

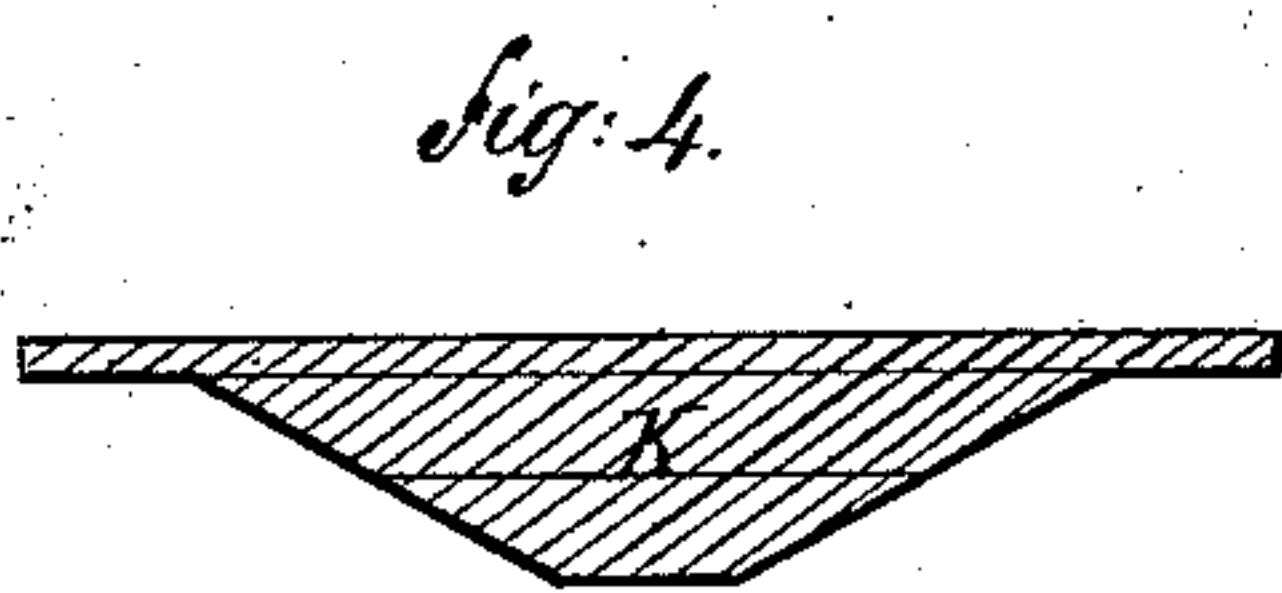
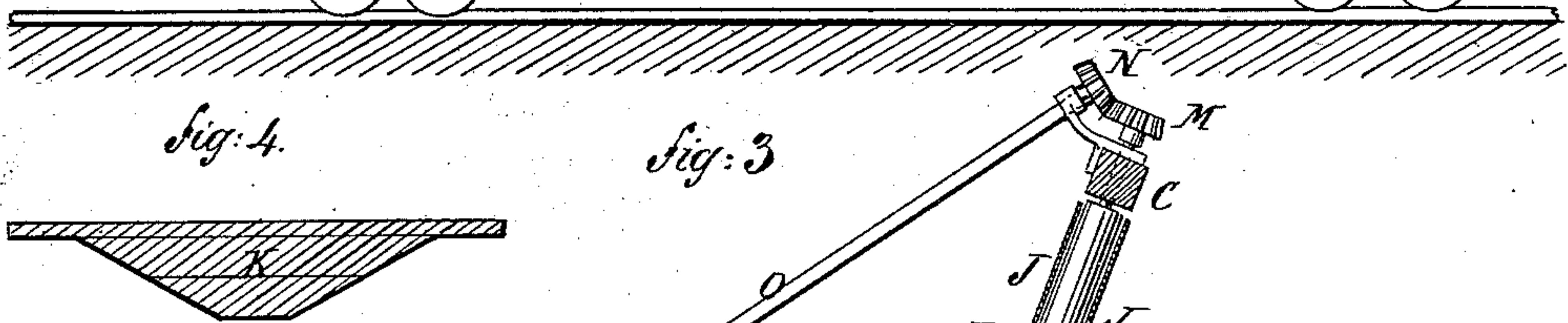
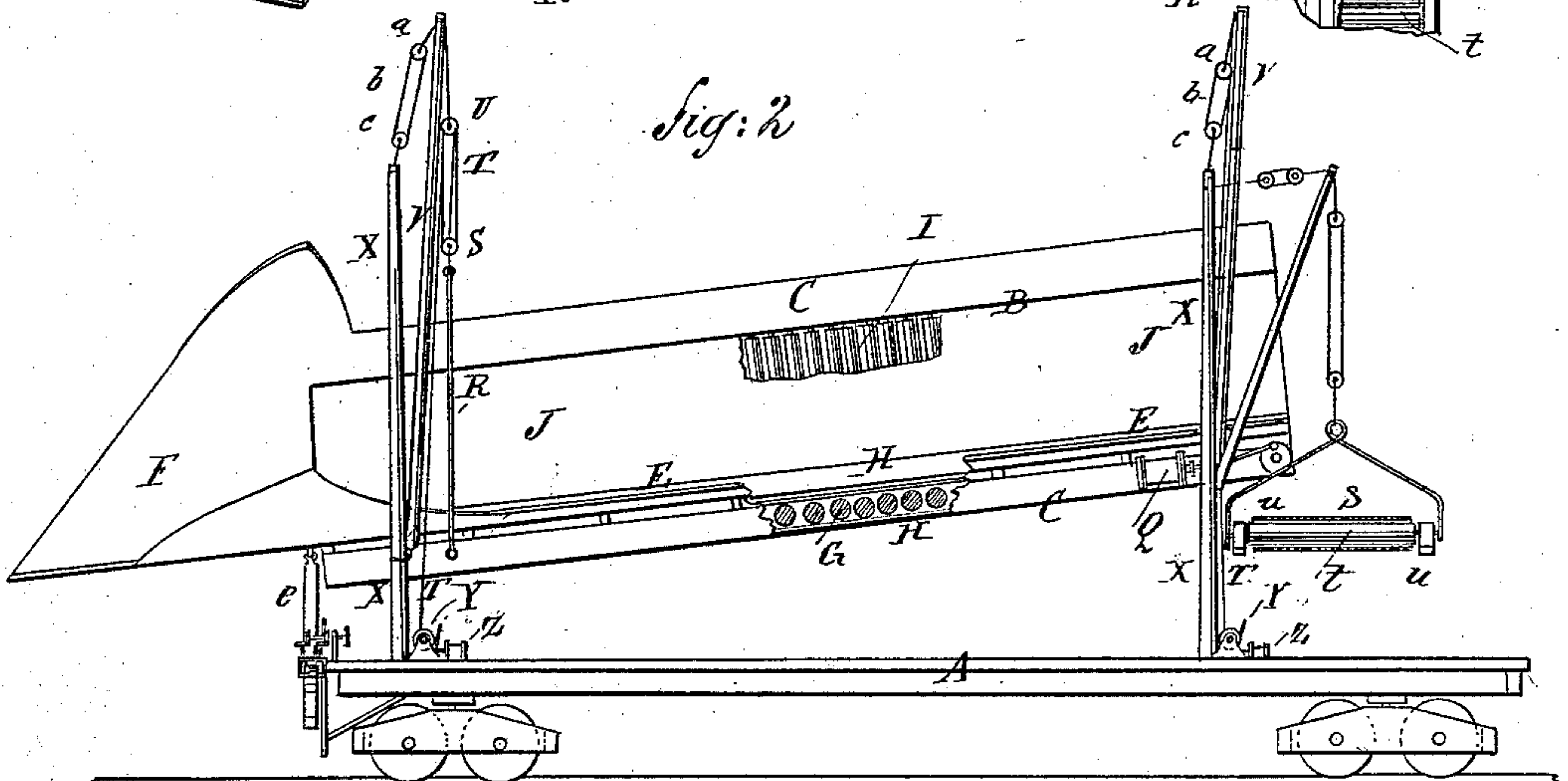
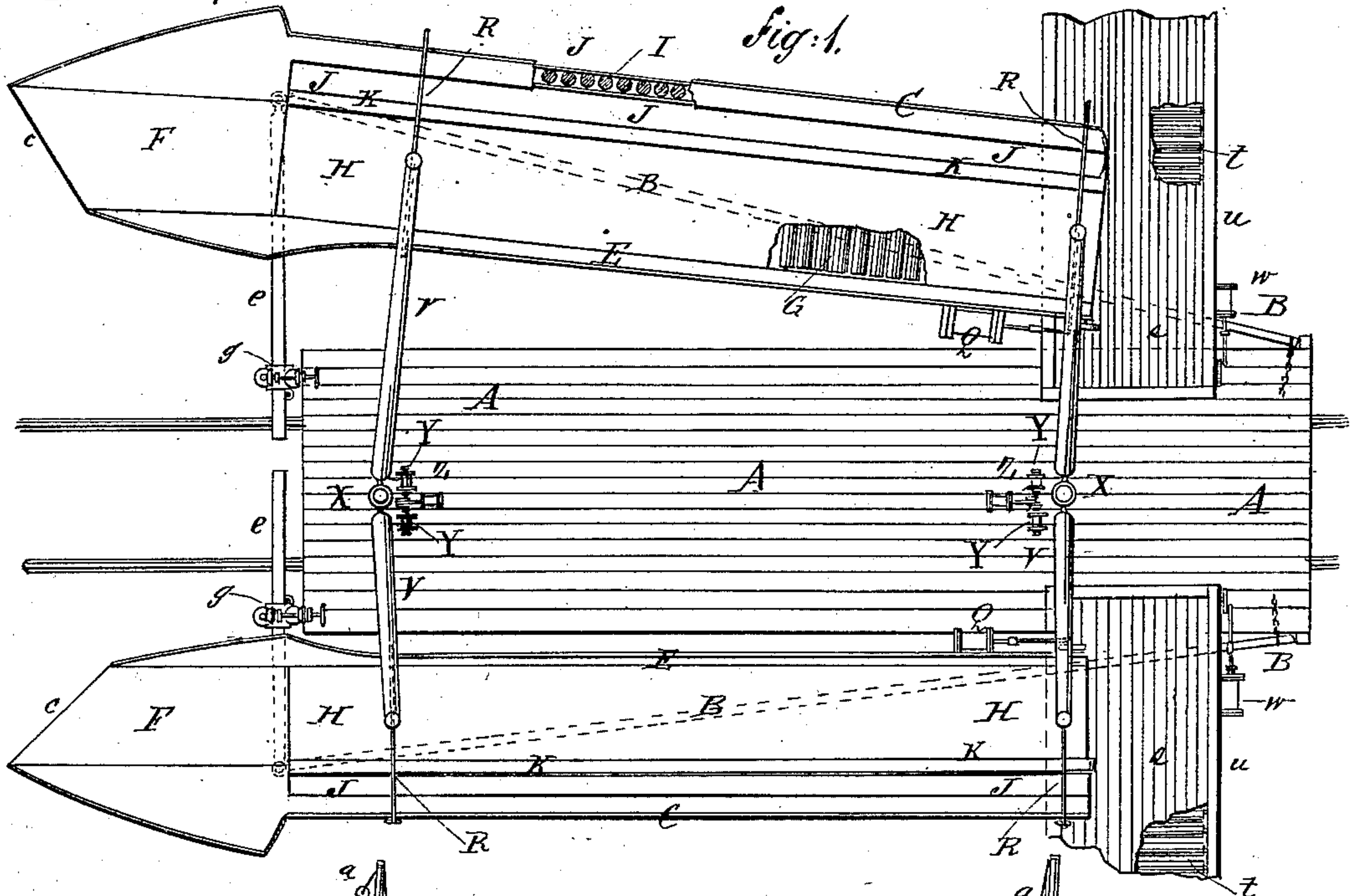
