(No Model.) 2 Sheets—Sheet 1.

T. F. MOORE.

HOISTING AND CONVEYING APPARATUS.

No. 524,502. Patented Aug. 14, 1894.

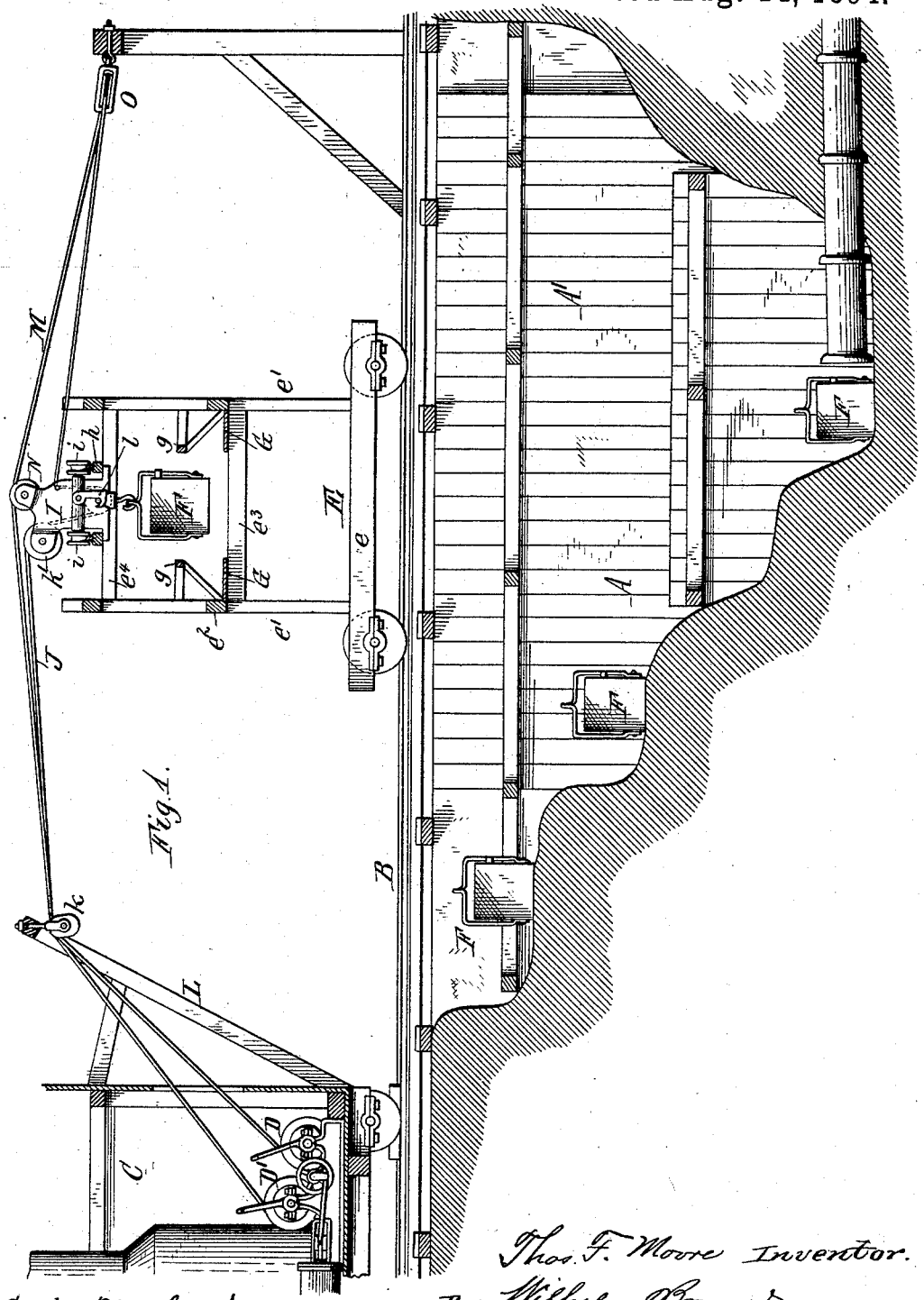

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

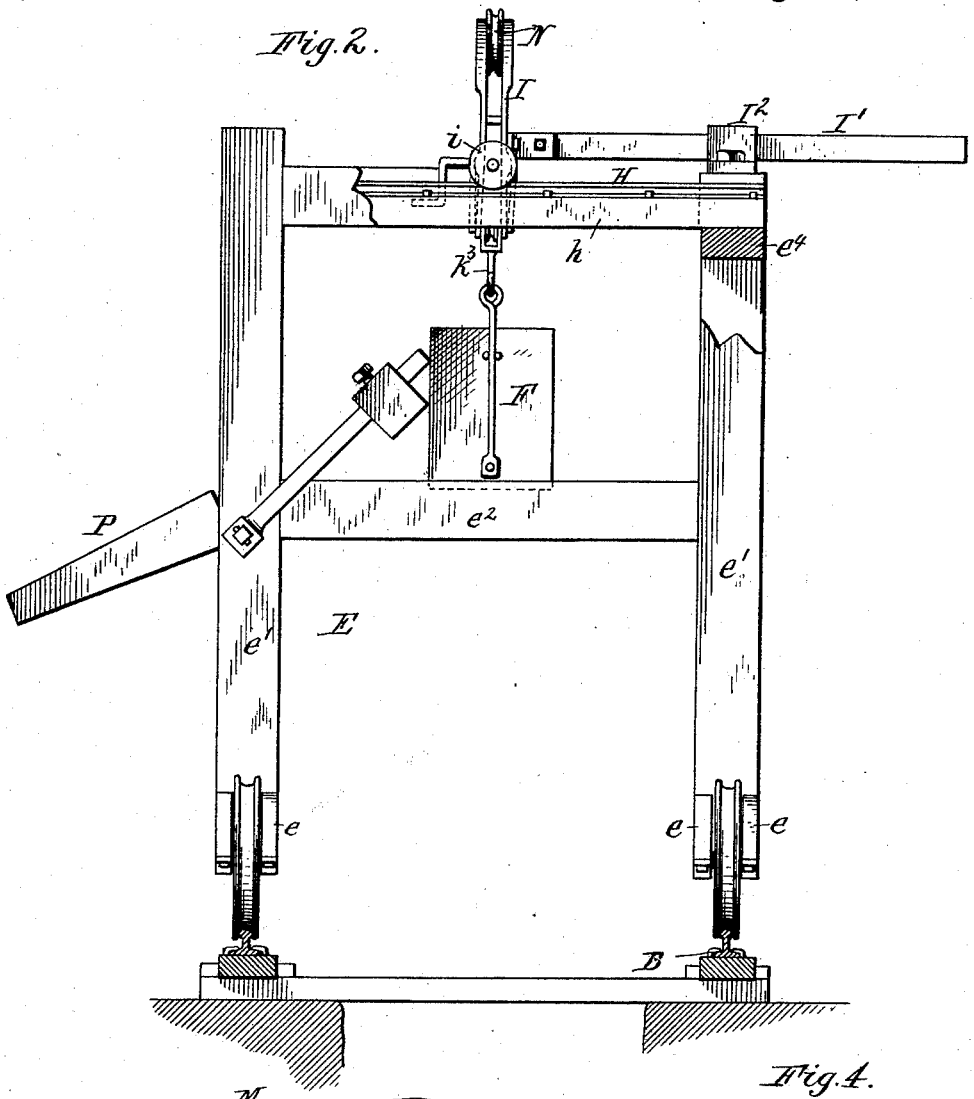


Fig. 3.

