(No Model.) 3 Sheets—Sheet 1.

C. BOLLINGER.

CABLE RAILWAY AND GRIP THEREFOR.

No. 470,280. Patented Mar. 8, 1892.

Fig. 1.

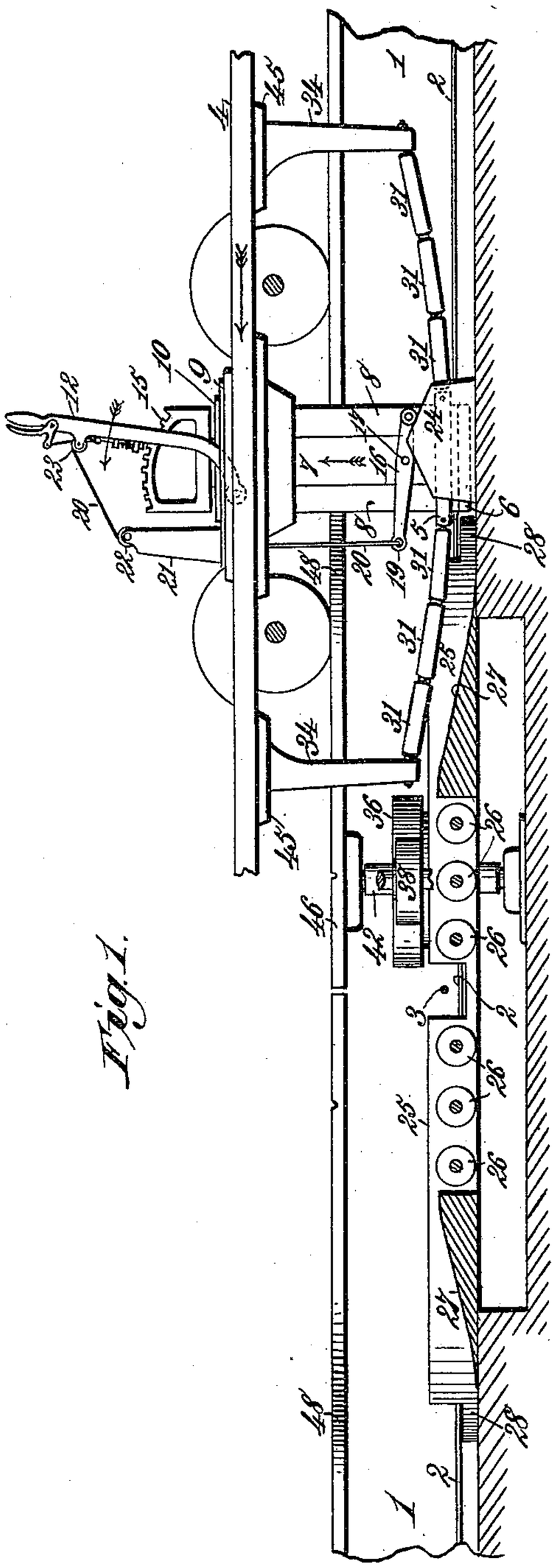
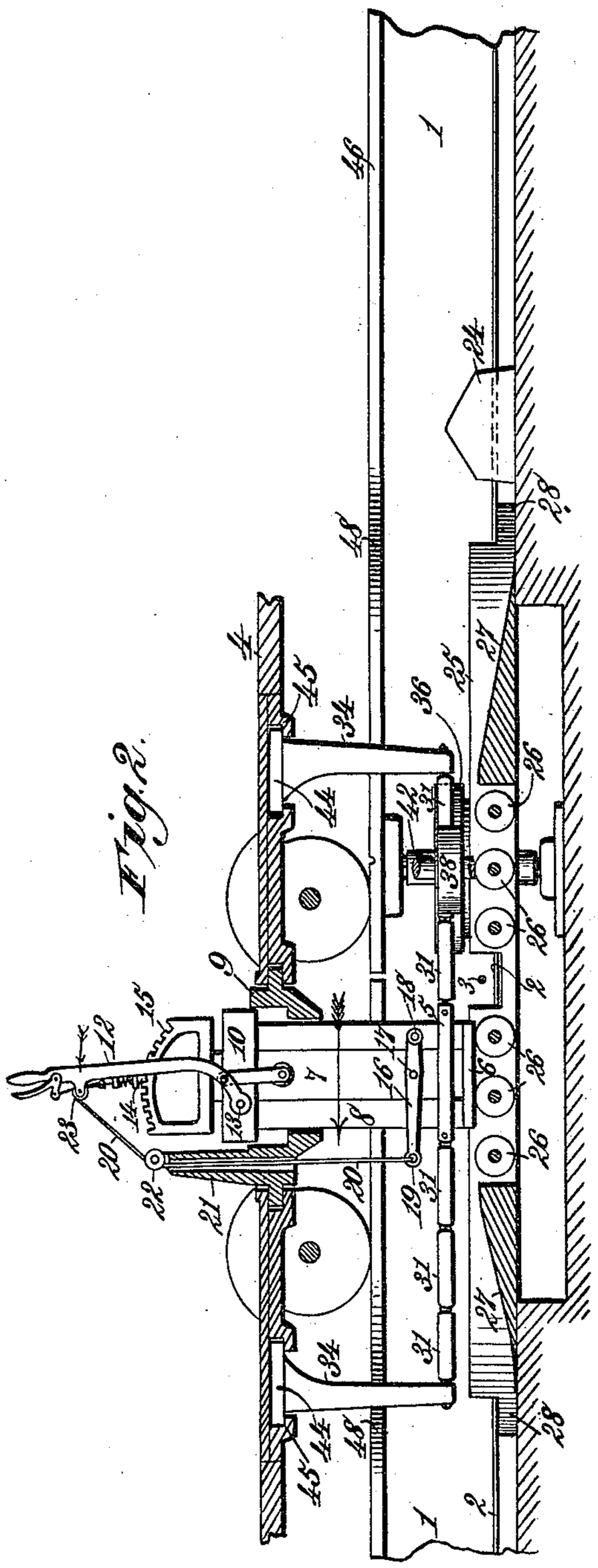


