No. 692,892. Patented Feb. 11, 1902.

W. S. McKINNEY.

EXCAVATOR.

(Application filed Mar. 2, 1901.)

(No Model.) 2 Sheets—Sheet 1.

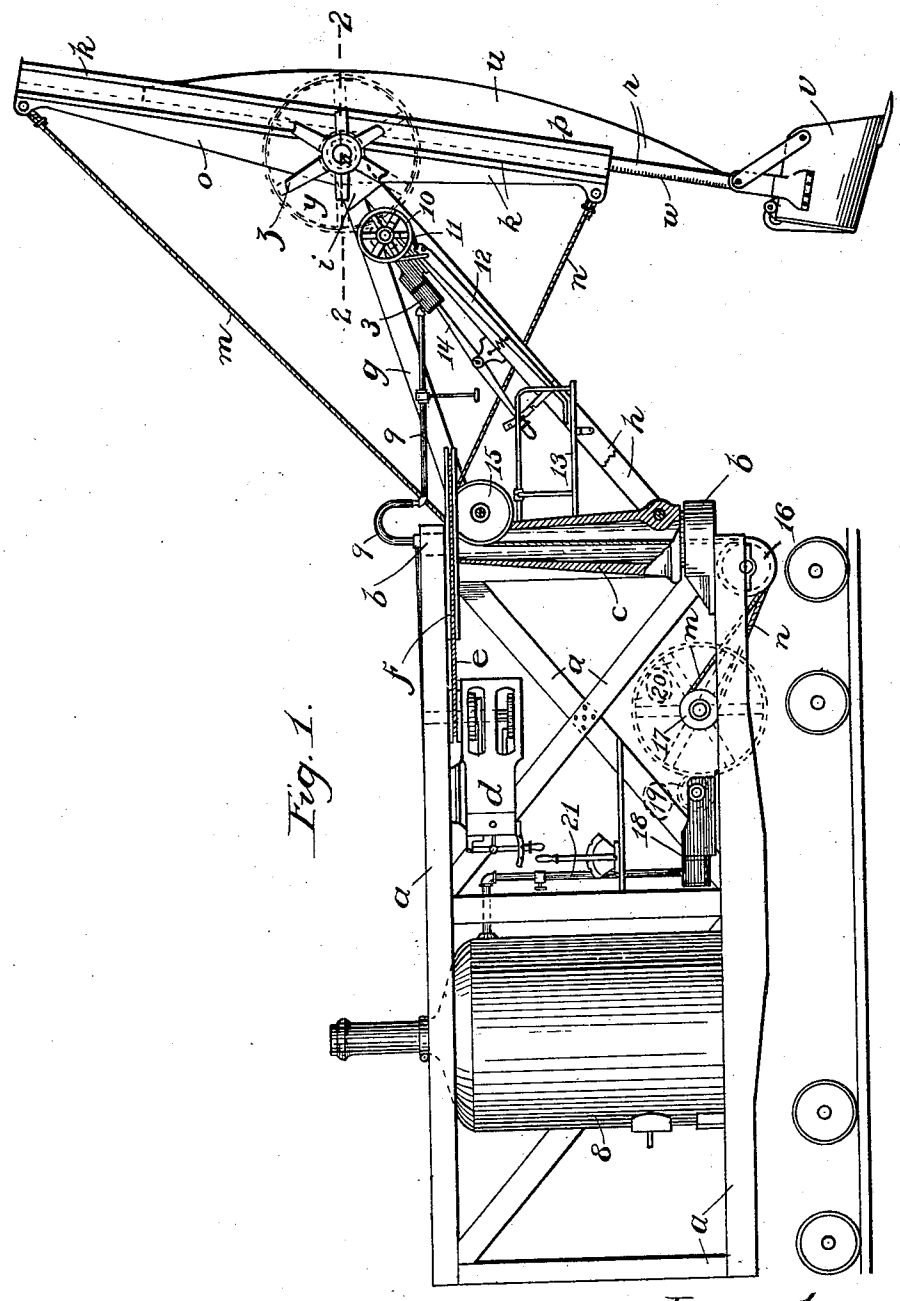

Fig. 1.

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Fig. 3.

