounted at the lower end of the swinging frame C. This frame is preferably composed of two parallel beams or channel-irons c c , connected by cross-bars c' . Sprocket-chains d^8 , d^9 , d^{10} , and d^{11} are trained over said sprockets. These sprocket-chains carry the excavating devices or diggers E, which loosen and scrape up the soil and carry it upward to the point of discharge. Each excavating device or digger is preferably composed of a plate e , pivotally secured to the chains by arms e' , knives or rooters e^2 , secured between said plate and a bar or angle-iron e^3 , and arms or braces e^4 for connecting said bar with the chains. A plate e^5 is also preferably secured to the chains at a point immediately in advance of the plate e . The shaft D is rotated so as to drive the chains in the direction indicated. The movement of the chains causes the knives or rooters to tear up or loosen the soil, and this loosened soil is then carried upward by the

plates e , the plates e^5 preventing it from falling off. Preferably the excavating devices or diggers are arranged in two separate rows or series—as, for instance, by securing one set to the chains d^8 and d^9 and another to the chains d^{10} and d^{11} . Also, it is preferable to have the knives or rooters alternate—that is to say, to provide every other digger with three rooters and the intermediate ones with four.

(See Fig. 2.)

Any suitable device may be employed for raising and lowering the swinging frame so as to permit the excavating or digging to be carried on at any depth, but as a simple and effective arrangement I pivot the lower end of a frame F to the middle portion of said swinging frame and connect this frame F with a drum or windlass G . The said drum or windlass is mounted in suitable bearings on the body-frame and is gear-connected with a crank-shaft G' . The vertically-disposed frame F can be constructed with upper and lower cross-pieces g and g' , and to these are secured the ends of the ropes g^2 , which are wound upon the said drum or windlass. Obviously by rotating the said crank-shaft the frame C will be swung about its pivotal point and in this way the traveling excavating devices can be raised or lowered at will, so as to vary the depth of the excavations, and also the frame C can be raised or swung clear of the ground in case it is desired to transport the machine to another locality. Any suitable device may be employed for locking the drum or windlass against rotation.

The dirt taken up by the excavating devices or diggers is discharged onto a couple of laterally-extending conveyers H . These conveyers are of the flat belt or apron type and are secured to the underside of the body-frame. Each belt or apron is driven from the shaft D , the power-transmitting connections consisting, preferably, of a shaft I , bevel-gears i and i' for connecting the rear end of this shaft with said shaft D , and a sprocket-chain i^2 , trained over sprockets i^3 , i^4 , and i^5 . The sprocket i^3 is mounted on the forward end of said shaft, and sprockets i^4 and i^5 are secured to the journals of the two conveyer-rolls. In this way the conveyers are operated from the main shaft D , and the two belts or aprons are driven in a direction to discharge the dirt at each side of the machine.

In order to prevent a premature discharge of the dirt from the excavating-plates while traversing the space between the ground and the point of discharge, I provide an extensible guard J . This guard is preferably secured to the frame C , so as to maintain a parallelism with the series of traveling diggers and is preferably in the form of a telescoping trough. The outer and upper section of this trough is secured to the frame C , while the inner and lower section is constructed and arranged for longitudinal adjustment. The two sections are locked against relative shift by the locking-bolts j , secured

to the lower section and sliding in slots j' in the sides of the upper section. In this way the guard is longitudinally extensible and can be adjusted in accordance with the angle of the frame C . Such adjustment permits the lower end of the guard to be maintained at the desired distance from the ground regardless of the position of the frame C , and, as previously stated, without destroying the parallelism between the guard and said frame.

The improved means which I employ for automatically cleaning the dirt from the diggers or excavating devices as they issue from the upper end of the guard consists of a scraper-blade K , arranged in the path of said plates e and secured to the bottom of a swinging and vertically-disposed frame K' . The said frame has its upper end pivoted to the arms K , which project from the upper end of the frame C . Springs k' hold the said pivoted frame normally in position against the stops K^2 . Each plate e as it moves upward comes in contact with the blade K , and the movement continuing the springs k' yield and permit the frame to swing forward, and thereby cause the blade to slide outward across the face of the plate. The blade in this way cleans a plate of its load and, slipping over the ends of the rooters, then swings back into position to engage the next plate.