Fig. 2.



Witnesses.
Robert Everett.
J. A. Rutherford

Inventor:
Cornelius Bollinger.
By James L. Norris.
Atty.

(No Model.) 3 Sheets—Sheet 2.

C. BOLLINGER.

CABLE RAILWAY AND GRIP THEREFOR.

No. 470,280. Patented Mar. 8, 1892.

Fig. 3.

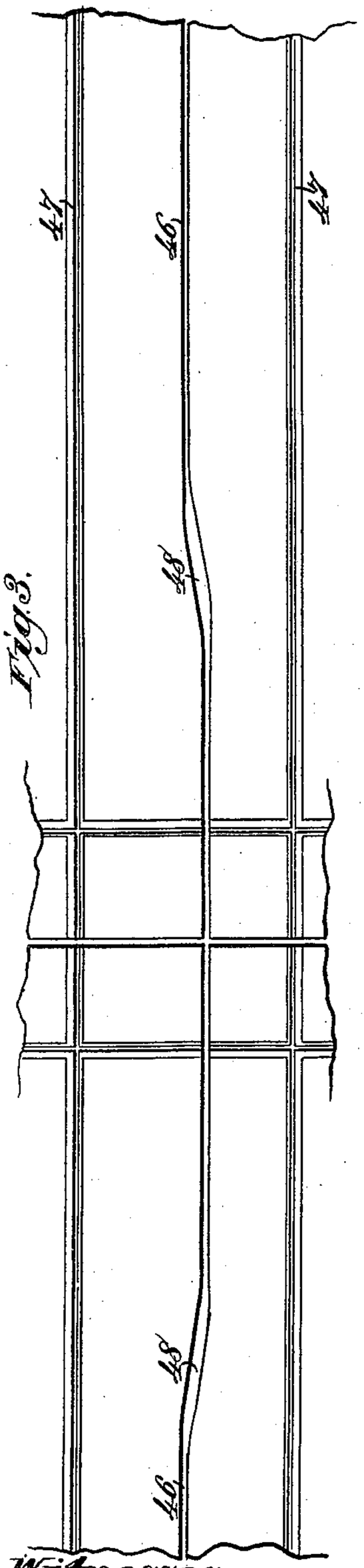


Fig. 4.

