No. 639,934. Patented Dec. 26, 1899.

F. S. REEDER.

EXCAVATOR.

(Application filed June 21, 1899.)

(No Model.) 5 Sheets—Sheet 1.

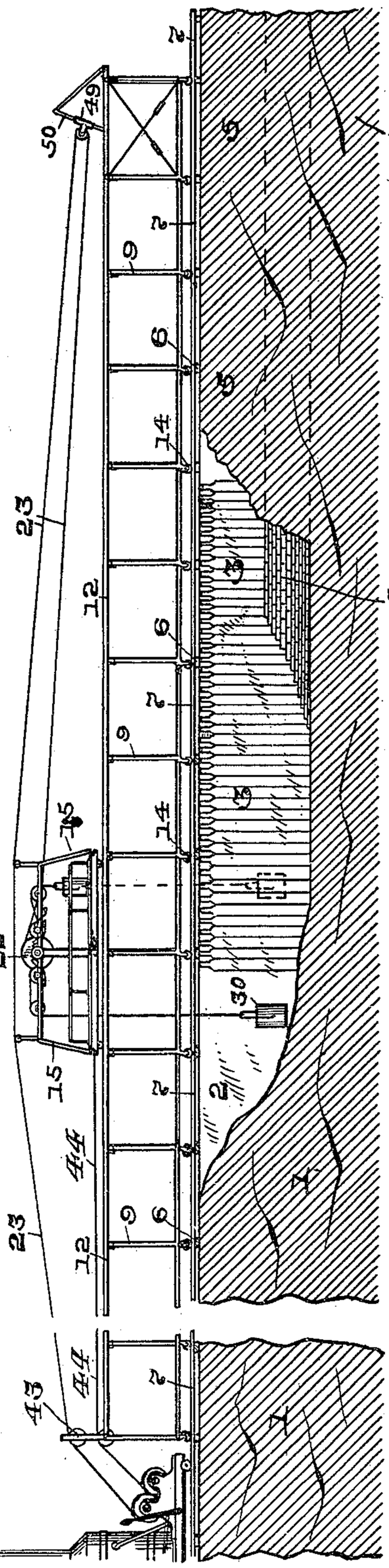

Fig. 1.

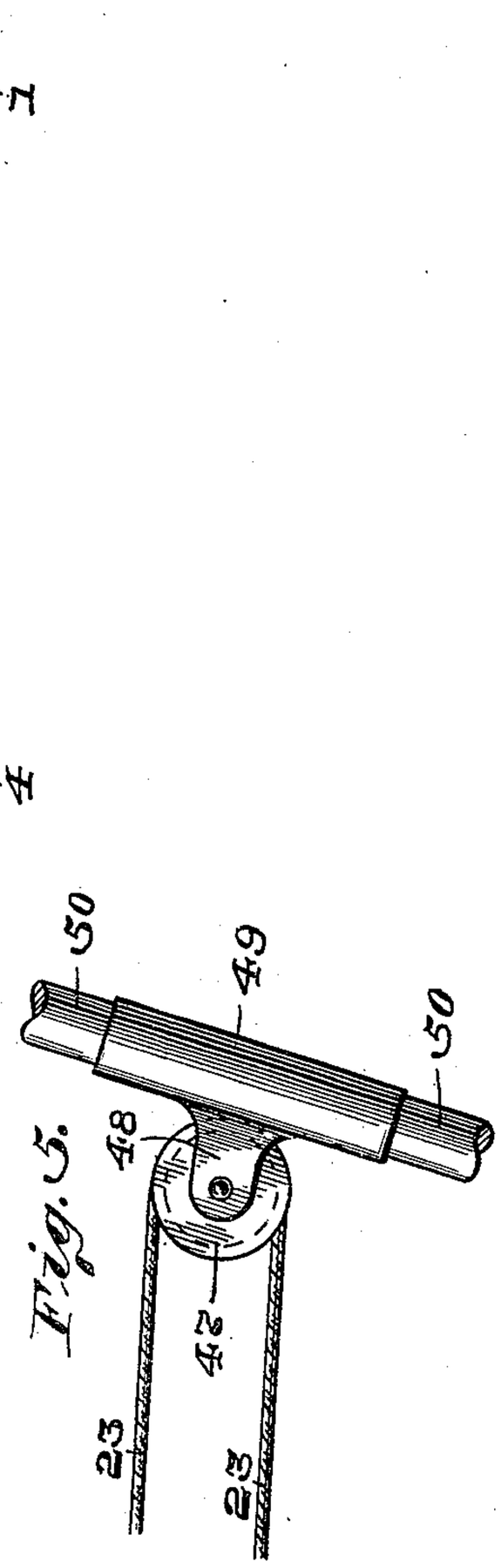

Fig. 5.

WITNESSES:

Mabel Goory

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(No Model.) 5 Sheets—Sheet 2.

