

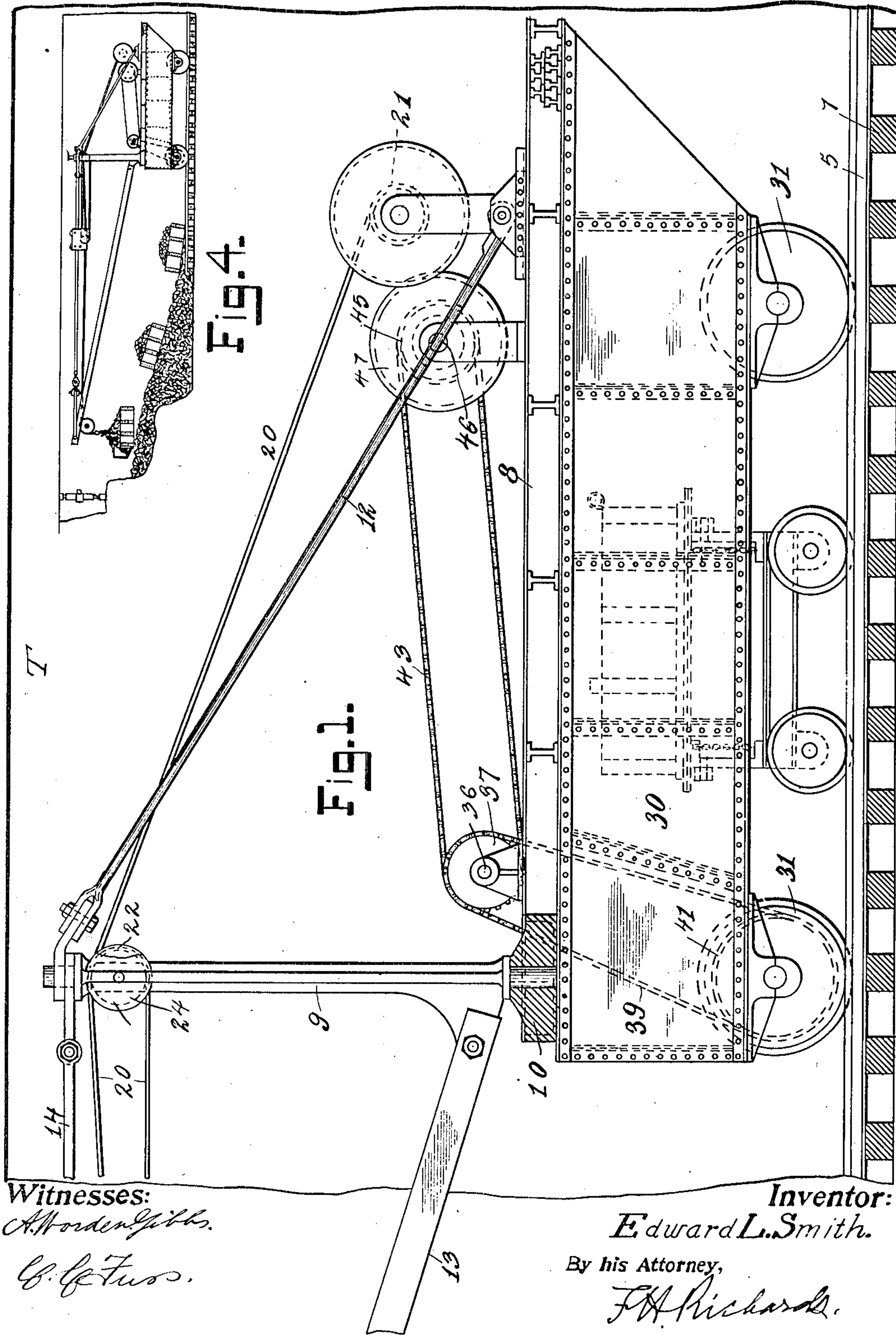
No. 844,624.

PATENTED FEB. 19, 1907.

E. L. SMITH.
TUNNEL CRANE.

APPLICATION FILED APR. 28, 1906.