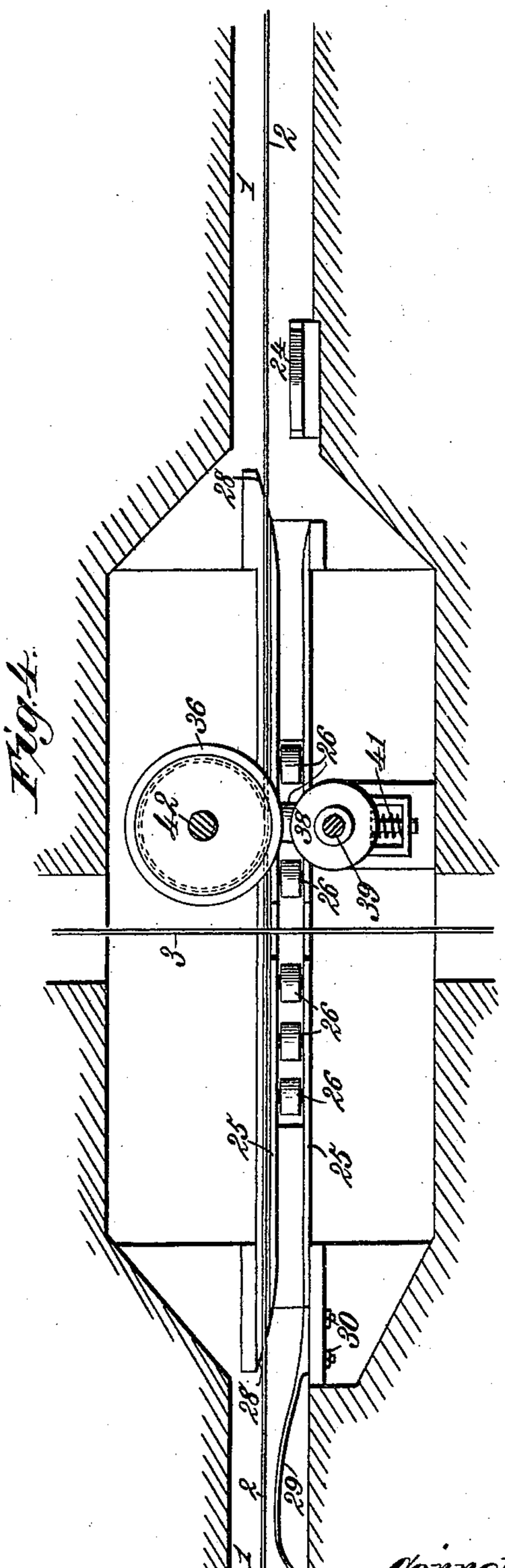


Fig. 6.

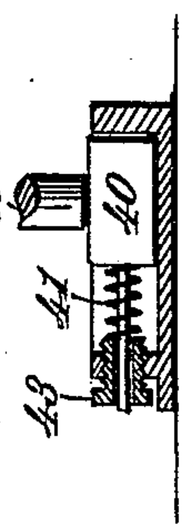
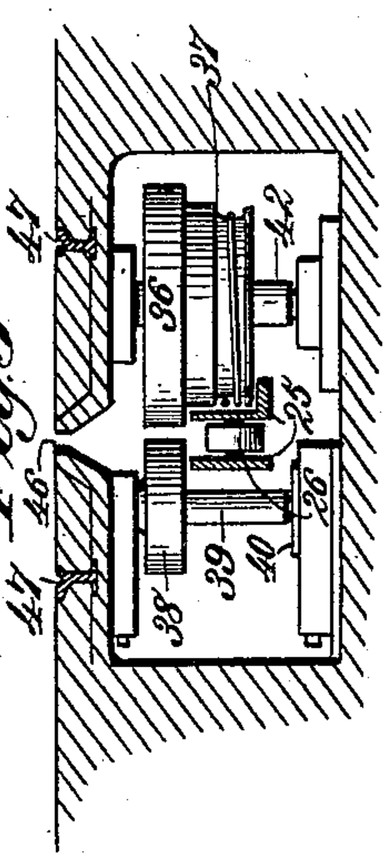


Fig. 5.



Witnesses.
Robert Evuett.
J. A. Rutherford.

Inventor.
Cornelius Bollinger.
By James L. Norris.
Atty.

(No Model.) 3 Sheets—Sheet 3.

C. BOLLINGER.

CABLE RAILWAY AND GRIP THEREFOR.

No. 470,280. Patented Mar. 8, 1892.

Fig. 7.