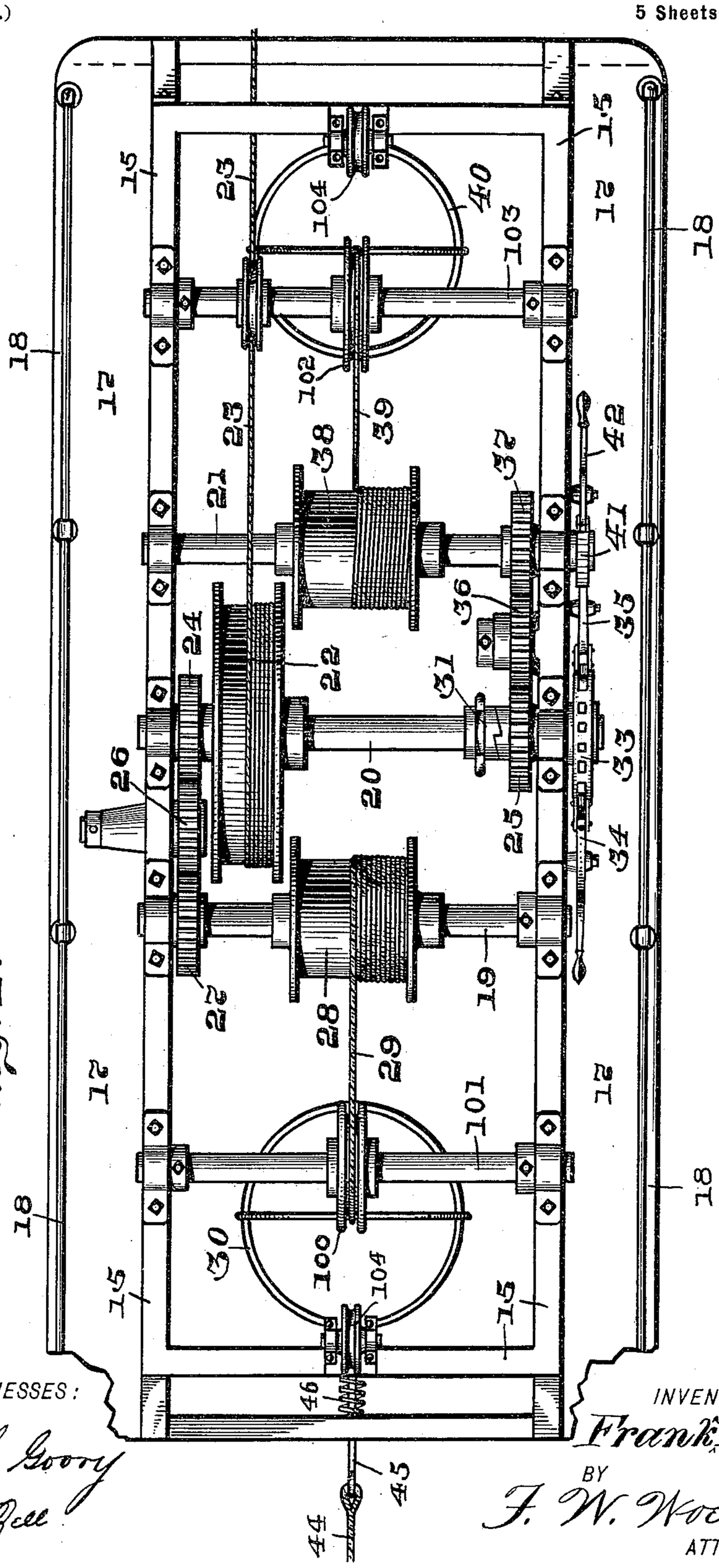

Fig. 2.

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(No Model.) 5 Sheets—Sheet 3.