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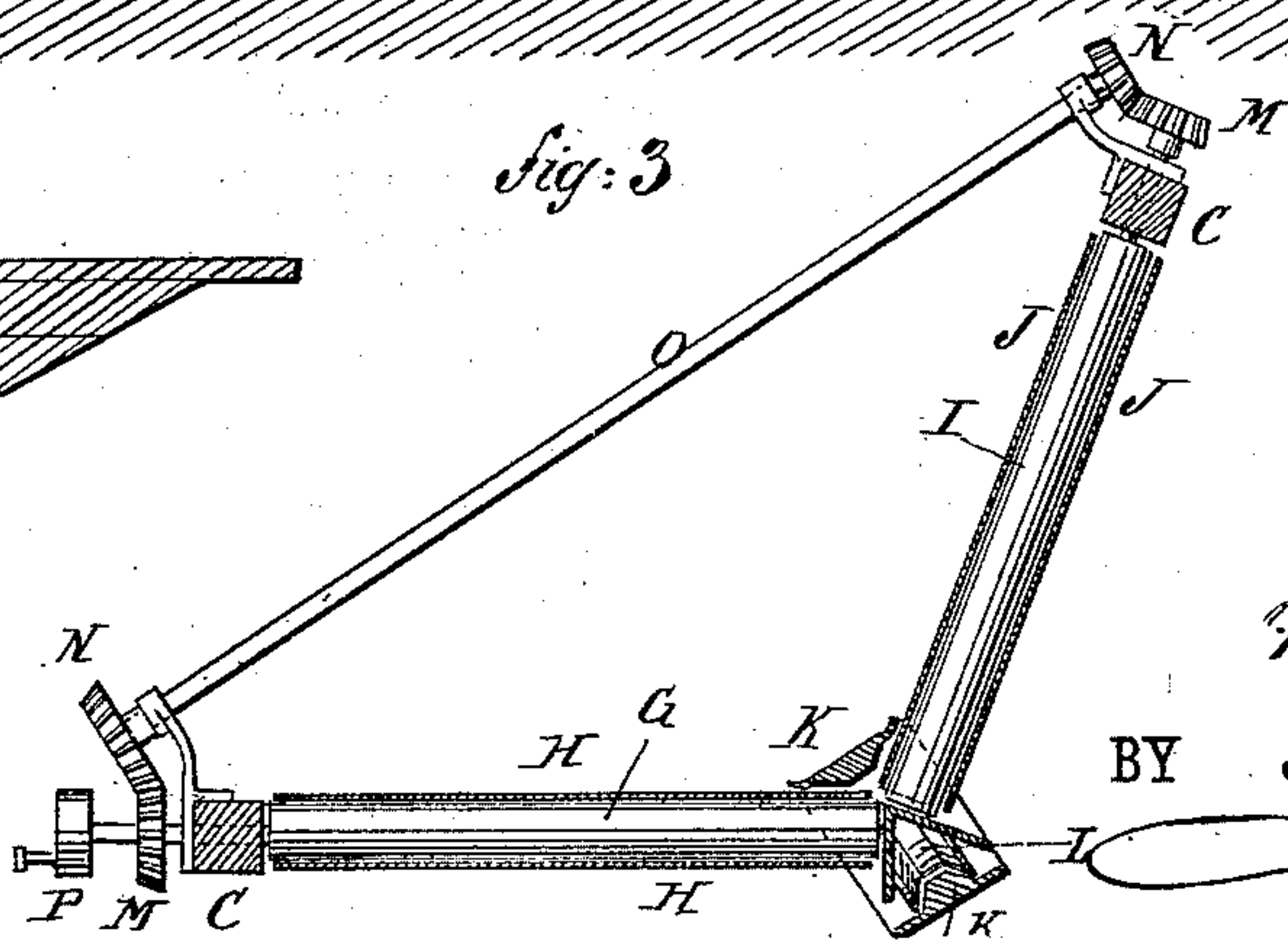
D. E. GROVE.  
RAILWAY DITCHING MACHINE.