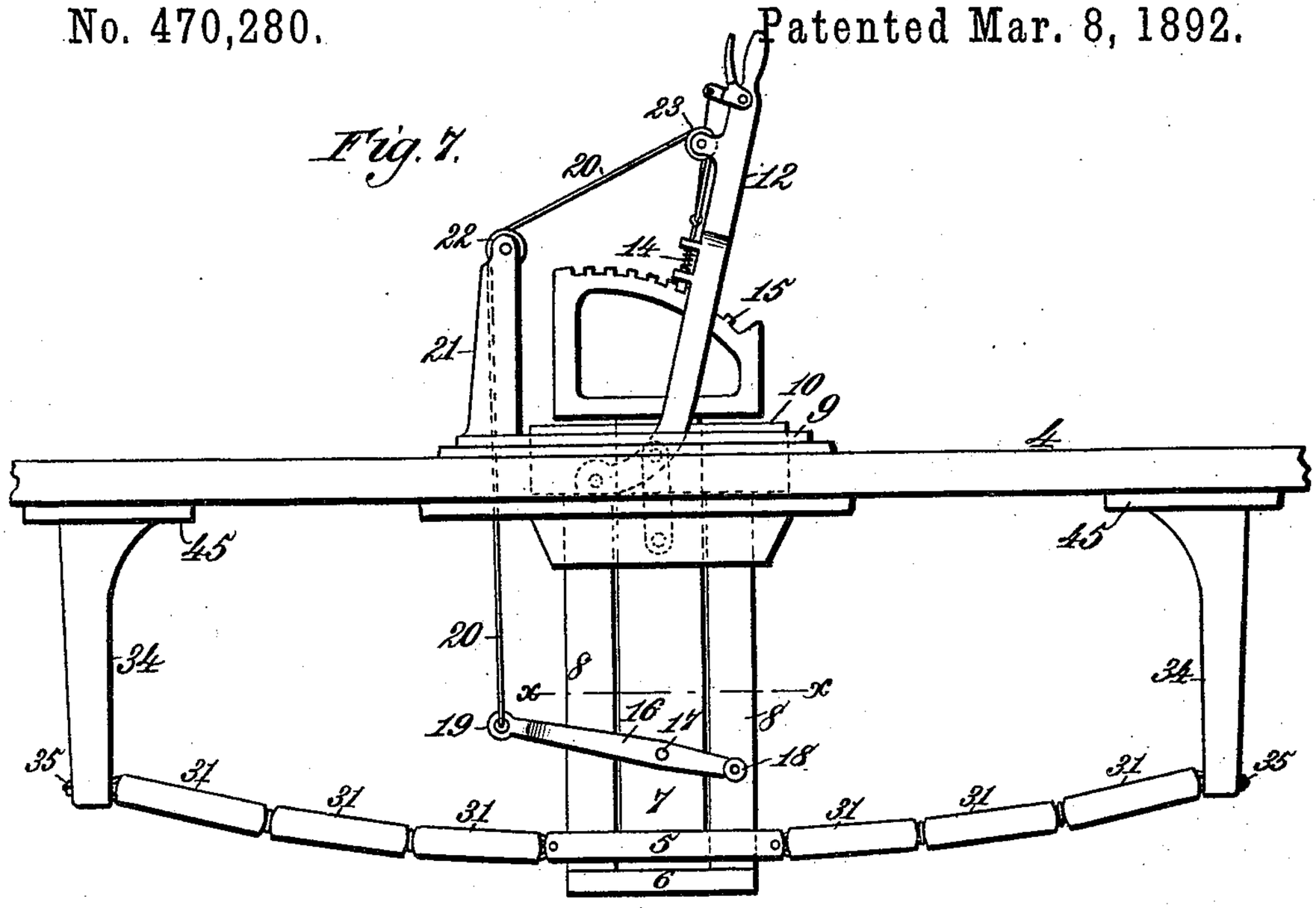


Fig. 8.