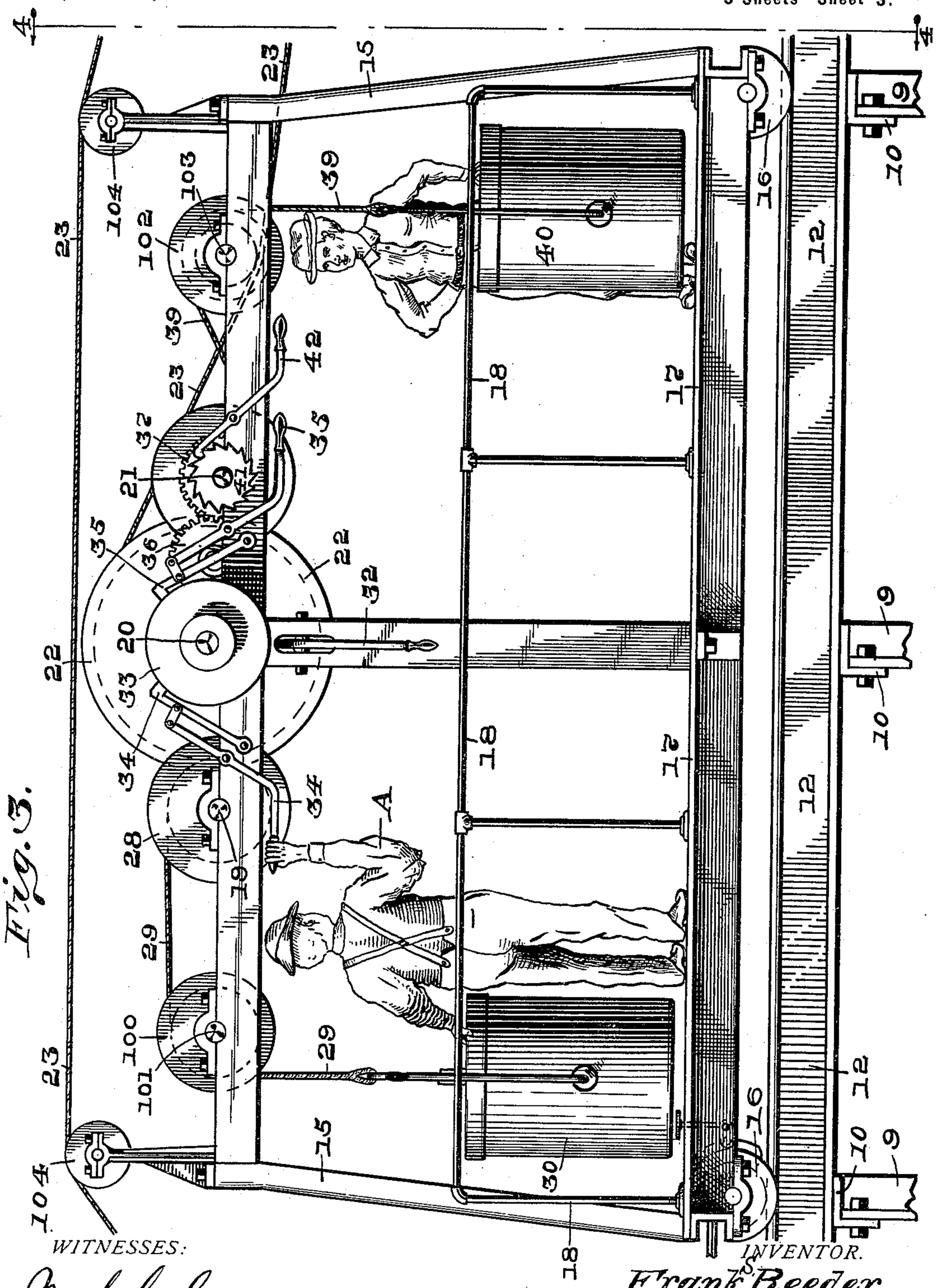

Fig. 3.

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