No. 264,282.

Patented Sept. 12, 1882.



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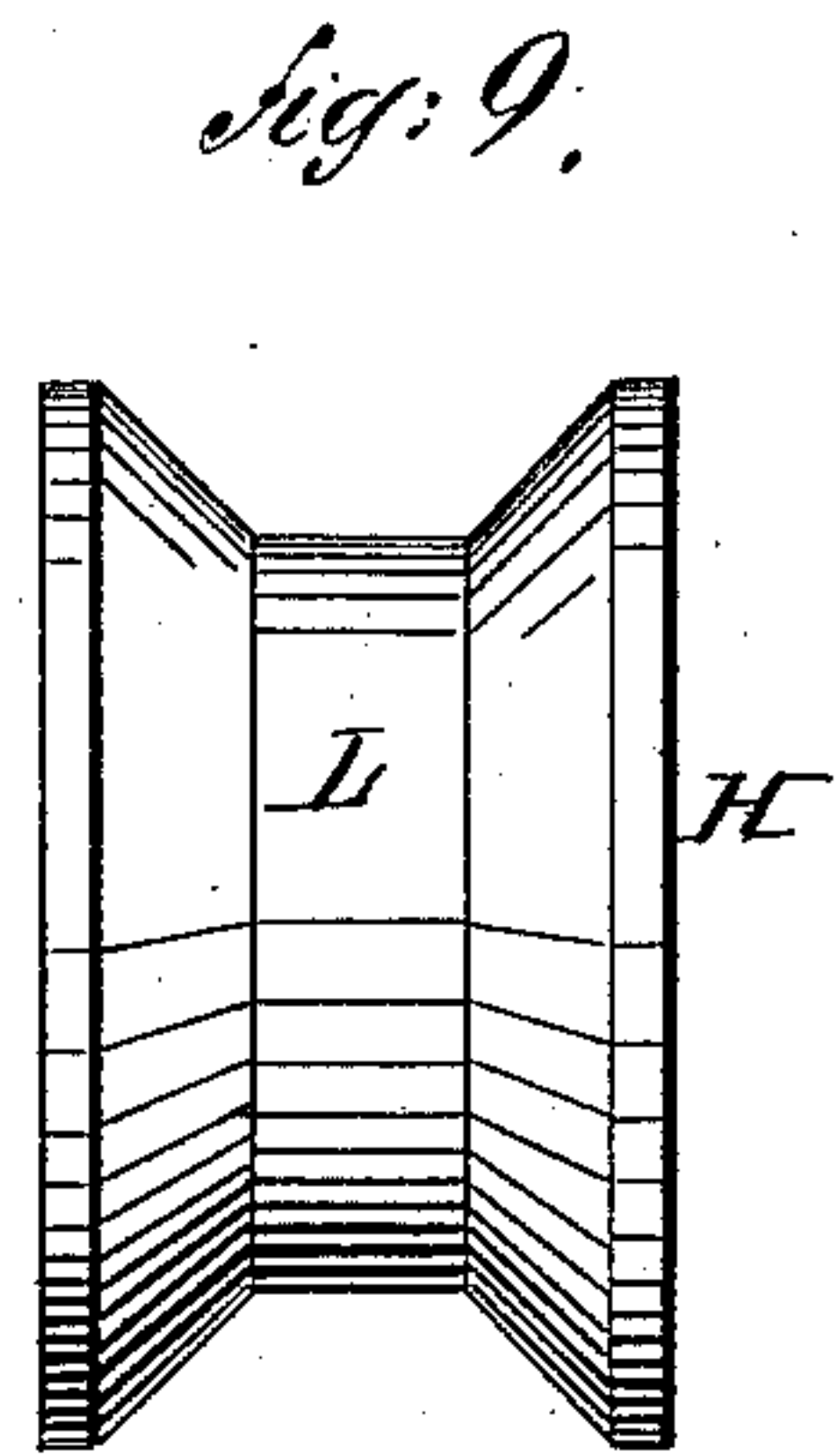