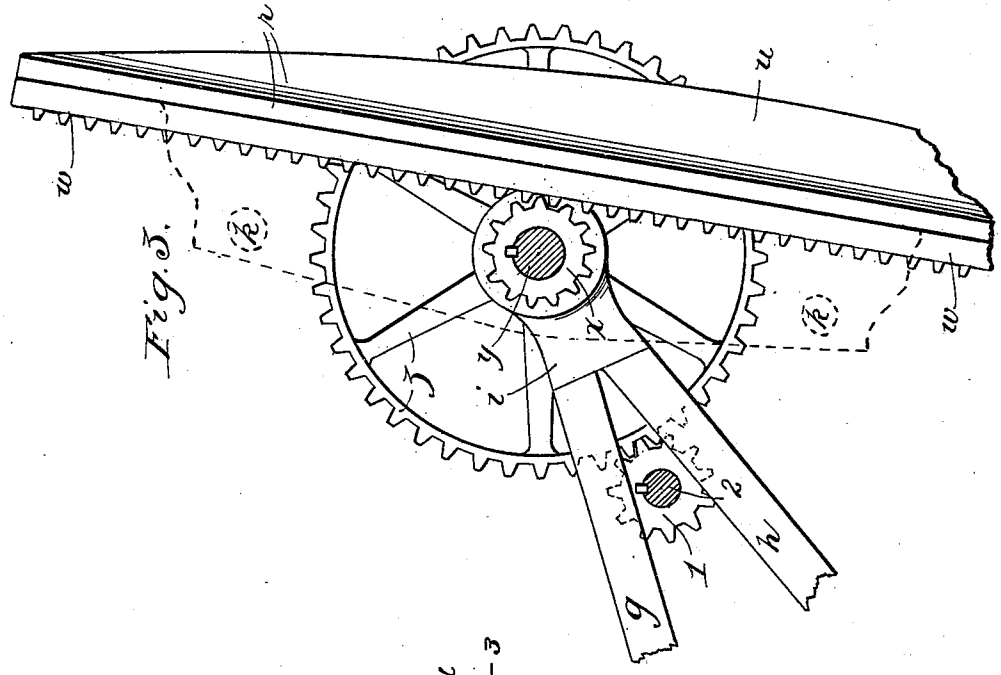
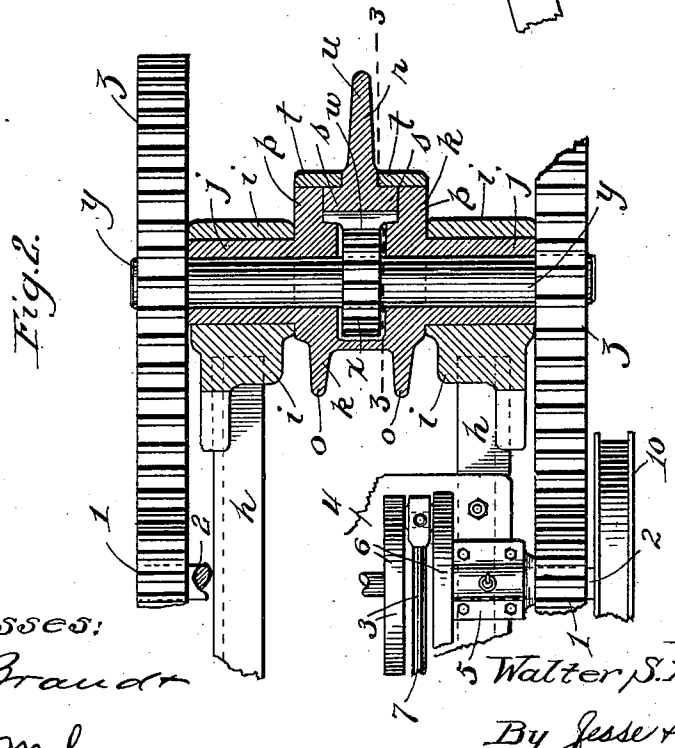


Fig. 2.



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EXCAVATOR.

SPECIFICATION forming part of Letters Patent No. 692,892, dated February 11, 1902.

Application filed March 2, 1901. Serial No. 49,545. (No model.)

To all whom it may concern:

Be it known that I, WALTER S. McKINNEY, a citizen of the United States, residing in the city of Chicago, county of Cook, and State of Illinois, have invented a new and useful Improvement in Excavators, of which the following is a specification.

My invention relates to excavators, more especially of the class employed in dredging, grading for roads and railways, and similar purposes; and the objects of invention are, first, to provide simple and positive-acting means for thrusting the bucket in a downward direction or transverse to the face of the cut independently of the hoisting mechanism; second, to provide a bucket-arm wherein the power-receiving member requires merely a motion of rotation upon the crane or other support whereon said bucket-arm is mounted, and, third, to provide the details hereinafter described. I accomplish these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side view in elevation of an excavator embodying my invention. Fig. 2 is a detail plan view, partly in section, taken on the line 2 2, Fig. 1, showing the construction of the bucket-arm and adjacent parts at the point of support of said arm. Fig. 3 is a detail side elevation of said parts, taken in section on the line 3 3, Fig. 2, the guide member of the bucket-arm being indicated in dotted lines.