3 SHEETS—SHEET 1.



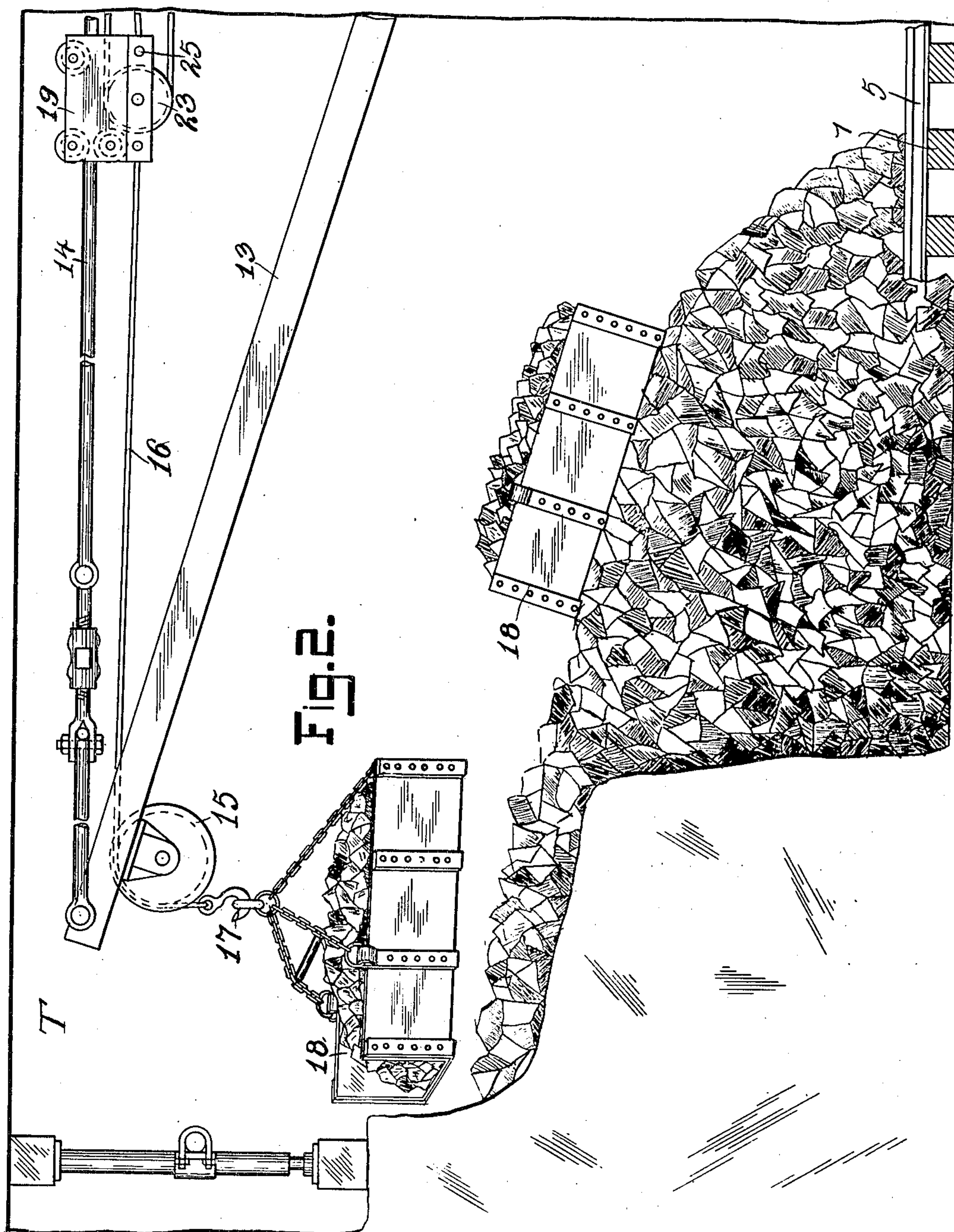
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Witnesses:

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Inventor:

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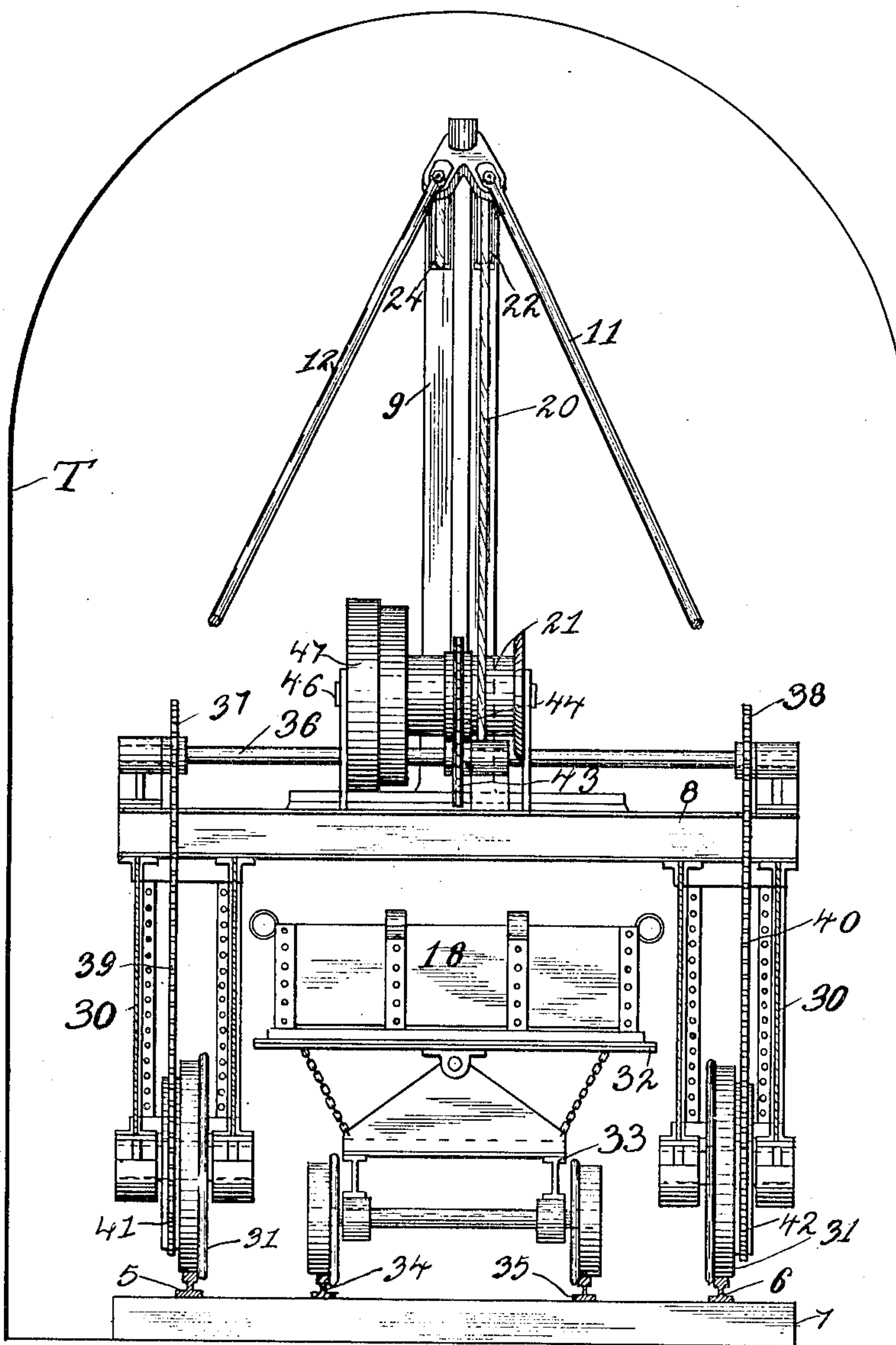
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3 SHEETS—SHEET 3.

Fig. 3.



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TUNNEL-CRANE.

No. 844,624.

Specification of Letters Patent.

Patented Feb. 19, 1907.

Application filed April 28, 1906. Serial No. 314,179.

To all whom it may concern:

Be it known that I, EDWARD L. SMITH, a citizen of the United States, residing in Breckenridge, in the county of Summit and State of Colorado, have invented certain new and useful Improvements in Tunnel-Cranes, of which the following is a specification.

This invention relates to excavating machinery, especially that adapted for use in shafts or tunnels for placing the excavated material upon a truck or car to facilitate the rapid removal of the same from the tunnel.

The object of the invention is to provide a car that can be operated along a track laid in the tunnel and provided with means whereby a body or vessel loaded with the excavated material can be elevated and then upon advancing the car such vessel can be placed on a car or truck that runs on a narrow track and passes entirely underneath of the main car-body.

In the accompanying drawings, representing one embodiment of my invention, Figure 1 is a side elevation, partly in section, of the mechanism in a tunnel, showing a portion only of the crane. Fig. 2 represents a continuation of Fig. 1, showing the other portion of the crane and its operation in the tunnel. Fig. 3 is a rear end elevation of the mechanism. Fig. 4 shows the mechanism on a smaller scale.

The apparatus is shown as operating in a horizontal shaft or tunnel, (denoted generally by T,) on the bottom of which is laid a track formed of rails 5 and 6, supported on suitable ties 7. A crane is pivotally supported at one end of a car-platform 8, the upright member or post 9 of which is pivoted in a block 10 on the platform by its lower end, while its upper end is pivotally supported by suitable tie-rods 11 and 12, passing to the opposite end of the car-platform. The crane is provided with a beam 13, extending from the lower end of the post 9, and which is supported from the top of the post 9 by a tie-rod 14.