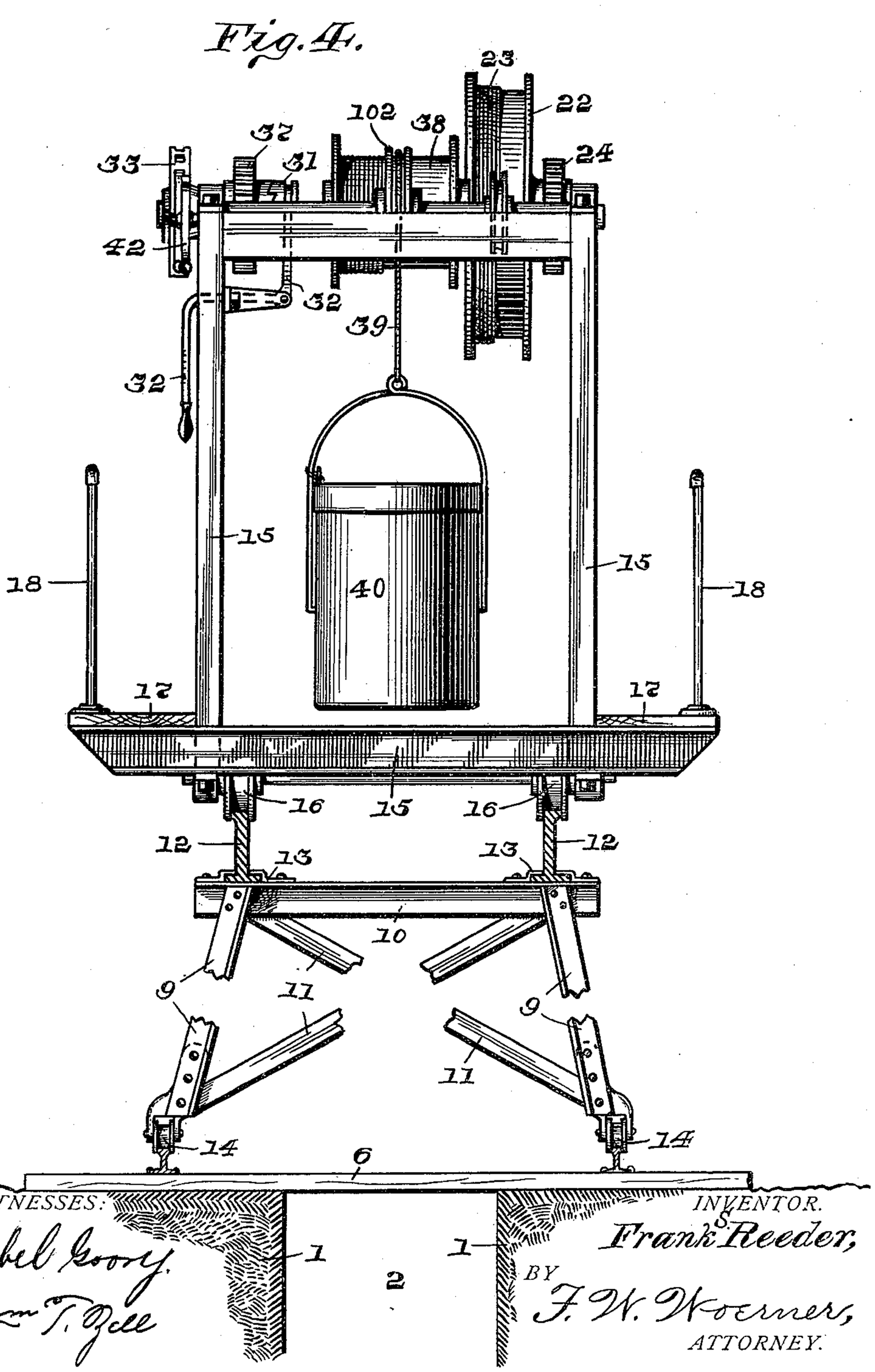
(No Model.) 5 Sheets—Sheet 4.