Similar characters refer to similar parts throughout the several views.

In the present instance I have shown my device mounted upon a railway-car; but it will be understood that the car and the particular manner of swinging and mounting the crane are not essential features of my invention.

The car *a a* is provided at its forward extremity with bearings *b b* for pivotally supporting the crane-mast *c*. Said mast is rotated and the crane swung laterally by means of the engine *d*, operating through the medium of the cables *e* and swinging circle *f*. The crane, which forms the support for the excavating parts, consists of the upper and lower members *g g* and *h h*, attached, respectively, to the upper and lower portions of the mast *c*. Said members *g* and *h* are secured together in pairs by the nose-castings *i i*, located at the forward extremity of the crane. The nose-castings *i* are bored out transversely to the crane in order to receive and form bearings for the laterally-projecting sleeves or bushings *j j*, which latter constitute a part of and are desirably integral with the guide member *k* of the bucket-arm. Said guide member *k* consists of a beam or lever pivotally supported in said castings *i i*, as above described, and extending in both directions from its point of support. At its upper and lower extremities said guide member *k* has points of attachment for the operating-cables *m* and *n*, respectively, as hereinafter mentioned. The fins *o o* extend along the said guide *k* for strengthening the same.

Extending longitudinally upon the guide *k*, preferably upon the forward portion thereof, are the flanges *p p*, which form a channel or guide for the bucket-handle *r*. The interior surfaces of said flanges *p p* form ways whereon the wings *s s* of said bucket-handle slide. The said wings *s* are held in place in the ways by means of the gibs *t t*, secured to said guide member *k* upon the flanges *p p*. Said bucket-handle is strengthened by the longitudinal fin *u*. At the lower extremity of the said bucket-handle is fastened the excavator-bucket *v*, which may be of any suitable pattern. It is within my conception also to substitute lifting tongs or crabs or other devices in lieu of the said bucket, and said part *r* is referred to as a "bucket-handle" merely for convenience of description. The rear portion of said bucket-handle is toothed to form a rack *w*, which meshes with the gear-pinion *x* for raising and lowering said handle in the guide member *k*. The gear-shaft *y*, whereto said pinion *x* is keyed, is journaled within the guide member *k* in such a manner as to lie concentric with the sleeves or bushings *j j*, above described. Said shaft projects at its extremities beyond the said sleeves or bushings a sufficient distance to carry the gear-wheels *z z*. Said gear-wheels are also keyed to said shaft *y* for driving said pinion *x*. It is desirable that the guide member *k* be chambered to form a housing for said pinion *x*, as shown in Fig. 2, thereby preventing access of dust and foreign matter thereto.

By constructing the sleeves or bushings *j j*

integral with the guide member k, as shown, the shaft y is relieved of the strain due to the weight of said guide member, said weight being carried directly by the nose-castings $i\,i$ of the crane.

The gears $z\,z$ are driven by the pinions 1 1, keyed to the engine-shafts 2 2 of the controlling-engines 3. Said engines 3 are mounted upon the crane in any suitable manner, the present drawings showing the same as having their base-plates 4 bolted to the lower members h of the crane.

In Fig. 2, 5 represents the main bearing, 6 the crank-disks, and 7 the connecting-rod of one of the said controlling-engines. Steam is supplied to the engines 3 from the boiler 8 by way of the piping 9.

In order to more perfectly control the pinion 1, and consequently the position of the bucket-handle r in the guide-member k, the brake-wheel 10 is rigidly secured to the engine-shaft 2. Said wheel is encircled by the brake-band 11, controlled by the brake-lever 12. Said lever is fulcrumed upon the crane and adapted to be operated by the foot of an operator standing upon the platform 13. The engines 3 are controlled by the starting-lever 14.

The rotation of the guide member k, and consequently the inclination of the bucket-arm, is determined by the cables m and n, above mentioned. Near the upper extremity of the crane-mast c are mounted guide-sheaves 15, and in the body of the car a are similarly mounted guide-sheaves 16. Said sheaves are so relatively placed that the operating-cables m and n when trained thereover pass through the hollow mast c and coincide approximately with the axis of rotation of said mast. The cable m extends from the upper extremity of the guide member k over one of the sheaves 15, under one of the sheaves 16, thence over the drum 17 of the hoisting mechanism mounted upon the car a. The cable n extends from the lower extremity of the guide member k over one of the sheaves 15, under one of the sheaves 16, thence under the drum 17 of the hoisting mechanism. Said drum is driven by means of the engine 18 through the agency of the pinion 19 and gear 20, as indicated in dotted lines, Fig. 1. Steam is supplied to said hoisting-engine by the steam-pipe 21, leading from the boiler 8.