At the forward end of the beam 13 is pivotally supported a sheave 15, around which passes a cable 16, provided with a hook 17 for engagement with a box or vessel 18, containing the excavated material. The other end of the cable 16 is connected with any suitable hoisting mechanism operated from the platform of the car. In the present construction a traveling member or trolley 19 is movable along the tie-rod 14 and has one

end of the cable 16 secured thereto. This trolley is shifted toward the crane-post by means of a cable 20, that is wound around a drum 21. The cable 20 passes around a sheave 22 on the post 9, thence around a sheave 23 on the trolley 19, thence around a second sheave 24 on the post 9, and thence back to the trolley, and is secured thereto at 25. When the cable 20 is wound up on the drum 21, it will move the trolley toward the car and raise the vessel 18. Obviously the unwinding of the drum 21 will permit the vessel to descend and move the trolley outward.

The car-platform 8 is considerably elevated from the track, and at each side is provided a supporting member 30, running the length of the car. These members at each end support wheels 31, that run on the tracks 5 and 6, as shown in Fig. 3. The space between the side portions 30 beneath the platform is sufficiently large to permit the passage of a smaller car, comprising a body portion or platform 32, mounted on a narrow-gauge truck, (denoted generally by 33,) which runs on rails 34 and 35, laid between the rails 5 and 6. This car, with the box or vessel 18 placed thereon, can pass entirely underneath the crane-supporting car from one end to the other, and a number of them can be run under the car up to the end of the track in the tunnel.

When the vessel 18 has been elevated, the crane-car is run back by any suitable means, either self-contained or external. In the present form there is a cross-shaft 36, supported on the platform 8 and provided with gears 37 and 38. Chains 39 and 40 run from these latter gears down to gears 41 and 42, secured to the wheels 31 of the crane-car. Another chain 43 runs from a sprocket 44 on the shaft 36 back to a gear 45, mounted on an operating-shaft 46 on the platform 8. This shaft may be operated by any suitable means, which is not shown. It may be operated from a motor or engine serving to drive the band-pulleys 47 on the shaft 46, if desired. Also any suitable means may be provided for operating the drum 21, which are not shown.

By means of the chains and gears the crane-car is moved out until the box 18 is in a position immediately above the smaller car, whereupon the box may be deposited on the car-platform, as shown, or else its contents dumped therein, as desired. This car

can now be run out of the tunnel, emptied, and thereupon returned, when the boxes 18 can be returned to the excavation by the crane, or else a series of such cars may be provided, and the crane-car will make successive trips back and forth to deposit the box 18 on the cars. Thereupon the train of filled cars can be run out, emptied, and returned and the crane return the boxes to the excavation.

This construction has the advantage that a series of such small cars can be used and the crane-car moved back and forth over them, which obviates the swinging around of the crane, that is obviously impossible in the narrow limits of a tunnel. At the same time the crane can be given a slight side motion from side to side of the tunnel to elevate the vessels at different places. The long arm of the crane also has the advantage that it can project a considerable distance beyond the end of the track and remove the material to permit the extension of the track as the excavation advances.

Having thus described my invention, I claim—

1. In a device of the character described, the combination with two lines of rails forming a track, and two lines of rails laid intermediate said rails forming a narrow-gage track, of a car comprising a platform supported on two upright side members, wheels on the side members running on the said outer rails, a crane pivotally mounted on the car and provided with a horizontal beam extending a considerable distance beyond the car, a trolley running along the beam, a vessel for containing the excavated material, means connecting the vessel and the trolley whereby the shifting of the trolley will elevate the vessel, means on the car for operating the trolley, and a second car provided with wheels arranged to run on the said intermediate track and to pass entirely underneath the car-platform between its sides, whereby the main car can be advanced upon elevating the vessel, to deposit the vessel upon said second car.

2. In a device of the character described, the combination with two lines of rails forming a track, and two lines of rails laid intermediate said rails forming a narrow-gage track, of a car comprising a platform supported on two upright side members, wheels on the side members running on the said outer rails, a crane pivotally mounted on the car and provided with a horizontal beam extending a considerable distance beyond the car, a trolley running along the beam, a vessel for containing the excavated material, means connecting the vessel and the trolley whereby the shifting of the trolley will elevate the vessel, means on the car for operating the trolley, a second car provided with wheels arranged to run on the said interme-

mediate track and to pass entirely underneath the car-platform between its sides, whereby the main car can be advanced upon elevating the vessel, to deposit the vessel upon said second car, and means on the platform for operating the wheels of the main car to advance the same.