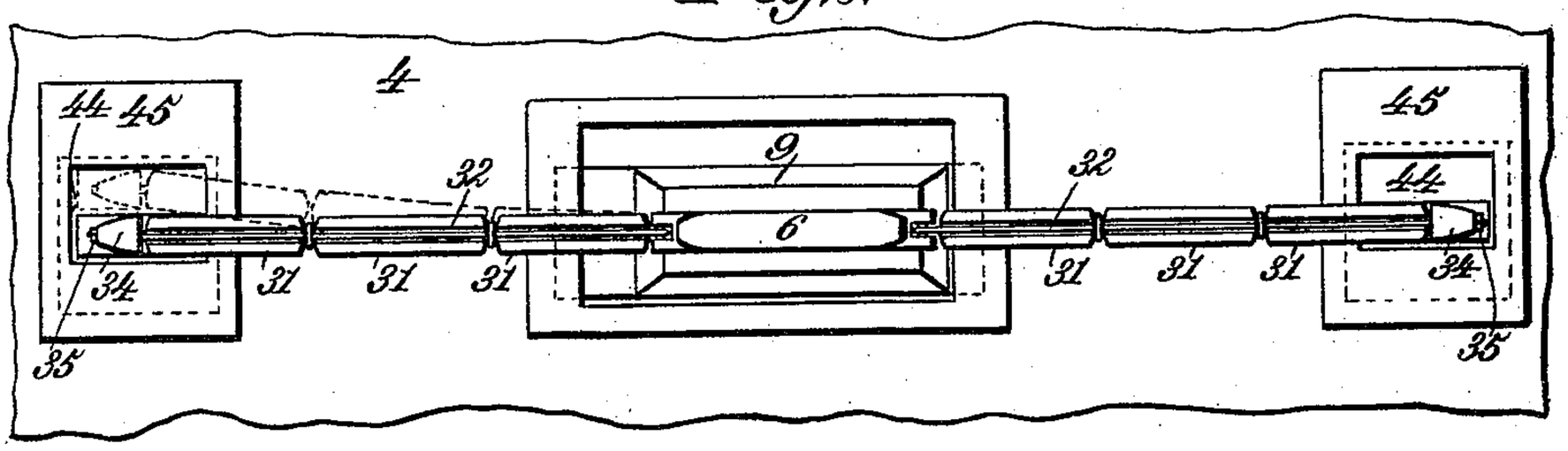


Fig. 9.

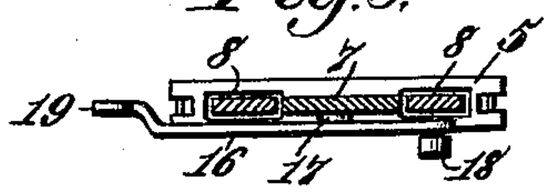


Fig. 10

Witnesses.
Robert Garrett.
J. A. Rutherford

Inventor.
Cornelius Bollinger.
By James L. Norris, Atty.

UNITED STATES PATENT OFFICE.

CORNELIUS BOLLINGER, OF HARRISBURG, PENNSYLVANIA.

CABLE RAILWAY AND GRIP THEREFOR.

SPECIFICATION forming part of Letters Patent No. 470,280, dated March 8, 1892.

Application filed November 6, 1891. Serial No. 411,067. (No model.)

To all whom it may concern:

Be it known that I, CORNELIUS BOLLINGER, a citizen of the United States, residing at Harrisburg, in the county of Dauphin and State of Pennsylvania, have invented new and useful Improvements in Cable Railways and Grips Therefor, of which the following is a specification.

This invention relates to cable railways, and has for its object to provide novel means for automatically releasing the grip from engagement with a traveling cable and lifting and impelling it with the car over a crossing cable.

To accomplish this object my invention involves the features of construction and the combination or arrangement of devices hereinafter described and claimed, reference being made to the accompanying drawings, in which—

Figure 1 is a longitudinal sectional elevation showing sufficient of a cable car and a cable-conduit to illustrate my invention, the parts being in the position where the grip is being operated to release the cable. Fig. 2 is a longitudinal sectional view showing the grip elevated and in transit over a crossing cable. Fig. 3 is a plan view of the trackway to illustrate the form of the slot at a crossing. Fig. 4 is a horizontal sectional view through the cable-conduit at a crossing. Fig. 5 is a transverse vertical sectional view of the same. Fig. 6 is a detail view of a modification hereinafter explained. Fig. 7 is a detail side elevation showing the grip mechanism on a larger scale. Fig. 8 is a bottom plan view of the same. Fig. 9 is a sectional view taken on the line *x x*, Fig. 7; and Fig. 10 is a detail sectional elevation showing a portion of the flexible traction-bar.