Various arrangements may be employed for moving or drawing the excavator forward. As an exceedingly simple and effective device, however, I mount a drum or windlass L at the forward end of the body-frame and connect such drum or windlass with some stationary object by means of a rope or cable. The said drum is supported in suitable bearings on the under side of the body-frame, and a ratchet-wheel L' is secured to the journal of the drum. A lever l is pivoted to the body-frame, and pivoted to said lever at opposite sides of the fulcral point are a couple of pawls l' and l'' , which engage the teeth of said ratchet-wheel. An eccentric cam l^3 on the shaft D is connected with the lever l by means of a strap l^4 and a pitman-rod l^5 . With this arrangement it is obvious that the rotation of the shaft D will cause a vibratory movement of the lever l and a consequent rotation of the drum. Such rotation of the drum winds up the aforesaid rope or cable, and thereby causes the machine to move forward in the direction desired for the trench or ditch.

What I claim as my invention is—

1. An excavator comprising a series of traveling excavating devices or diggers adapted and arranged to dig up or loosen and carry the dirt upward and forward to a point of discharge, and an extensible guard arranged in front of said excavating devices and adapted to prevent a premature discharge of the dirt therefrom while traversing the space between the ground and the said point of discharge, the said guard by this arrangement practically forming an extensible and up-

wardly and forwardly extending continuation of the inclined end wall or surface of the ditch, substantially as described.

2. In an excavator, the combination of a swinging frame carrying sprockets at its upper and lower ends, sprocket-chains trained over said sprockets, excavating devices or diggers mounted upon said chains and adapted to dig up or loosen and carry the dirt upward to a point of discharge, and a telescoping guard arranged in advance of said swinging frame and excavating devices and adapted to prevent a premature discharge of the dirt while traversing the space between the ground and the said point of discharge.

3. An excavator comprising a swinging frame provided with sprockets at its upper and lower ends, sprocket-chains trained over said sprockets, digging or excavating plates mounted upon said chains, and a telescoping trough arranged in front of said frame, substantially as and for the purpose set forth.

4. In an excavator, the combination of a frame pivoted at its upper end, sprockets mounted at the upper and lower ends of said frame, sprocket-chains trained over said sprockets, excavating or digging plates mounted upon said chains, and a telescoping trough secured to said frame and adapted to prevent a premature discharge of the dirt from said plates while traversing the space between the ground and the point of discharge.

5. In an excavator, the combination of a frame pivoted at its upper end, sprockets at the upper and lower ends of said frame, sprocket-chains trained over said sprockets, excavating or digging plates mounted upon said chains, and a telescoping trough secured to said frame and extensible in the direction of the latter's length, substantially as and for the purpose set forth.

6. In an excavator, the combination of a swinging frame, sprockets mounted at the upper and lower ends of said frame, sprocket-chains trained over said sprockets, excavating or digging plates mounted upon said chains, a trough secured to the forward side of said frame and adapted to prevent a premature discharge of the dirt from said plates while traversing the space between the ground and the point of discharge, the said trough being composed of two telescoping sections, the lower section sliding within the upper, and means for locking the two sections against relative shift.

7. The combination of a frame pivoted at its upper end, sprockets mounted at the upper and lower ends of said frame, sprocket-chains trained over said sprockets, excavating-plates mounted upon said chains, a telescoping trough arranged in front of said frame and adapted to serve as a guard for preventing a premature discharge of the dirt from said plates while traversing the space between the ground and the point of discharge, means for conveying the dirt to each side of the ma-

chine, means for raising and lowering said swinging frame, means for automatically removing the dirt from the said plates as they emerge from the upper end of said trough, means for driving said chains, and means for moving or drawing the excavator forward.