3. In a device of the character described, the combination with two lines of rails forming a car-track, and two lines of rails intermediate of said rails forming a narrow-gage track, of a car comprising a platform supported on two upright side members, wheels on said members running on the outer rails, a crane on the car-platform extending over the track a considerable distance beyond the car, hoisting mechanism mounted on the car-platform and connected with the crane to elevate a vessel at the projecting end of the crane, and a second car comprising a body, a truck, and wheels running on the said intermediate rails, the second car being of a size to pass entirely underneath the platform of said car between its side members, whereby the crane-supporting car can be advanced to pass over said other car and deposit the vessel elevated at the crane extremity upon said second car, a shaft mounted on the platform of a car, a sprocket on each end of said shaft, sprockets on the car-wheels, chains connecting the shaft-sprockets with the car-wheel sprockets, a main shaft rotatably supported on the car, a sprocket on the latter shaft, a third sprocket on the said other shaft on the platform, and a chain connecting the latter sprocket with the sprocket on the driving-shaft, whereby the car-wheels are operated to advance the car.

4. In a device of the character described, the combination with two lines of rails forming a track, and two lines of rails laid intermediate said rails forming a narrow-gage track, of a car comprising a platform supported on two upright side members, wheels on the side members running on the said outer rails, a crane pivotally mounted on the car and comprising an upright post pivotally supported on the car, a beam extending from the lower end of the post a considerable distance beyond the car at one end, a tie-rod connecting the upper end of the post with the outer extremity of the beam, a trolley running along the tie-rod, a sheave at the outer end of the crane, a cable secured to the trolley by one end and passing over said sheave, a vessel for containing the excavated material, means for removably securing the vessel to the end of the cable beyond the sheave, whereby the shifting of the trolley will elevate said vessel, a sheave at the upper portion of the upright post, a cable secured to the trolley, and passing over said sheave and thence downward to the platform of the car, a drum around which the latter end of the cable is wound, a second car provided

with wheels arranged to run on the said intermediate track and to pass entirely underneath the car-platform between its sides, whereby the main car can be advanced upon elevating the vessel, to deposit the vessel upon said second car.

5. In a device of the character described, the combination with a pair of rails forming a track, and a pair of rails laid intermediate said rails forming a narrow-gage track, of a car comprising a platform supported on two upright side members, wheels on the side members running on the said outer rails, a crane pivotally mounted on the car and comprising an upright post pivotally supported on the car, a beam extending from the lower end of the post a considerable distance beyond the car at one end, a tie-rod connecting the upper end of the post with the outer extremity of the beam, a trolley running along the tie-rod, a sheave at the outer end of the crane, a cable secured to the trolley by one end and passing over said sheave, a vessel for containing the excavated material, means for removably securing the vessel to the end of the cable beyond the sheave, whereby the shifting of the trolley will elevate said vessel, a sheave at the upper portion of the upright post, a cable secured to the trolley and passing over said sheave and thence downward to the platform of the car, a drum on the platform around which the latter end of the cable is wound, a second car provided with wheels arranged to run on the said intermediate track and to pass entirely underneath the car-platform between its sides, whereby the main car can be advanced upon elevating the vessel, to deposit the vessel upon said second car, and means on the platform for operating the wheels of the main car to advance the same.

6. In a device of the character described, the combination with two lines of rails forming a track, and two lines of rails laid inter-

mediate said rails forming a narrow-gage track, of a car comprising a platform supported on two upright side members, wheels on the side members running on the said outer rails, a crane pivotally mounted on the car and comprising an upright post pivotally supported on the car, a beam extending from the lower end of the post a considerable distance beyond the car at one end, a tie-rod connecting the upper end of the post with the outer extremity of the beam, a trolley running along the tie-rod, a sheave at the outer end of the crane, a cable secured to the trolley by one end and passing over said sheave, a vessel for containing the excavated material, means for removably securing the vessel to the end of the cable beyond the sheave, whereby the shifting of the trolley will elevate said vessel, a sheave at the upper portion of the upright post, a cable secured to the trolley and passing over said sheave and thence downward to the platform of the car, a drum on the platform around which the latter end of the cable is wound, a second car provided with wheels arranged to run on the said intermediate track and to pass entirely underneath the car-platform between its sides, whereby the main car can be advanced upon elevating the vessel, to deposit the vessel upon said second car, a shaft mounted on the platform of a car, a sprocket on each end of said shaft, sprockets on the car-wheels, chains connecting the shaft-sprockets with the car-wheel sprockets, a main shaft rotatably supported on the car, a sprocket on the latter shaft, a third sprocket on the said other shaft on the platform, and a chain connecting the latter sprocket with the sprocket on the driving-shaft, whereby the car-wheels are operated to advance the car.

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