In order to enable those skilled in the art to make and use my invention, I will now describe the same in detail, referring to the drawings, where—

The numeral 1 indicates a suitable conduit of any desired construction; 2, a traveling cable; 3, a crossing cable, and 4 a car having a grip to engage the cable 2. The grip is of the type known as "side grip," and comprises a pair of jaws 5 and 6, the jaw 5 being rigidly attached to the vertically-movable plate 7 and the jaw 6 being rigidly secured to a frame 8, which is adapted to bodily rise and fall in a vertical plane, while the plate 7 can be raised or lowered to release or engage the cable 2. The frame 8 is movable vertically in a head-block 9, suitably supported by the car 4 and having a socket to receive the head 10 on such frame. The grip-lever 12 is pivoted at its lower end to the head 10, as at 13, and is provided with a pawl 14 to engage a segmental rack 15, secured to or forming a part of the vertically-movable plate 7. The grip-lever is pivotally connected at one side of its pivot 13 with the plate 7, through the medium of a suitable link, in such manner that when the grip-lever is moved in the direction of the arrow, Figs. 1 and 2, the plate 7 is elevated, and the cable thereby released. A grip-releasing lever 16 is pivoted to the plate 7, as at 17, to form two arms of different length, the short arm having a stud or roller bearing 18, and the long arm having an eye 19 or other device for connecting it with a chain, cord, or other flexible connection 20, which rises through a channel in a tubular post 21 and passes over a suitable guide-pulley 22 to a guide-pulley 23 on the grip-lever. The upper extremity of the cord, chain, or flexible connection is connected with the spring-actuated pawl 14 in such manner that when the short arm of the lever 16 is elevated the chain, cord, or other flexible connection 20 is so operated as to release the pawl 14 from the segmental rack 15 and at the same time pull the grip-lever 12 in the direction of the arrow, Figs. 1 and 2, to lift the plate 7, and thereby release the cable.

The grip-releasing lever 16 is automatically operated to release the grip through the medium of an incline 24, located in the cable-conduit in proximity to a bridging, which is so constructed as to lift the grip and enable it to pass over the crossing cable 3. The bridging is composed of suitable side plates 25, between which is journaled a gang or series of friction-rollers 26, and at each end portion of the side plates is arranged an interposed incline 27, which terminates at its highest point on a level with the uppermost peripheries of the friction-rollers 26. The inclines 27 are adapted to lift the grip in a perpendicular plane; but in order to throw the grip laterally away from the cable 2 after the grip has been released from such cable I pro-

vide one end of the bridging with a lateral incline 28, arranged beneath the cable 2, so that after the grip has been released, as hereinafter explained, the incline 28 will shift the grip laterally away from the cable and the incline 27 will then operate to lift the grip, so that the latter can rest upon and travel over the friction-rollers 26 for the purpose of passing the crossing cable. After the grip has crossed the cable 3 it is essential to restore the grip into such position that it can be re-engaged with the cable 2. To accomplish this I provide the bridging at the end opposite the incline 28 with a laterally-yielding incline 29, which is preferably composed of a leaf-spring bolted at one extremity to the bridging, as at 30, and having its body portion curved toward the cable 2.

In order to draw or impel the car over the bridging for the purpose of crossing one or more cables, such as 3, I provide a flexible traction-bar so connected with the car that when such traction-bar is operated upon by suitable driving mechanism it will draw or impel the car over the bridging and across the cable or cables 3. The traction-bar may be of any construction suitable for the conditions required; but as here illustrated it is composed of a gang of blocks 31, tied together by flexible cables, chains, or ties 32, which connect at their ends with eyebolts 33, secured to the lower ends of suspended arms or supports 34.

The blocks 31 are suitably connected with the grip, and, as here shown, the connection is made with the grip-jaw 5. The eyebolts 33 are adjustable lengthwise, through the medium of screw-nuts 35, for the purpose of placing the traction-bar under more or less tension, according to the conditions required or as occasion may demand.