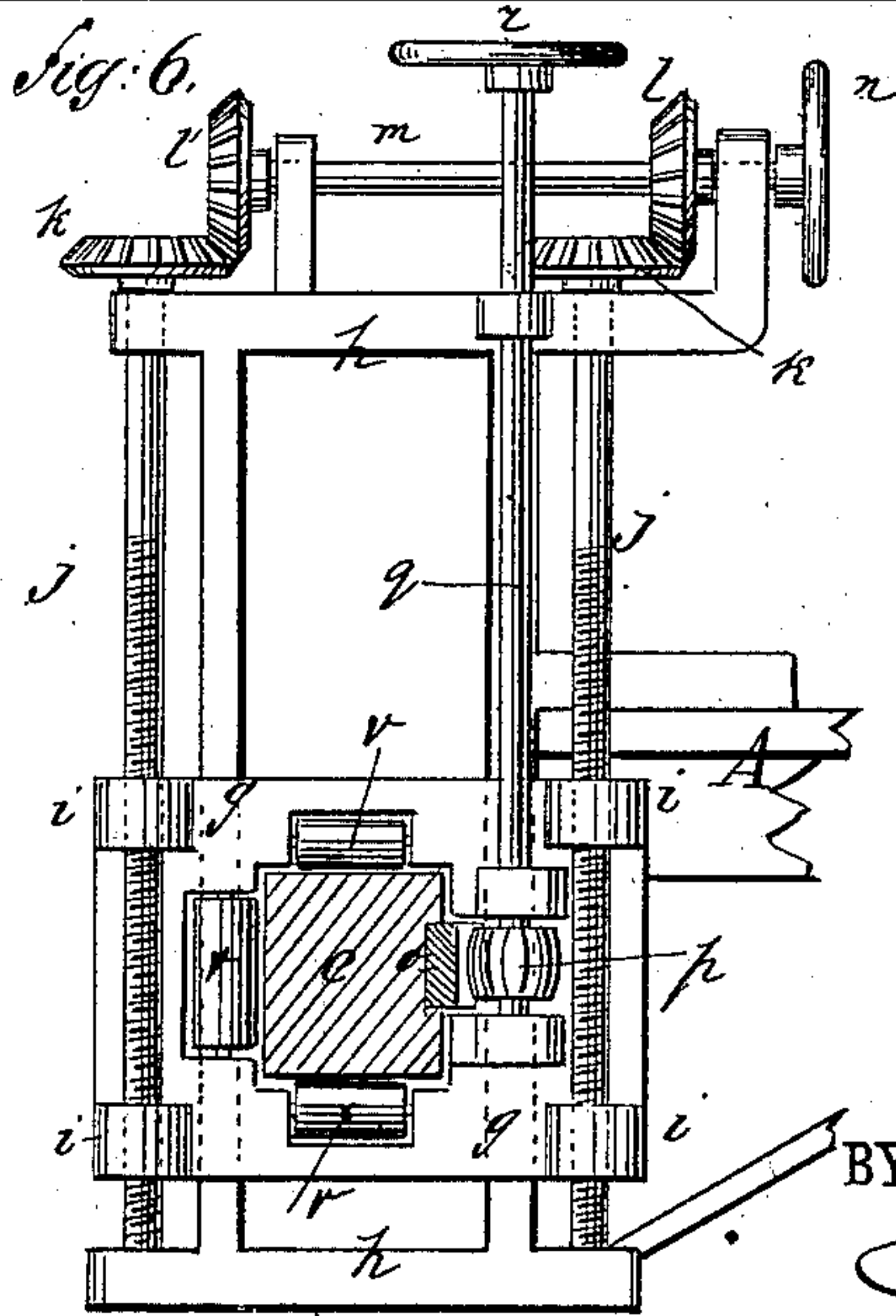
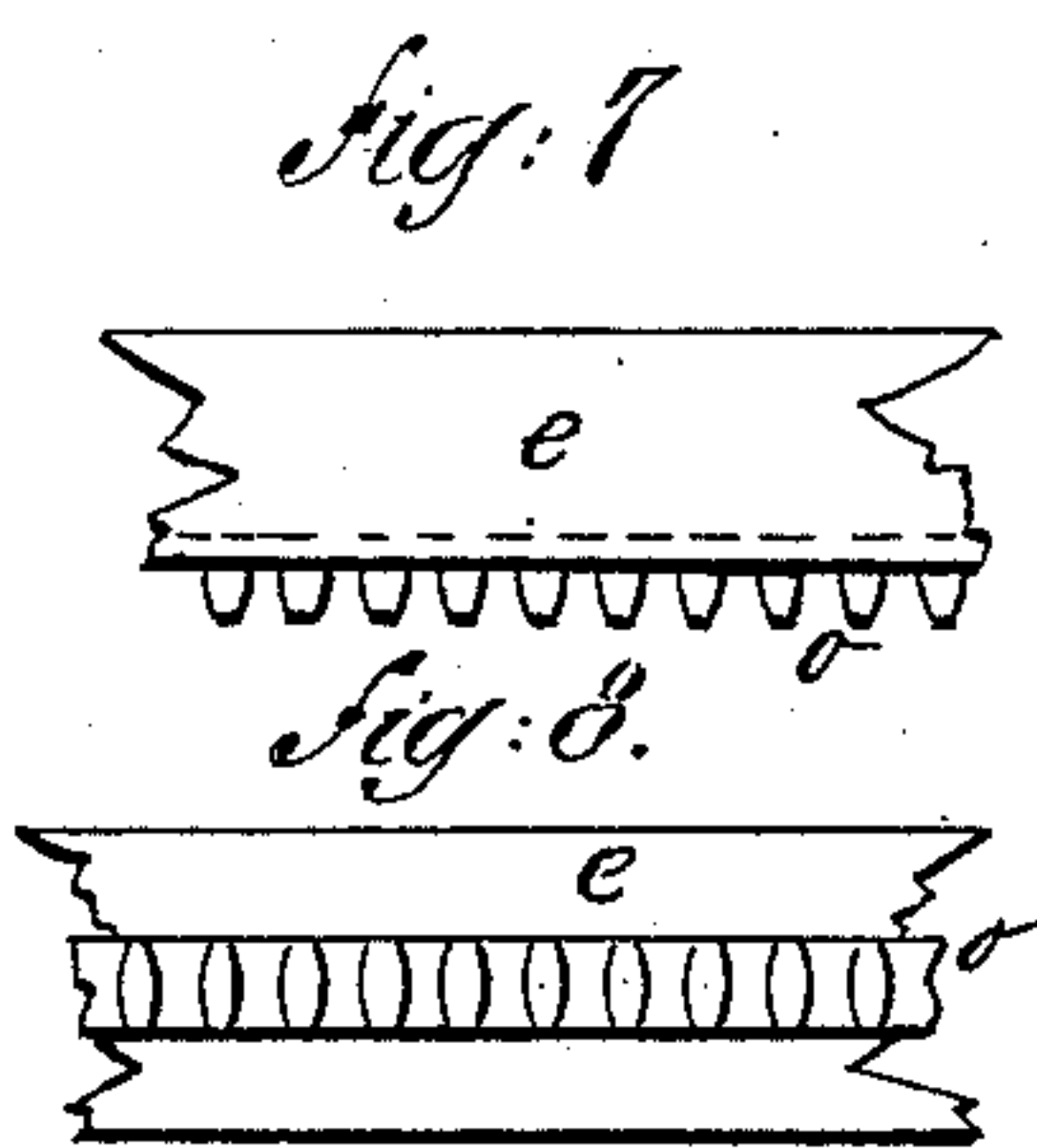
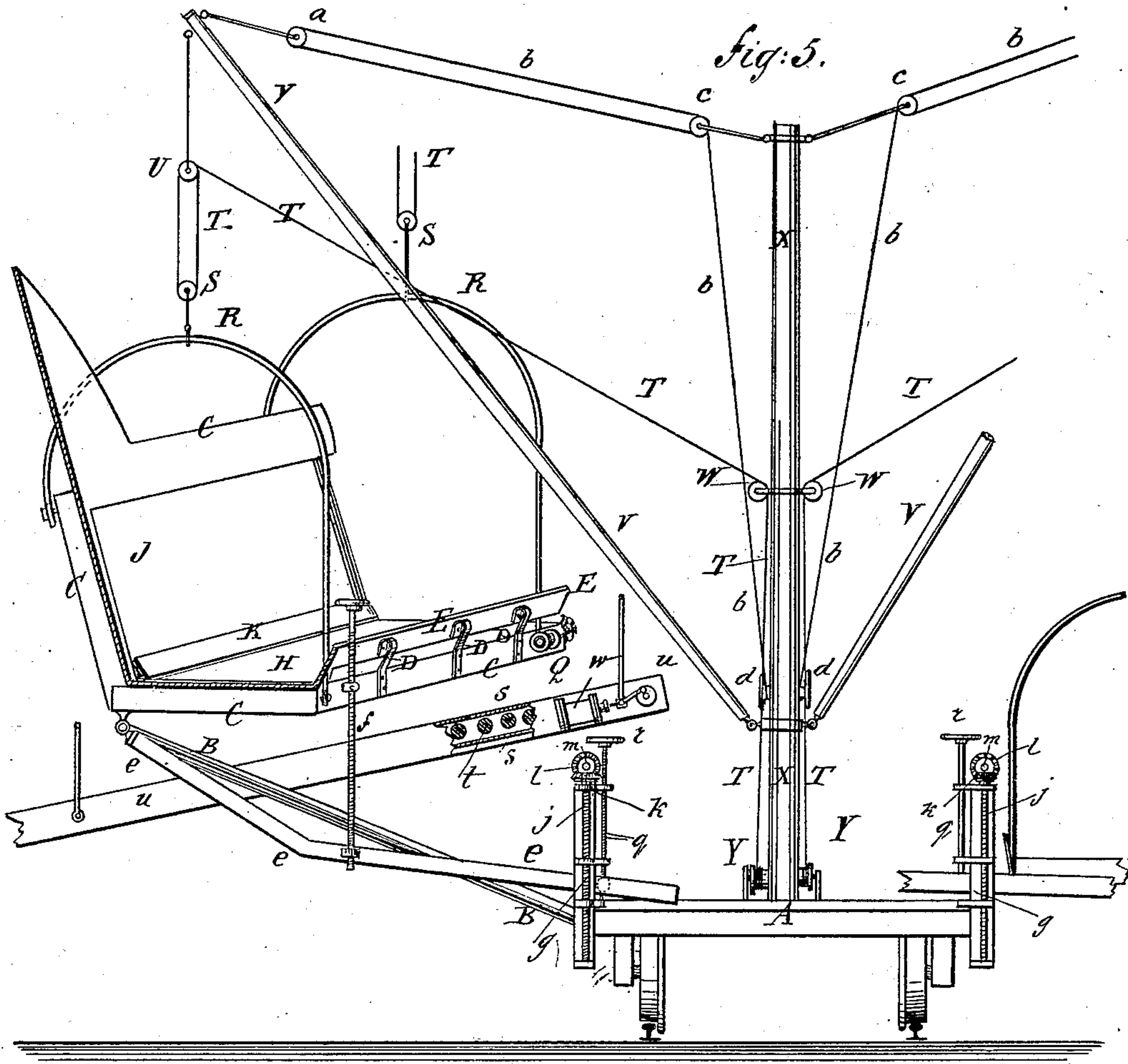