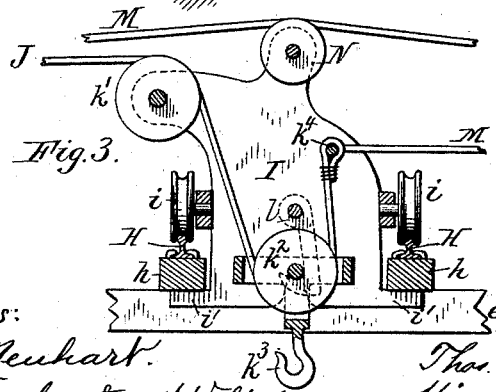
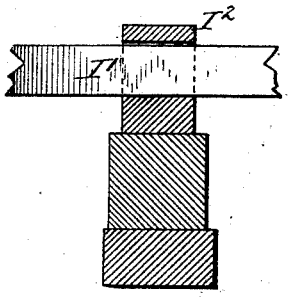


Fig. 4.



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UNITED STATES PATENT OFFICE.

THOMAS F. MOORE, OF BUFFALO, NEW YORK.

HOISTING AND CONVEYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 524,502, dated August 14, 1894.

Application filed November 20, 1891. Serial No. 412,478. (No model.)

To all whom it may concern:

Be it known that I, THOMAS F. MOORE, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Hoisting and Conveying Apparatus, of which the following is a specification.

This invention relates more especially to that class of excavating apparatus which is employed in digging sewer-trenches and in which the earth removed from the front or advancing portion of the trench is conveyed to the rear portion of the trench for refilling the same as fast as the sewer work is finished.

Prior to my invention conveyer-carriages for the hoisting buckets have been run from end to end of the trench on elevated tracks supported upon movable trestles which are shifted as the work progresses. Such trestles constitute an expensive part of the apparatus and as they span the trench at short intervals they form obstructions which interfere in a measure with the workingmen. It has also been proposed to run a power-house or engine and boiler together with the hoisting mechanism back and forth over the trench, but this plan is objectionable because of the large amount of power required to operate the apparatus and because the great weight of the conveyer truck jars the walls of the trench to such an extent as to endanger the stability of the walls and render work in the trench hazardous.

The objects of my invention are to dispense with the trestles heretofore employed and thus reduce the cost of the apparatus, also to so construct the apparatus as not to interfere with the workingmen or the sheeting used for preventing caving in of the walls of the trench, and finally to simplify the tackle for operating the hoisting and conveying mechanism.

In the accompanying drawings consisting of two sheets:—Figure 1 is a sectional elevation of my improved excavating apparatus, showing the same in connection with a sewer in course of construction. Fig. 2 is an end view of the conveyer-car, on an enlarged scale. Fig. 3 is a vertical longitudinal section of the transversely movable carriage mounted upon the conveyer-car. Fig. 4 is a longitudinal section, on an enlarged scale, of the bearing of the carriage-guide.

Like letters of reference refer to like parts in the several figures.

A represents the trench and A′ the usual sheeting for preventing the walls of the trench from caving in.

B are surface tracks arranged on opposite sides of the trench and C is a power-house containing the engine and boiler and which is preferably mounted on wheels which run upon the tracks B, so that the same may be shifted as the work advances,—the power-house or engine being held in place during the operation of the apparatus by blocking its wheels or by other means. The power-house carries, in addition to the engine, two drums or windlasses D D′ which are provided with any suitable or well-known clutch mechanism for throwing them into and out of gear with the engine and with a brake for controlling their motion.

E is a conveyer-car running upon the tracks B and which carries the loaded buckets F to the part of the trench to be filled and returns the empty buckets to the part of the trench in course of excavation. This car consists of double longitudinal side beams *e* between which the supporting wheels are arranged and a raised, open frame consisting of uprights e' connected by cross-bars e^2 and longitudinal bars e^3 e^4. The hoisting bucket, in being raised and lowered, passes through the aperture formed by the open base frame and the raised frame of the car.