The blocks 31 are adapted to be operated upon by a driver-wheel 36, having a suitably-constructed hub 37 engaged with and driven by the traveling cable 2. The driver-wheel 36 is constructed with a smooth-surfaced periphery for acting on the traction-bar by friction, and in order to press the traction-bar in contact with the driver-wheel I provide a spring-yielding pressure-wheel 38, which is arranged in the conduit at a point opposite the driver-wheel. The pressure-wheel is secured to a vertical shaft 39, having its upper and lower ends arranged in sliding boxes 40, subject to the action of suitable springs 41, which act to press the shaft in a direction toward the shaft 42 of the driver-wheel. In some instances it may be desirable to vary the tension of the springs 41, and therefore I propose to provide suitable devices to accomplish this object.

In the modification, Fig. 6, I illustrate an adjustable screw-threaded bushing 43, which may be employed to regulate the tension of one of the springs, a similar construction being used for the other spring. I do not, however, confine myself to the employment of adjustable bushings to vary the tension of the springs, as obviously other devices for this purpose will suggest themselves to those skilled in the art.

The suspended arms or supports 34 are provided at their upper ends with head-blocks 44, adapted to slide transversely of the car in suitable bearings 45 for the purpose of rendering the traction-bar susceptible of conforming itself to curves in the conduit, which object is also materially facilitated by reason of the flexible construction of the traction-bar. By connecting the traction-bar with the movable jaw 5 of the grip it will be obvious that when this jaw is elevated to release the cable the central portion of the traction-bar will also be elevated for the purpose of safely moving over the bridge. The jaw 5 is preferably constructed of a slotted metallic plate, through which extend arms comprising the frame 8, as will be understood by reference to Fig. 9, and since the traction-bar connects with opposite ends of this plate and with the suspended arms or supports 34 the grip is materially strengthened and braced against the pressure exerted thereupon in impelling the car.

If the grip is engaged with the cable 2 and the car is traveling on the trackway, as such car approaches a crossing cable the short arm of the grip-releasing lever 16 will be acted on by the incline 24, and consequently the grip-releasing lever will be rocked on its pivot 17 to depress its long arm 19, thereby pulling on the cord, chain, or other flexible connection 20, which has the effect of releasing the spring-pawl 14 from engagement with the segmental rack 15. At the same time the grip-lever 12 is drawn in the direction of the arrow, Figs. 1 and 2, and through the link connection with the plate 7 the latter is lifted for the purpose of releasing the grip from the cable. It will be observed that the chain, cord, or other flexible connection 20 is secured to the long arm of the lever, and that the short arm of the lever is operated by the incline 24. In consequence of this the extremity of the long arm of the lever has a greater range of movement and swings more rapidly than the short arm, so that the spring-pawl 14 is released from the segment 15 in ample time to permit the grip-lever 12 being swung in the direction of the arrow, Figs. 1 and 2, to release the grip. The grip having been released in the manner described, its lower end is shifted laterally by the incline 28 for the purpose of moving the grip out of alignment with the cable 2, and then the grip moves up the incline 27 and rides on the friction-rollers 26 over the crossing cable 3. As the grip leaves the friction-rollers 26 it gradually descends the other incline 27, and then the laterally-yielding incline 29 restores the grip into proper alignment with the cable 2 for its re-engagement therewith. As the car is moving over the crossing cable the traction-bar is operated on by the driver-wheel 36, and consequently the car is drawn or impelled a sufficient distance

to clear the crossing cable, even though the latter be in a portion of the track having an upgrade.

The invention is particularly useful where a car must cross a cable or cables on an upgrade; but it is also useful for level ways or wherever a cable car is to be moved over a crossing cable.

I have merely exhibited a single driver-wheel for acting on the traction-bar, but do not confine myself to any particular number, for obviously the number of driver-wheels will be made to suit the conditions required.

Where more than one crossing cable is to be passed, it may be found desirable to employ two or more driver-wheels for operating on the traction-bar; but all will be driven in the same direction by the cable 2.

I have only exhibited a single-track railway; but where a double-track system is employed the driver-wheel in the conduit for the other track will be suitably operated by the cable 2 to move the car in substantially the same manner as hereinbefore described with reference to the driver-wheel 36.

In ordinary cable railways the grip-slot 46 is centrally between and parallel with the rails 47, and to render the grip susceptible of being shifted laterally by the inclines 28 and 29 I construct the slot with laterally-inclined portions 48, as will be understood by reference to Fig. 3.

The construction and arrangement heretofore described provides simple, efficient, and economical means whereby the cable-car grip is automatically released from engagement with the traveling cable and is lifted and drawn or impelled with the car over a crossing cable or cables.