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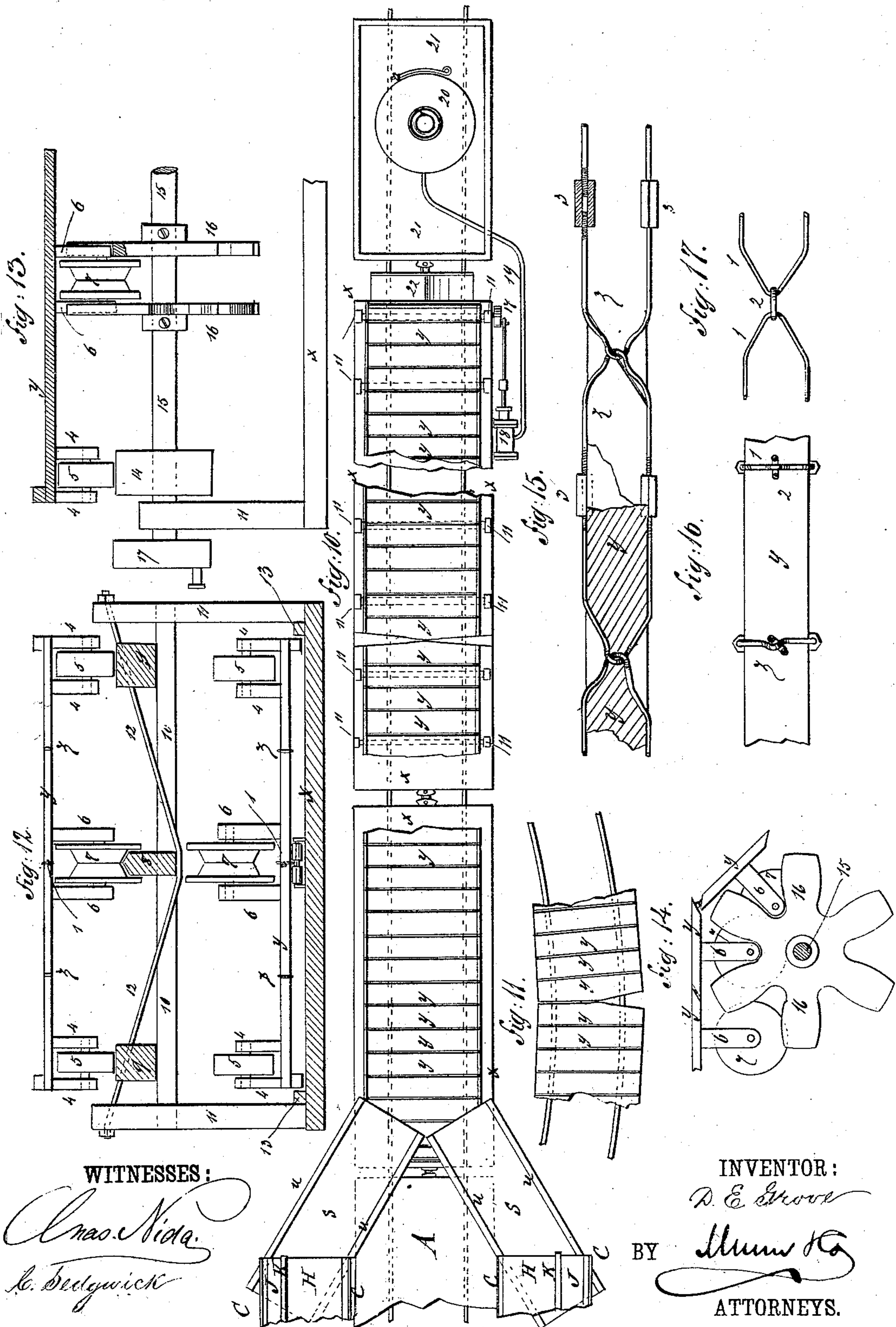
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3 Sheets—Sheet 3.