Upon the lower longitudinal bars are supported transverse platforms G upon which the attendants stand who dump the hoisting buckets and signal the engineer. The platforms G are provided at a suitable height with guard rails *g* for the safety of the attendants. By elevating the cross-timbers and platforms of the conveyer-car, as shown in the drawings, the car clears the sheeting which usually projects above the trench when the same is started and the danger of the car striking the workingmen in passing back and forth over the trench is also avoided.

H are transverse tracks secured to stringers *h* supported upon the upper longitudinal bars e^4 of the conveyer-car and I is a carriage

running upon the transverse tracks H and which carries the hoisting bucket and permits the same to be moved to one side of the car.

The carriage I consists of parallel upright side plates or frames arranged between the transverse tracks H and provided with grooved wheels *i* which run upon said tracks, the carriage being provided at its front and rear ends with horizontal arbors or journals upon which its wheels are mounted, as shown in Fig. 3. The side frames of the carriage are provided at their lower ends with longitudinal lugs *i'* which bear against the under sides of the stringers *h*, as represented in Figs. 1 and 3. These lugs prevent the carriage from tipping laterally on its transverse rails under the unequal strain of the hoisting and draft cables.

I' represents a guide bar secured to the carriage and sliding in a bearing I^2 secured to the upper portion of the conveying-car.

J is a hoisting rope or cable attached at its front end to the drum D and extending upwardly and rearwardly over a guide block or pulley *k*, thence over a guide wheel *k'* journaled at the front end of the carriage I and thence downwardly and around a vertically movable block or pulley k^2 having a hook k^3 from which the bucket is suspended. The rear end of the cable is fastened to a transverse rod or bar k^4 connecting the side plates of the carriage, as represented in Fig. 3, so that upon winding the cable upon the drum D, the movable pulley k^2 is elevated. The guide block *k* is attached to an overhanging frame L secured to the power-house. The carriage I is provided with a suitable catch which automatically interlocks with the movable pulley k^2 when the same is raised to the proper height, so as to support the pulley and the elevated bucket and relieve the hoisting cable. In the construction represented in the drawings, this automatic catch consists of a pair of gravity hooks *l* depending from the carriage I and which engage under the projecting end portions of the axle of the movable pulley k^2, the lower edges of the hooks being beveled so as to be deflected aside by the projecting pulley axle upon being struck by the same, and the side plates of the carriage being provided in their lower edges with downwardly flaring notches or recesses whereby the axle of the movable pulley is guided into engagement with the gravity hooks. The axle of the movable pulley is made of sufficient length to extend across the lower end of the carriage, so as to bear against the same, when the bucket is hoisted to its extreme height, and act as a stop which limits the further upward movement of the movable pulley.

M is a draft cable for moving the conveying-car rearwardly to the part of the trench which is to be refilled. This cable is attached at its front end to the drum D' and passes thence upwardly and rearwardly through the block *k*, thence over a guide wheel N journaled at the upper end of the carriage I and thence around a guide pulley or block O attached to a post or other stationary support located at the rear end of the trench. From the block O the draft cable passes forwardly to the carriage I to which its rear end is secured.

The operation of the apparatus is as follows:—In the position of the parts represented in Fig. 1, the loaded bucket has been dumped and is ready to be again lowered into the trench. The attendant signals the engineer to shift the conveyer-car over a loaded bucket in the trench, which is done by winding one of the cables upon its drum and unwinding the other cable, according to the direction in which the car is to be moved. The hoisting cable is then wound upon its drum, which raises the movable pulley with the empty bucket clear of the gravity hooks, which latter are moved aside by the attendant. The movable pulley being detached from the gravity hooks, the engineer releases the brake controlling the hoisting drum, thus allowing the hoisting cable to pay out and permitting the empty bucket to descend into the trench, and the attendant in the trench then unhooks the movable pulley from the empty bucket and attaches it to the loaded bucket. The stay cable is next drawn taut to prevent the conveyer-car from moving toward the power-house, and the loaded bucket is hoisted until the axle of the movable pulley is automatically interlocked with the gravity hooks. The elevated load is then conveyed to the part of the trench to be refilled, by winding the cable M upon the drum D' and allowing the hoisting cable to pay out from its drum, and the bucket is then dumped. The conveyer car with the empty bucket is now returned to the front part of the trench over another loaded bucket by winding the hoisting cable upon its drum and allowing the cable M to unwind from its drum and the bucket is lowered into the trench, as before described. The draft of the hoisting cable in drawing the car back to the front part of the trench is transmitted to the car through the guide wheel *k'* and the axle of the movable pulley k^2. The cable J thus serves the double function of hoisting the load and returning the car to the front part of the trench after the load has been dumped, while the cable M performs the double function of holding the car from displacement in hoisting the load and drawing the car to the rear part of the trench after the load has been hoisted. This arrangement of the cables renders the hoisting and draft tackle very simple, and easy of control and adjustment.