Fig. 4.



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(Application filed June 21, 1899.)

(No Model.)

5 Sheets—Sheet 5.

Fig. 6.

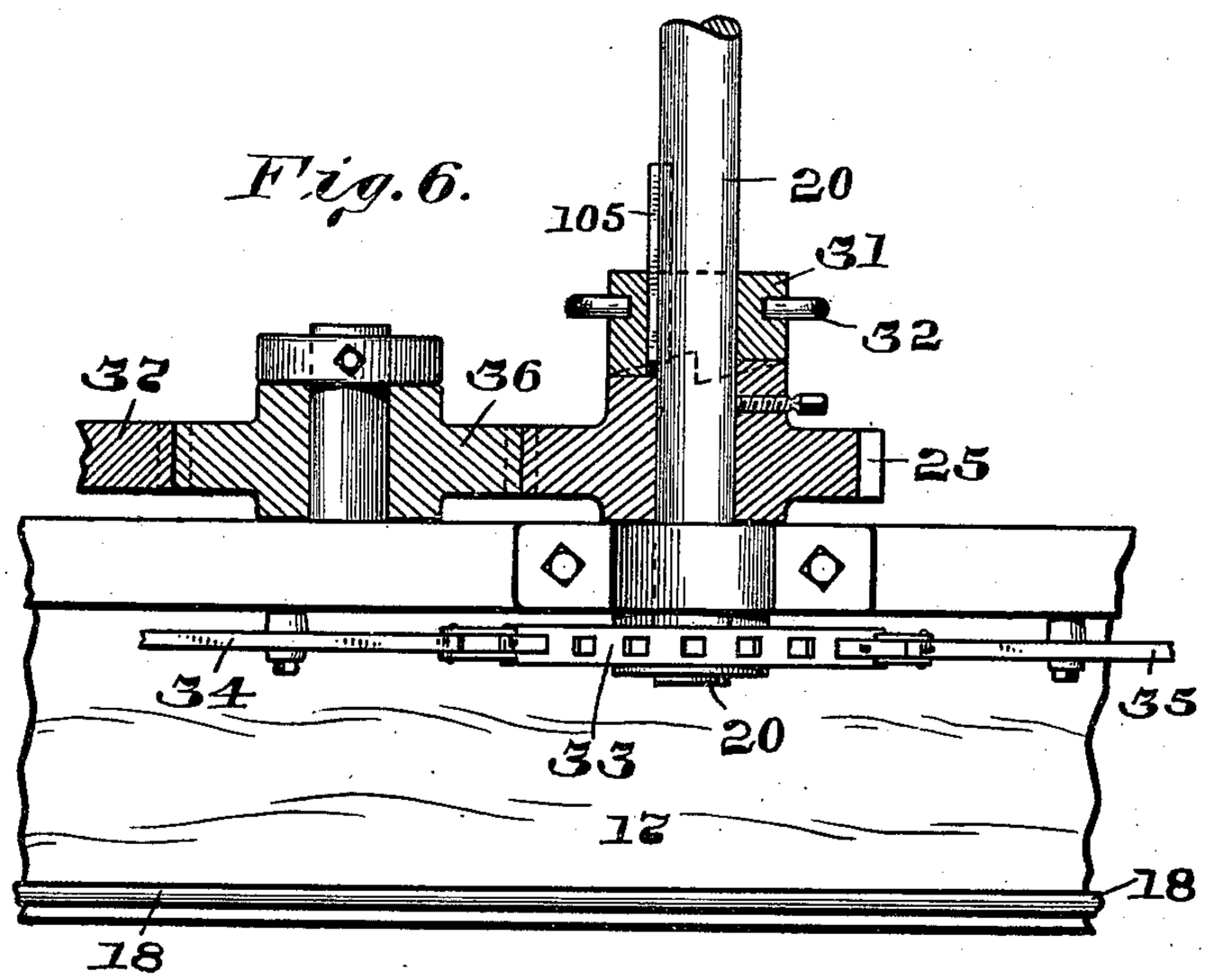
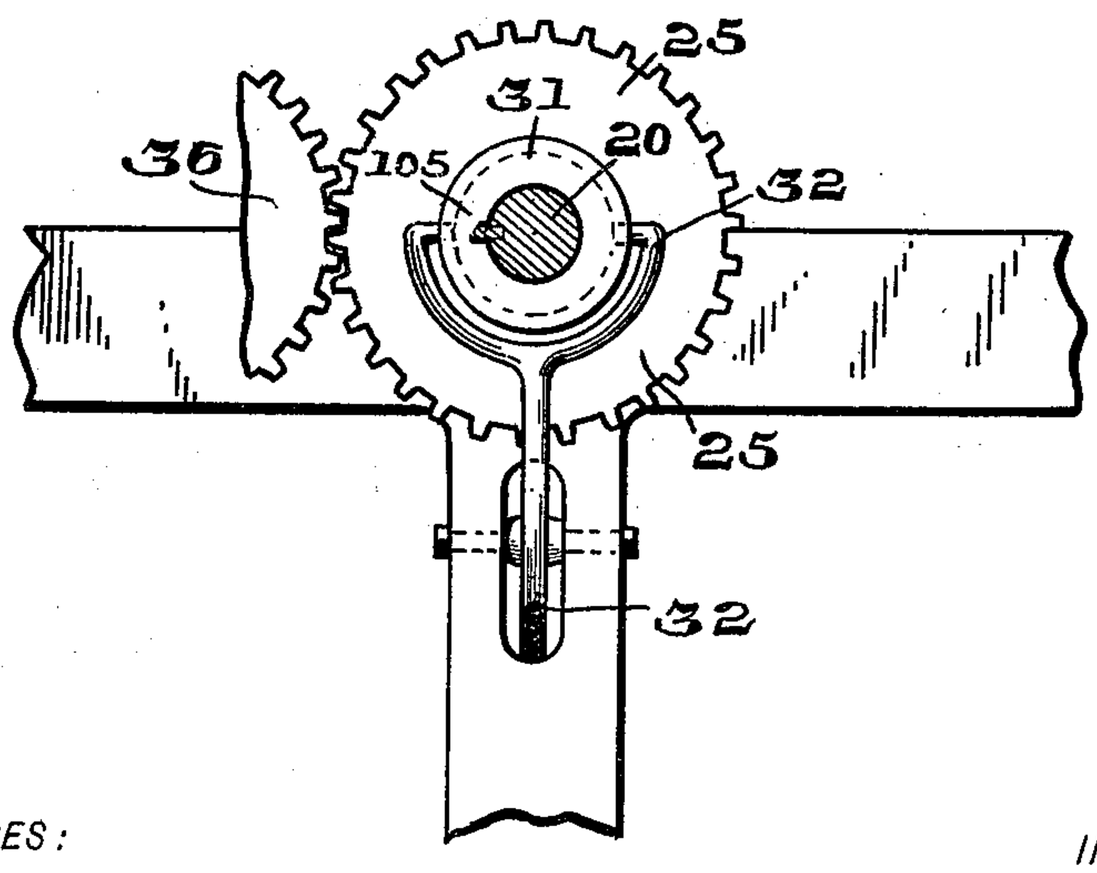


Fig. 7.



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UNITED STATES PATENT OFFICE.

FRANK S. REEDER, OF INDIANAPOLIS, INDIANA.

EXCAVATOR.

SPECIFICATION forming part of Letters Patent No. 639,934, dated December 26, 1899.

Application filed June 21, 1899. Serial No. 721,319. (No model.)

To all whom it may concern:

Be it known that I, FRANK S. REEDER, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Excavators, of which the following is a specification.