Patented Sept. 12, 1882.





# UNITED STATES PATENT OFFICE.

DAVID E. GROVE, OF DALLAS, TEXAS.

## RAILWAY-DITCHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 264,282, dated September 12, 1882.

Application filed April 14, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, DAVID E. GROVE, of Dallas, in the county of Dallas and State of Texas, have invented certain new and useful  
5 Improvements in Railway-Ditching Machines, of which the following is a full, clear, and exact description.

Reference is to be had to the accompanying drawings, forming part of this specification, in  
10 which similar letters of reference indicate corresponding parts in all the figures.

Figure 1, Sheet 1, is a plan view of a part of my improvement. Fig. 2, Sheet 1, is a sectional side elevation of the same. Fig. 3,  
15 Sheet 1, is a sectional end elevation of one of the carriers. Fig. 4, Sheet 1, is a sectional end elevation of the angle-belt enlarged. Fig. 5, Sheet 2, is a sectional front elevation of a part of the improvement. Fig. 6, Sheet 2, is a sectional elevation of a part of the adjusting mechanism. Fig. 7, Sheet 2, is a plan view of a part of an adjusting-bar. Fig. 8, Sheet 2, is a side elevation of the same. Fig. 9, Sheet 2, is a plan view of one of the angle-belt guide-  
25 rollers. Fig. 10, Sheet 3, is a plan view of a part of the improvement, showing the conveyer applied to a train of cars. Fig. 11, Sheet 3, is a plan view of a part of the same, showing the position of the conveyer when passing around curves. Fig. 12, Sheet 3, is a sectional end elevation of the conveyer and supporting-frame. Fig. 13, Sheet 3, is a sectional end elevation of a part of the same, showing the mechanism for operating the conveyer. Fig. 14, Sheet  
35 3, is a side elevation of a part of the same. Fig. 15, Sheet 3, is a side elevation, partly in section, of a part of the conveyer-apron, and showing the central-belt coupling. Fig. 16, Sheet 3, is a sectional end elevation of a part of the conveyer-apron. Fig. 17, Sheet 3, is a side elevation of one of the side-belt couplings.

The object of this invention is to facilitate the opening of railway-ditches and the removal of the dirt therefrom.

45 The invention consists in the peculiar construction and arrangement of parts, as hereinafter fully set forth, and pointed out in the claims.

A represents a flat car, to the opposite sides  
50 of the rear end of which are hinged, by bolts or other suitable detachable means, the rear

ends of two bars, B. The bars B are hinged at their forward ends to the outer forward corners of the frames C, that carry the plows and the carriers. The bars B and their connections  
55 are made of sufficient strength to support the plows against the resistance of the ground. The frame C is formed of a base-frame and an outer side frame, meeting each other at an obtuse angle, as shown in Figs. 3 and 5, and  
60 firmly connected together.

To the inner side of the base of the frame C are attached, by spring-standards D or other suitable supports, narrow side boards, E, to keep the dirt in place upon the carriers while  
65 being carried back by the said carriers.

To the forward end of the frame C is attached the plow F, which is made angular in cross-section, as shown in Fig. 5, and with its point in line with the angle of the said frame  
70 C. The cutting-edges or shears of the plows are made sharply inclined, and the outer shear is made wider than the outer part of the frame C to shear off the sides of cuts or banks. The inner side of the base-shear has a narrow  
75 inclined flange formed upon it to correspond with the inner side board, E, and is intended to serve as a guide to conduct the dirt to the carrier.