Having thus described my invention, what I claim is—

1. The combination, with a cable, of a driver-wheel rotated by the movement of the cable, a bridging for a crossing cable, a car having a vertically-movable grip, and a flexible traction-bar moving with the car and acted on by the driver-wheel to move the car over the crossing cable, substantially as described.

2. The combination, with a cable, of a bridging for a crossing cable, a car having a vertically-movable grip, a flexible traction-bar permanently connected with the car, and a driver mechanism for acting on the flexible traction-bar to move the car over the crossing cable, substantially as described.

3. The combination, with a cable, of a bridging for a crossing cable, a car having a vertically-movable grip, a flexible traction-bar connected with the car and grip, and a driver mechanism located wholly below the surface of the track for acting on the traction-bar to move the car over the crossing cable, substantially as described.

4. The combination, with a cable, of a horizontal friction driver-wheel arranged below the surface of the track and rotated by the movement of the cable, a bridging for a crossing cable, a car having a vertically-movable grip, means for automatically releasing the grip, and a flexible traction-bar connected with the car and acted on by the friction driver-wheel after the grip has been automatically released to move the car over the crossing cable, substantially as described.

5. The combination, with a cable, of a horizontal friction driver-wheel rotated by the movement of the cable, a bridging for a crossing cable, a car having a vertically-movable grip, a grip-lever, a grip-releasing lever connected with the grip-lever for swinging the latter in the direction required to release the grip, means for automatically operating the grip-releasing lever, and a flexible traction-bar connected with the car and acted on by the driver-wheel to move the car over the crossing cable, substantially as described.

6. The combination, with a cable, of a bridging for a crossing cable, a car having a vertically-movable grip, means for automatically releasing the grip from engagement with the cable, an incline for shifting the grip laterally out of alignment with the cable, an incline for elevating the grip after it has been shifted laterally, a traction-bar operated on by the driver-wheel to move the car over the crossing cable, and an incline for restoring the grip into position for its re-engagement with the cable, substantially as described.

7. The combination, with a cable and a car having a vertically-movable grip, of a bridging for a crossing cable, having at one end inclines to laterally shift and elevate the grip and at the opposite end a laterally-yielding incline for restoring the grip into position to re-engage the cable, substantially as described.

8. The combination, with a cable and a cable-conduit, of a bridging for a crossing cable, a vertically-movable grip comprising two gripping-jaws, a grip-lever having a pawl, a guide supported in proximity to the grip-lever, a double-armed lever pivoted to the grip, a flexible connection passing over the guide and connected with the grip-lever, the pawl, and the double-armed lever, and an incline in the cable-conduit for acting on the double-armed lever to so operate the flexible connection as to release the pawl and swing the grip-lever in the direction required to release the grip, substantially as described.

9. The combination, with a cable, a bridging for a crossing cable, and a car having a vertically-movable grip, of a flexible traction-bar having its opposite extremities provided with supports which move transversely in bearings on the car, and a driver mechanism for operating on the traction-bar to move the car over the crossing cable, substantially as described.

10. The combination, with a cable and a bridging for a crossing cable, of a car having a vertically-movable grip, a traction-bar having a flexible connection at its extremities with the car, and driver mechanism for acting

on the traction-bar to move the car over the crossing cable, substantially as described.

11. The combination, with a cable car having a vertically-movable grip and means for automatically releasing the grip, of a bridging for a crossing cable, having a gang of friction-rollers on which the grip rides, means for laterally shifting and elevating the grip after it has been automatically released, and means for restoring the grip into position for its re-engagement with the cable, substantially as described.

12. The combination of a car having a grip, a traction-bar connected with the car, means for placing the traction-bar under more or less tension, and a driving mechanism arranged in the conduit for acting on the traction-bar to draw or impel the car, substantially as described.

13. The combination, with a car having a grip, of a traction-bar connected with a part of the car, a driver-wheel for acting on the traction-bar, a spring-yielding pressure-wheel for pressing the traction-bar against the driver-wheel, and mechanism for varying the tension of the spring which acts on the pressure-wheel, substantially as described.

In testimony whereof I have hereunto set my hand and affixed my seal in presence of two subscribing witnesses.

CORNELIUS BOLLINGER. [L. S.]

Witnesses:

ALBERT H. NORRIS,

JAMES A. RUTHERFORD.