The object of my invention is to produce an excavating-machine to be used in the construction of sewers, in which a railroad is laid on the ground-surface and a portable elevated track mounted on wheels to run on said ground-track. The elevated structural work is made of structural iron, such as channel or angle iron. Mounted on the elevated track is a movable carriage which has suitable mechanism for carrying the buckets that are used in conveying the dirt or earth. The car is moved backward or forward and the buckets raised and lowered by means of cables which are connected to an engine that propels the machine, and all are under perfect control of the operator. The use of an elevated road and a movable carriage in sewer-building is well known, for it requires but one handling of the dirt by taking the dirt at the point of excavating and carries it back to the rear of the completed brickwork of the sewer. In my machine I carry two buckets—that is, two buckets of dirt may be conveniently and simultaneously handled. The main object of my invention, however, is to produce a two-bucket machine that can instantly be converted into a one-bucket machine. This is a feature that has never been accomplished in any other machine and is invaluable during certain periods in the construction of a sewer, where a one-bucket will save more time and produce better results than a two-bucket machine—the density of the soil, for instance, where the machine can handle more dirt than can be excavated. These points will be hereinafter more particularly described.

It will be readily understood that the space in a sewer is necessarily limited, and consequently only a limited number of men can be employed. Therefore the interference with the workman must be reduced to minimum in order to produce profitable results. By examining Fig. 1 it will be seen that the structural work is made of upright standards. The space between these standards mark the sections, which is about eight feet. The carriage being designed to cover two sections, the buckets will hang about central to the section. It will be seen that when the carriage stops over any section its trucks will be directly over the standards of the elevated structure, and during the raising of the buckets the strain will be placed directly on the standards. Each section has a bucket, and there are two men to the bucket. During the excavating of hard material the carriage may move to a section in which only one bucket is filled. Now in machines of other construction the carriage must wait for the other bucket or move to another section, for if they desired to raise the one bucket which is filled there would be an interference with the other men, for, as before stated, there are always two buckets on the machine and which must be lowered before the others can be taken. The shovelers always take care of the empty or descending buckets and arrange the placing of the same, and it will be readily seen that a machine that can be instantly converted into a one-bucket machine can be economically used, in which one bucket is left hanging on the machine while the other is lowered and the full one taken out.

In sewer-excavating the breadth and width are approximately made by the first excavators. Immediately following the first excavators come the "sheeters," who sheet the sides of the sewer, which prevents the dirt from caving. Following the sheeters come the bottom-makers. These men finish and level the bottom for the brickwork, and here is one of the points where my invention is most applicable. The bottom-makers use but one bucket, as the excavation is not sufficient for a greater number. However, it requires as much time to get their bucket as it would to get two, and in other machines it requires more time where you interfere with the workman in advance of the bottom-makers during the process of getting their bucket. The bottom-makers are always in the section to the rear of the sheeters, and as the carriage covers the two sections it would cause an interference with the sheeters during the time of getting the bottom-makers' bucket. If the carriage was run backward or forward a section, the same difficulty would be encountered

by interfering with the excavators in front or the brick-masons in the rear. To obviate these difficulties is the object of this invention, by being able to convert a two-bucket machine into a one-bucket machine as contingencies may arise, and which will be readily understood by men skilled in the art of sewer construction. The mechanism employed to bring about these results and the different stages where the adaptability of my invention will be most marked will be hereinafter more particularly described and then pointed out in the claims.

Referring to the accompanying drawings, which are made a part hereof and on which similar numerals of reference indicate similar parts, Figure 1 is a side elevation of the upper structure and of the movable carriage and showing the earth through which the sewer passes in section. Fig. 2 is a top or plan view of the carriage on a considerably-enlarged scale. Fig. 3 is a side elevation of the same. Fig. 4 is an end elevation of the carriage and shows in cross-section a portion of the elevated structure as seen when looking in the direction indicated by the arrows on the line 4 4, Fig. 3. Fig. 5 is a detail on an enlarged scale of the adjustable sheave which is mounted on the extreme rear end of the movable elevated track around which the cable passes and which moves the carriage to and fro and for raising and lowering the buckets, all of which will be hereinafter more particularly described. Fig. 6 is a horizontal section of the gears 25 and 36, the main shaft 20 being shown in elevation, and also shows the position of the feather 105 in said shaft; and Fig. 7 is a rear elevation of Fig. 6.

In the drawings, 1 is the dirt or earth; 2, the trench or sewer; 3, the sheeting, and 4 the completed brickwork of the sewer.

5 is that portion of the trench that has been refilled.

6 are cross-ties that are laid on the ground-surface at intervals and on which the rails 7 are secured. The rails 7 are of the well-known variety and are the same as used in railway construction.

8 is the upper structure of the elevated track, being composed of the side standards 9, which are tied together by the braces 10 and 11. Mounted on the upper portion of the structure 8 are the rails 12, which rails are secured to the structure by the plates 13. The elevated track and structure are mounted on the wheels 14, which ride on the ground-rails 7, and is capable of being moved during the progress of the sewer-excavating. The moving of the structure takes place only when the sewer has been completed the length of said structure. It may also be mentioned here that the ground-track is of a predetermined length, as the track is taken up at the rear of the machine and is again laid at the front thereof.