To the base of the frame C is pivoted a series of rollers, G, around which passes the end-  
80 less belt H to form the base of the carrier. To the inclined outer side of the frame C is pivoted a series of rollers, I, around which passes an endless belt, J, to form the outer  
85 side of the carrier. The adjacent edges of the endless belts H J meet or nearly meet at the angle of the frame C, and are covered by the central belt, K, which is made thick and has its side edges beveled to fit against the upper  
90 surfaces of the said belts H J. The inner side of the belt K is made of such a width as to fit the space between the adjacent edges of the belts H J. The outer part of the belt K projects a little beyond the beveled sides of  
95 the said belt, as shown in Figs. 3 and 4, to serve as flexible flanges to pack the edges of the said belt and prevent dirt from working in between the belt K and the belts H J. The belt K, at the front and rear ends of the frame  
100 C, passes around guide-rollers L, the faces of which are so formed that the inner side of the



said belt K will exactly fit the said faces. The rollers L are pivoted to supports attached to the frame C.

To the outer ends of the rear rollers, G I, are attached beveled-gear wheels M, the teeth of which mesh into the teeth of the beveled-gear wheels N, attached to the opposite ends of the shaft O, revolving in bearings attached to the frame C, so that the side belt, J, will be carried by the movement of the base-belt, H.

To the journal of the inner end of the rear roller, G, is attached a crank-wheel, P, to the crank-pin of which is pivoted the jointed piston-rod of a small engine, Q, attached to the rear part of the inner side of the frame C. The engine Q is designed to be supplied with steam through a flexible hose leading to the locomotive-boiler.

To the forward and rear parts of the frame C are attached the ends of bails R, to the middle parts of which are attached pulley-blocks S, the ropes T of which also pass around the pulleys of blocks U, suspended from the outer ends of the derrick-booms V. From the pulley-blocks U the ropes T pass around guide-pulleys W, pivoted to supports attached to the derrick-posts X. The ends of the ropes T are attached to windlass Y, pivoted to supports attached to the car A, and which are driven from a small engine, Z, attached to the car A and receiving steam from the locomotive-boiler, so that either or both ends of the frame C can be raised and lowered quickly to pass obstructions or give a desired depth to ditches and inclination to banks.

With the outer ends of the derrick-booms V are connected pulley-blocks *a*, the ropes *b* of which pass around the pulleys of blocks *c*, connected with the upper ends of the derrick-posts X. The ends of the ropes *b* are secured to the belaying cleats or cavils *d*, or other supports attached to the derrick-posts X, so that the booms V can be adjusted to swing the frames C outward or inward by means of the tackle *a c b*.

To the outer forward corner of the base of the frame C is hinged the outer end of a bar, *e*, which is connected with the inner forward corner of the frame C by a hand-screw, *f*, swiveled to the said bar *e*, and passing through nuts attached to the said corner of the frame C, or to some suitable support connected with the said frame C, so that the lateral inclination of the frame C can be regulated by turning the said screw *f*. The inner part of the bar *e* passes through the guide-block *g*, which moves up and down along a frame or post, *h*, attached to the forward corners of the car A, and has nuts *i* formed upon or attached to its ends to receive the screws *j*, having bearings in the said frame or post *h*, so that the said inner end of the bar *e* can be adjusted vertically by operating the screws *j*.

To the upper ends of the screws *j* are attached beveled-gear wheels *k*, into the teeth of which mesh the teeth of the beveled-gear

wheels *l*, attached to the shaft *m*. The shaft *m* works in bearings attached to the frame or post *h*, and to its end is attached a hand-wheel, *n*, for convenience in operating it to raise and lower the inner end of the bar *e*, and thus regulate the lateral inclination of the frame C.

Upon one side of the bar *e* are formed, or to it are attached, rack-teeth *o*, into which mesh the teeth of the gear-wheel *p*, attached to the shaft *q*. The gear-wheel *p* is made long and with a bulged or convexed face, as shown in Fig. 6. The shaft *q* works in bearings attached to the frame or post *h*, and has a hand-wheel, *r*, attached to its upper end for convenience in operating it to adjust the bar *e* longitudinally, and thus move the plow toward or from the track. The friction of the bar *e* when moved longitudinally is lessened by rollers *v*, pivoted in recesses in the block *g*, and which bear against the sides of the said bar *e*, as shown in Fig. 6. With this construction, as the car A moves forward the plow F raises the dirt from the bottom of the ditch or cuts it from the face of a bank, and the belts H J K carry it back to the rear end of the frame C, where it falls upon the endless belt *s*, which passes around a series of rollers, *t*, pivoted to a frame, *u*. The frame *u* is designed to be supported by bails and tackle from derricks, in the same manner as the side carriers, as indicated in Figs. 2 and 5, so that its position can be regulated as circumstances may require. The carrier-belt *s* is driven by a small engine, *w*, to which steam is supplied from the boiler of the locomotive. The engine *w* is attached to the side of the frame *u*, and its jointed piston-rod is connected with a crank-wheel attached to the inner roller, *t*. With this construction the carriers *s t u* can be swung around so as to deliver the dirt upon cars *x*, placed in the rear of the car A, with which the plows and carriers are connected, as shown in Fig. 10. In this case the cars *x* are provided with a conveyer extending the entire length of the train. The conveyer is formed of slats *y*, the adjacent edges of which are beveled and overlap each other, as shown in Figs 14 and 15. The slats *y* are connected together at their centers by links *z*, the ends of which are contracted and interlock with each other, as shown in Figs. 15 and 16. The slats *y* are connected near their ends by links 1, the ends of which are contracted, and are connected by short links 2, as shown in Figs. 16 and 17. The contracted end parts of the links *z* 1 are placed in recesses in the beveled edges of the slats *y*, as shown in Fig. 15. The couplings, in connection with the beveled edges of the slats *y*, allow the said slats *y* to have a little play upon each other when the cars are passing around curves. It the conveyer, at a distance apart equal to the length of a car and the distance between two adjacent cars, the end couplings, 1 2, are omitted, and the adjacent edges of the slats *y* are beveled from the center toward each end, as shown in Figs. 10



and 11, to give the conveyer the lateral play necessary in passing around curves.

When the train of cars is to be drawn from place to place the conveyer should be so adjusted that the single slat-couplings will be directly over the car-couplings, so that the train can pass around curves without straining the conveyer.