8. An excavator comprising a suitable body-frame, a transversely-arranged shaft journaled in bearings on said frame, four sprockets on said shaft, a frame mounted to swing about an axis coincident with said shaft, four sprockets carried at the lower end of said swinging frame, sprocket-chains trained over said sprockets, plates or diggers secured to said chains in two separate rows or series, means for driving said shaft, a telescoping trough arranged in front of said swinging frame and adapted to prevent a premature discharge of the dirt from said plates while traversing the space between the ground and the point of discharge, and means for raising and lowering said swinging frame.

9. An excavator comprising a swinging frame, sprockets mounted at the upper and lower ends of said frame, sprocket-chains trained over said sprockets, a plurality of excavating-plates having pivotal connections with said chains, a bar arranged in rear of each plate, knives or rooters secured between said bars and plates, and arms or braces for pivotally connecting said bars with said chains.

10. An excavator comprising a suitable body-frame, a swinging frame carrying suitable excavating devices or diggers, a vertically-disposed frame having its lower end pivoted to the middle portion of said swinging frame, a drum or windlass journaled in bearings on said body-frame, upper and lower cross-beams on said vertically-disposed frame, ropes wound around said drum and having their ends secured to said upper and lower cross-beams, and means for rotating said drum for the purpose of winding and unwinding said ropes and thereby raising and lowering said swinging frame.

11. An excavator comprising a swinging frame pivoted at its upper end, sprockets mounted at the upper and lower ends of said frame, sprocket-chains trained over said sprockets, excavating-plates secured to said chains, a vertically-disposed frame having its upper portion pivoted to arms projecting upwardly from the upper end of said swinging frame and having its lower portion provided with a scraper-blade adapted and arranged to successively engage and clean the excavating-plates, and springs arranged to connect said arms with the pivoted frame carrying said scraper, substantially as and for the purpose set forth.

12. In an excavator, the combination of a swinging frame pivoted at its upper end, sprockets mounted at the upper and lower ends of said swinging frame, sprocket-chains trained over said sprockets, excavating-plates secured to said chains, and a spring-pressed

scraper pivotally supported by said swinging frame and arranged to clean the said plates on the chains, substantially as and for the purpose set forth.

5 13. An excavator comprising a suitable body-frame, a transversely-arranged shaft journaled in bearings on said body-frame, sprockets on said shaft, a swinging frame having its upper end pivoted at a point co-
10 incident with said shaft, sprockets mounted at the lower end of said swinging frame, sprocket-chains trained over said sprockets, excavating-plates secured to said chains in
15 two separate rows or series, a vertically-disposed frame having its lower end pivoted to said swinging frame, a drum or windlass and ropes or like flexible connection for raising and lowering said vertically-disposed frame,
20 and an extensible guard for preventing a premature discharge of the dirt from said plates while traversing the space between the ground and the point of discharge.

14. An excavator comprising a suitable body-frame, a swinging frame pivoted at its
25 upper end to said body-frame, sprockets mounted at the upper and lower ends of said swinging frame, sprocket-chains trained over

said sprockets, excavating-plates secured to said chains, a couple of belt conveyers supported from the underside of said body-frame 30 and arranged to receive the dirt from the said excavating-plates, an extensible guard for preventing a premature discharge of the dirt from said plates while traversing the space between the ground and the point of dis- 35 charge, means for raising and lowering said swinging frame, means for cleaning the excavating-plates, the latter being arranged in two separate rows or series, and means for moving or drawing the excavator forward. 40

15. The combination of the double-pawl ratchet device for rotating the drum or windlass, the swinging frame carrying a series of traveling excavating devices or diggers, the extensible guard arranged in front of said 45 swinging frame, means for raising and lowering said frame, means for cleaning the diggers, and a couple of laterally-extending conveyers for discharging the dirt at each side of the machine.

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Witnesses:

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