Mounted on the elevated rails 12 of the structure 8 is the carriage 15, which carries the buckets for conveying the dirt. The carriage is rectangular in form and is built of structural iron and is mounted on the wheels 16. The wheels are flanged on each side, which overhang the elevated rails 12, and which reduces the liability of derailing the carriage. The carriage is provided with the running-boards 17 for the carriage-men, and to protect them from being thrown from the car by a sudden lurch or otherwise I have provided the hand-rails 18.

Mounted on the upper structure of the carriage is the mechanism for moving the same as well as for the raising and lowering of the buckets. Central of the carriage are three parallel cross-shafts 19, 20, and 21. The shaft 20 is the main shaft and carries the drum 22, and around which the cable 23 is wound. This cable 23 draws the carriage forward on the elevated track 12, and will be hereinafter more particularly described. The shaft 20 also carries the two gear-wheels 24 and 25. The gear 24 is rigidly secured to the shaft and engages with the idler 26, which idler has a bearing in the framework of the carriage. The idler 26 meshes with the gear-wheel 27 on the shaft 19, and on which shaft the drum 28 is secured. The drum 28 carries the cable 29, which passes over an idler 100 on the cross-shaft 101 and is so situated as to hold the bucket 30, which is attached thereto, central to one of the sewer-sections heretofore described. It will be readily seen that when the main drum 22 is acted upon by the cable 23 and through the shaft 20 and the series of gears 24, 26, and 27, the bucket 30 will be elevated or lowered, as may be desired. The gear-wheel 25 on the other end of the shaft 20 is loosely mounted thereon and is actuated only when it is thrown into engagement with the clutch 31, which clutch is secured to the shaft 20 by means of a feather and is actuated by the hand-lever 32. (See Fig. 4.) The shaft 20 also carries a toothed wheel 33, which engages with the dogs 34 and 35, one of which is mounted on each side thereof. The manner in which they are used will be hereinafter described. As before stated, the gear-wheel 25 is loosely mounted on the main shaft 20 and engages with an idler 36, which in turn engages with the gear 37 on the shaft 21. The shaft 21 is similar to the shaft 19 and carries the drum 38, on which a cable 39 is wound. The cable 39 passes over the idler 102 to the bucket 40, which is hung in the adjacent section similar to the bucket 30. The bucket 40, however, is the one that is left suspended upon the carriage when the machine is converted into a one-bucket machine, which is accomplished by throwing the clutch 31 on the main shaft 20 out of engagement with the loose gear 25. The shaft 21 carries a toothed wheel 41, which wheel engages with the dog 42. The engagement of these parts, however, is only when the machine is converted into a one-bucket machine, when the dog 42, whose outer end terminates into a hand-

lever, is thrown into engagement with the toothed wheel 41 before the clutch 31 is disengaged. It will be readily understood were the clutch 31 disengaged first the bucket 40 would descend immediately. When using two buckets on the machine, the dog 42 is always disengaged from the wheel 41.

I will now describe the dogs 34 and 35, which engage with the toothed wheel 33. By examining Fig. 3 it will be seen that both dogs are engaged with the wheel 33. This occurs when the buckets have been hoisted, as seen in Fig. 3, and the carriage is ready to be hauled backward or brought forward. In the above-mentioned figure the carriage-man is represented by A and has his hand on the dog 34, and when in the act of releasing said dog he signals the engineer, who slacks the main cable 23, which passes over the carriage on the elevated sheaves 104 and around an adjustable sheave on the extreme rear end of the structure 8 (which will be hereinafter described) and back to the carriage and is secured to the main drum 22. The slack on the cable 23 allows the buckets to descend into the trench and simultaneously the cable 23 winds itself around the drum 22. When the empty buckets have been lowered and the filled ones are hooked on the cable and are now ready for hoisting, the carriage-man now throws the dog 34 back into engagement with the toothed wheel 33 and disengages the dog 35. The engineer being signaled, the main cable unwinds, while the cables to which the buckets are secured wind up, and vice versa. During the operation of hoisting the buckets the dog 34 would catch and hold the main shaft, thereby preventing the buckets from falling into the trench should the engine or main cable break. The dog 35 serves the same purpose during the time of lowering the buckets. The buckets having been hoisted into the position as shown in Fig. 3, the dog 35 is thrown into engagement with the wheel 33, which securely locks the main shaft 20, when the stress or tension on the cable 23 compels the carriage to travel backward or from the engine on the elevated track 12.

By examining Fig. 1 it will be seen that the engine is mounted on trucks and is capable of being moved forward on the ground-track as the sewer progresses in the same manner as the elevated structure 8. The engine is of an old and well-known variety and carries two drums. On one of the drums the main cable 23 winds and passes over a sheave 43, secured to standards on the front end of the elevated structure 8 and passes over the carriage and to the rear end of the structure 8 and back to the carriage and is wound around the main drum 22 thereon. The winding up of the cable 23 on the drum of the engine is the manner in which the buckets are hoisted and in which the carriage is carried back to the rear end on the structure 8. A second cable 44 is secured to the front end of the carriage by means of a rod 45, having an eye in the outer end thereof. The rod 45 passes through the framework of the carriage and has a nut on the inner end thereof. A spring 46 is interposed between the nut and the frame, which allows the rod 45 longitudinal motion, which has a tendency to lessen the sudden stress placed on the carriage by the cables. The cable 44 is wound around a second drum on the engine, whereby the carriage is brought forward, and during said operation the cable 23 unwinds.