Each link  $z$  1 is made in two equal parts, the division being made in the center of its side bars. The adjacent ends of the parts of the links have right-and-left screw-threads cut upon them to receive the right-and-left nuts 3, so that the wear can be taken up by turning the said nuts.

To the inner side of each end of each slat  $y$  is attached a pair of hangers, 4, to and between the lower ends of which is pivoted a small wheel, 5, and to the center of each slat  $y$  is attached a pair of hangers, 6, to and between the lower ends of which is pivoted the wheel 7. The wheels 7 are made larger than the wheels 5, and have their faces grooved and provided with side flanges to fit upon the corresponding-shaped top of a bar, 8, to prevent the conveyer from having a lateral movement. The side wheels, 5, roll upon the tops of the bars 9. The bars 8 and 9 are secured to cross-bars 10, the ends of which are attached to the posts 11 at a little distance from their upper ends. The lower ends of the posts 11 are attached to the cars  $x$ . The bar 8 is placed at a little lower level than the bars 9 on account of the greater size of the wheels 7, and the bars 8 9 and posts 11 are strengthened in position by truss-rods 12, which pass through the posts 11 and bars 9 and beneath the bar 8, as shown in Fig. 12. The lower part of the conveyer slides upon rollers pivoted close to the decks of the cars  $x$ , and is kept from lateral movement by cleats 13, attached to the decks of the cars. At the front end of the first car of the train and the rear end of the last car the wheels 5 pass around wheels 14, attached to shafts 15, which are pivoted to posts 11.

To the middle part of the rear shaft, 15, are attached two rag-wheels, 16, at such a distance apart as to receive between them the guide-wheels 7. The teeth, arms, or projections of the wheels 16 are so formed as to engage with the hangers 6, to which the said wheels 7 are pivoted, so that the upper part of the endless conveyer will be drawn toward the rear end of the train by the revolution of the shaft 15.

To one end of the shaft 15 is attached a crank-wheel, 17, to the crank-pin of which is pivoted the jointed piston-rod of an engine, 18, attached to the side of a car,  $x$ , as shown in Fig. 10. The engine 18 is supplied with steam through a flexible pipe, 19, from a boiler, 20, placed upon a tool-car, 21, coupled to the rear car,  $x$ .

To the rear end of the rear car,  $x$ , is attached a V-shaped guide or chute, 22, to guide the dirt discharged from the endless conveyers at

the rear end of the rear car to the sides of the track. With this construction, as the train moves forward the plows F raise the dirt. The belts H J K carry it back and discharge it upon the endless apron  $s$ , by which it is conveyed to the conveyer  $y$ . As the conveyer  $y$  is loaded it is carried back by the engine 18 until that part of the conveyer over each car in the train is loaded. When the conveyer is loaded the plows F are raised from the ground, the conveyer  $y$  is adjusted to bring the beveled cleats over the car-couplings, and the train is then drawn to the place where the filling in is to be done. The engine 18 is then started and the dirt is discharged from the rear end of the rear car,  $x$ .

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

1. In a railway-ditching machine, the combination, with the angular plow F, having inclined cutting-edges, of the angular frame C, provided with the endless belts H J K and spring side boards, E, substantially as herein shown and described.

2. In a railway-ditching machine, the combination, with the car A, of the angular frame C, the angular plow F, the carrier-belts H J and their rollers G I, and the angle-belt K and its guide-rollers L, substantially as herein shown and described, whereby the dirt will be raised and carried back, as set forth.

3. In a railway-ditching machine, the combination, with the angular carrying-frame C and the inclined endless belts H J, of the narrow belt K, made thick and with beveled edges, and the guide-pulleys L, substantially as herein shown and described, whereby dirt is kept from entering the space between the adjacent edges of the said inclined belts, as set forth.

4. In a railway-ditching machine, the angular frame C, carrying the plow F and provided with the bails R R, in combination with the bar  $e$ , hinged at its outer end to the frame C and connected at its inner end to the car A, and the derrick X V, mounted on the car and provided with tackle S U T and  $a b c$ , substantially as and for the purpose set forth.

5. In a railway-ditching machine, the combination, with the car A and the carrier-frame C, of the hinged bar  $e$  and the swiveled hand-screw  $f$ , substantially as herein shown and described, whereby the lateral inclination of the plow and carrier can be regulated, as set forth.

6. In a railway-ditching machine, the combination, with the car A, the bar  $e$ , and the carrier-frame C, of the vertically-sliding block  $g$  and the swiveled screws  $j$ , substantially as herein shown and described, whereby the lateral inclination of the carrier and plow can be adjusted from the car, as set forth.

7. In a railway-ditching machine, the combination, with the car A, the bar  $e$ , hinged at its forward end to the frame C, and the carrier-frame C, of the rack-bar  $o$  and the gear-wheel  $p$ , having shaft and hand-wheel, sub-



stantially as herein shown and described, whereby the carrier-frame can be adjusted to bring the plow nearer to or farther from the car, as set forth.

5 8. In a railway-ditching machine, the combination, with the angular carrier-frame C, the endless belts H J K, and their rollers G I L, of the beveled-gear wheels M N, the connecting-rod O, and the steam-engine Q, substantially as herein shown and described, whereby  
10 the carrier-belts are made to move together, as set forth.

9. In a railway-ditching machine, the combination, with the car A, carrying the side carriers and their plows and the transverse carriers, of a train of cars, X, provided with an  
15 endless conveyer, substantially as herein shown and described, whereby the conveyer lying over each car can be loaded from the said side  
20 and transverse carriers, as set forth.

10. In a railway-ditching machine, the conveyer, constructed substantially as herein shown and described, and consisting of the

slats y, having their side edges correspondingly beveled and overlapped, the coupling- 25 links z and 12, and the wheels 5 7, as set forth.

11. In a railway-ditching machine, the combination, with the cars x, having posts 11, cross-bars 10, and track-timbers 9 8 9, of the  
endless conveyer y z 12, having hangers 4 6 4 30 and wheels 5 7 5, substantially as herein shown and described, whereby the dirt received at the forward end of the conveyer will be carried to the rear of the trains, as set forth.

12. In a railway-ditching machine, the combination, with the hangers 6, that carry the  
35 guide-wheels 7 of the conveyer, of the rag-wheels 16, the crank-shaft 15, and the steam-engine 18, substantially as herein shown and described, whereby the conveyer can be operated  
40 independently of the other parts of the mechanism, as set forth.

DAVID E. GROVE.

Witnesses:

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