In operation the bucket v is lowered into or raised out of the cut, normally to the face thereof, by operating the controlling-engine 3, the motion of said engine in either direction being transmitted to the rack w of the bucket-handle r by means of the gear-wheels 1, z, and x in such a manner as to cause said handle to slide up or down in the guide member k. The thrusting of the bucket in a forward direction about the point of support of the bucket-arm for taking a cut is accomplished by means of the hoisting-engine 18 and connected gearing operating through the medium of the cables m and n. As said cables are wound in opposite directions upon the hoisting-drum 17 and are attached to the bucket-arm on opposite sides of the point of support thereof, the rotation of the drum will cause the paying off of one cable simultaneously with the winding in of the other cable, the result being that the temporarily inactive cable is at all times approximately in a condition to immediately become taut or active upon the reversal of the hoisting-engine—that is to say, there is at no time a considerable amount of excess of cable off the engine-drum. This is an advantage in that it eliminates the danger of the slack cable becoming entangled with other parts of the machine or surrounding obstructions, and, moreover, it obviates waste motion of the hoisting-engine, which would otherwise occur in winding in the slack of the cable.

It is obvious that the cables m and n may be in reality continuous and consist of a single piece, especially when wound over a single hoisting-drum, as shown in the preferred construction.

An important feature of my excavator is its ability to discharge the contents of the bucket at a considerable distance from the crane and at an elevation above the forward and highest point of said crane. This is accomplished by rotating the guide member k to a suitable inclination and simultaneously projecting or sliding the bucket-handle r forward in the guide member k. Projection or retraction of the bucket-handle r is at all times possible, for the reason that the operation of said handle in the guide member k is independent of the hoisting mechanism.

What I claim as new, and desire to secure by Letters Patent, is—

1. In an excavator, the combination of a guide-beam, pivotally supported between its ends, a bucket-handle sliding therein, and power devices attached to said guide-beam on opposite sides of the pivot thereof for rotating said guide-beam.

2. In an excavator, a bucket-arm consisting of a pivotally-supported guide member and a bucket-handle sliding therein, in combination with means for controlling the position of said handle in said guide member, and power devices attached to said guide member on opposite sides of the pivot thereof for rotating said guide member.

3. In an excavator, the combination of a guide-beam, pivotally supported between its ends, a bucket-handle sliding upon said beam, cables attached to said beam on opposite sides of the pivot thereof and a power-operated drum for controlling said cables.

4. In an excavator, the combination of a guide-beam pivotally supported between its ends, a bucket-handle sliding longitudinally upon said guide-beam, a cable attached to said beam upon one side of the point of support thereof, a second cable attached to said beam upon the other side of the point of support thereof, a drum whereon said cables are

wound in opposite directions and a power device for operating said drum.

5. In an excavator, the combination of a guide member pivotally supported by means of laterally-projecting sleeves or bushings formed thereon, a shaft concentric with said sleeves or bushings, a pinion on said shaft, a bucket-handle sliding within said guide member and having a rack, gearing with said pinion for regulating the position of said handle in its guide, and power devices applied to said guide member for rotating the same about its pivot.

6. In an excavator, the combination of a guide-beam pivotally supported between its ends, a bucket-handle sliding longitudinally upon said guide-beam, a cable attached to said beam upon one side of the point of support thereof a second cable attached to said beam upon the other side of the point of support thereof, and means for operating said cables.

7. In an excavator the combination with a telescoping, pivotally-supported bucket-arm, of cables attached to said arm on opposite sides of the point of support thereof and a hoisting-drum for operating said cables, said cables being wound upon said drum in opposite directions.

8. In an excavator, a bucket-arm composed of two parts, one sliding within the other, one of said parts being chambered, in combination with a gear-wheel housed within the said chambered part and meshing with a rack upon the second of said parts for varying the relative positions of said parts.

9. In an excavator, a pivotally-supported power-receiving member, a second member sliding thereon, and constituting the bucket-handle; and controlling mechanism for determining the relative positions of said members, said controlling mechanism comprising a power device, a shaft driven by means of said power device, said shaft being concentric with the pivot of said first-mentioned power-receiving member, and connections between said shaft and said second member for sliding the latter in the power-receiving member.

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