In Fig. 5 I have shown in detail my adjustable sheave. The sheave consists of a small grooved wheel 47, mounted between standards 48, which are integral with the hollow sleeve 49. A vertical rod 50, which is secured to the elevated structure 8, passes through the sleeve 49. The rod is mounted in an oblique manner, slightly slanting toward the rear. The object of mounting my sheave in an adjustable manner is as the carriage advances toward the rear end of the elevated structure 8 the sheave rises on the upright rod 50 and descends as the car recedes therefrom. This relieves the tension on the cable caused by acute angles should the car advance too near the extreme rear end of the elevated track.

Having thus fully described my said invention, what I desire to secure by Letters Patent is—

1. In an excavating-machine, in combination with a ground-track having an elevated structure carrying an elevated track thereon and adapted to be moved on said ground-track, a carriage adapted to run on the elevated structure, a series of simultaneously-operating cross-shafts mounted in bearings in the upper framework of the carriage, a gear-wheel mounted on each end of the main shaft, one of which is rigidly secured to the shaft while the other is loosely mounted thereon, a clutch secured to the said shaft by means of a feather, a hand-lever pivotally secured to the framework of the carriage and engages with the clutch, whereby said clutch is thrown into engagement with the loose gear on the main shaft, secondary parallel shafts carrying drums which carry the cables for the buckets, gear-wheels rigidly secured to the secondary shafts, idlers interposed between the secondary shafts, and the main shaft, and through which gears motion is imparted to the secondary shafts, substantially as shown and for the purposes set forth.

2. In a trench-machine, in combination with a movable carriage, a series of shafts having bearings in the framework of the carriage, the main one of which carries a gear on each end thereof, one of said gears being rigidly secured to said shaft while the other is loosely mounted thereon and carries an integral ratchet-face which forms the portion of a clutch, a clutch proper mounted on said shaft and adapted to slide longitudinally thereon by means of a feather, a crank pivotally se-

cured to the framework of the carriage, one end of which terminates into a hand-lever, while the other engages with the slidable clutch and through which motion is imparted to said loose gear, substantially as shown and for the purposes set forth.

3. In a trench-machine, in combination with a movable carriage carrying a series of simultaneously-operating cross-shafts which are mounted in the upper structure of the carriage, a clutch secured to the main shaft in an adjustable manner and which engages with a gear mounted thereon, said gear engaging with a series of gears one of which is rigidly secured to a secondary shaft whereby said shaft is operated at will, a drum secured to the secondary shaft to which a cable is attached, a bucket attached to said cable whereby said bucket is operated, a toothed wheel rigidly secured to the outer end of the secondary shaft, a dog pivotally secured to the framework of the carriage and adapted to engage with the toothed wheel when said shaft is not in use, substantially as described and for the purposes set forth.

4. In a trench-machine, in combination with a movable carriage carrying a series of simultaneously-operating parallel shafts which have a bearing in the framework of the carriage, a gear-wheel loosely mounted on the main shaft, a clutch secured to the main shaft in an adjustable manner, and adapted to engage with the loose gear, a secondary shaft having a gear-wheel rigidly secured thereto, an idler having a bearing in the framework of the carriage, interposed between the gear on the secondary and the loose gear, and through which motion is imparted to the secondary shaft when the clutch on the main shaft engages with the loose gear, substantially as shown and described.

5. In a trench-machine, in combination with a movable carriage having a series of shafts mounted therein, the said series of shafts consisting of a main shaft, and a pair of secondary shafts mounted in a parallel manner therewith one of which is mounted on each side of said main shaft, a gear loosely mounted on the main shaft which engages with a clutch whereby one of the secondary shafts may be disconnected from the main shaft, a toothed wheel secured to one end of the main shaft, a dog mounted on each side of the wheel and adapted to engage therewith, the said dog being pivotally secured to the framework of the carriage and adapted to be thrown into engagement with the toothed wheel, substantially as described and for the purposes specified.

6. In an excavating-machine, in combination with a movable structure carrying an elevated track, an upright standard rigidly secured near the extreme rear end of said structure, a sleeve adapted to be moved in a vertical manner on said standard, a sheave mounted between standards which are integral with the sleeve and adapted to slide therewith, substantially as shown and for the purposes set forth.

In witness whereof I have hereunto set my hand and seal, at Indianapolis, Indiana, this 8th day of May, A. D. 1899.

FRANK S. REEDER. [L. S.]

Witnesses:
WM. T. ZELL,
F. W. WOERNER.