When the trench has been excavated up to the power-house, the latter and the post at the rear end of the trench are shifted for excavating another section, and the tracks upon which the power-house and the conveying-car run are extended by using the tracks

which are removed from the filled part of the trench.

By suspending the bucket from the transversely movable carriage I, the same can be moved laterally to one side of the conveyer-car for dumping its contents into wagons for removing the earth. For this purpose the conveyer-car is provided with a pivoted chute P which may be lowered into the position shown in Fig. 2, or be swung up out of the way. This is an important and desirable feature of the apparatus, as it saves reloading into wagons, especially in connection with large sewers, which involves considerable surplus excavation which must be removed.

In my improved apparatus, no trestles or other supports which are required for overhead conveying-tracks are employed, rendering the apparatus much cheaper than apparatus employing such trestles. As the conveying-car carries only the buckets and no heavy parts, such as the engine and boiler, a light car may be used which is moved back and forth over the trench with comparatively little power and which does not jar the walls of the trench like apparatus in which a car carrying the engine and boiler, in addition to the hoisting mechanism, is run over the trench, thus requiring less bracing of the walls of the trench and rendering work in the trench more safe.

The lightness of the conveyer-car permits comparatively light rails, ties and stringers to be employed, rendering the cost of these items considerably less than that of corresponding parts of apparatus in which the power-appliances and the hoisting and conveying tackle, together with the load, are run over the trench, and which require heavy rails and a heavy road bed.

The apparatus herein described and shown is further advantageous in that it does not obstruct traffic at street crossings, as the power-house and the post at the rear end of the trench can be placed on opposite sides of the crossing, the intermediate space being open for the passage of vehicles except when the conveyer-car passes the cross-street which occurs only at intervals.

By elevating the conveyer-car, as shown, and attaching and guiding the draft and hoisting cables on the top of the car, such cables are raised clear of the workmen from end to end of the trench.

I claim as my invention—

1. In a hoisting and conveying apparatus, the combination with tracks arranged lengthwise of the trench to be excavated, of a conveyer car running upon said tracks and provided with an open base frame and an open raised frame, forming an aperture for the passage of the hoisting bucket, a platform arranged on said raised frame adjacent to said aperture, and guide wheels mounted on the raised frame above said platform, and hoisting and draft cables running over said guide wheels respectively, whereby such cables are supported clear of the operator standing upon said platform, substantially as set forth.

2. The combination with the conveying car for the load, of the carriage transversely movable thereon and having a guide wheel, separate drums located at the advancing end of the trench, a guide wheel arranged at the rear end of the trench, a combined hoisting and draft cable attached at its front end to one of said drums, at its rear end to said carriage and running around the guide wheel of the carriage, a vertically movable pulley or fall block suspended from said cable between its fixed rear end and the guide wheel of the carriage, and a combined stay and draft cable attached at its front end to the other drum, at its rear end to the carriage on the conveying car and running around the guide wheel at the rear end of the trench, substantially as set forth.

Witness my hand this 16th day of November, 1891.

THOS. F. MOORE.

Witnesses:
CARL F. GEYER,
ALICE G. CONNELLY.