Aug. 5, 1924. 1,503,813

P. BURKE

EXCAVATOR

Filed Nov. 27, 1922 2 Sheets-Sheet 1

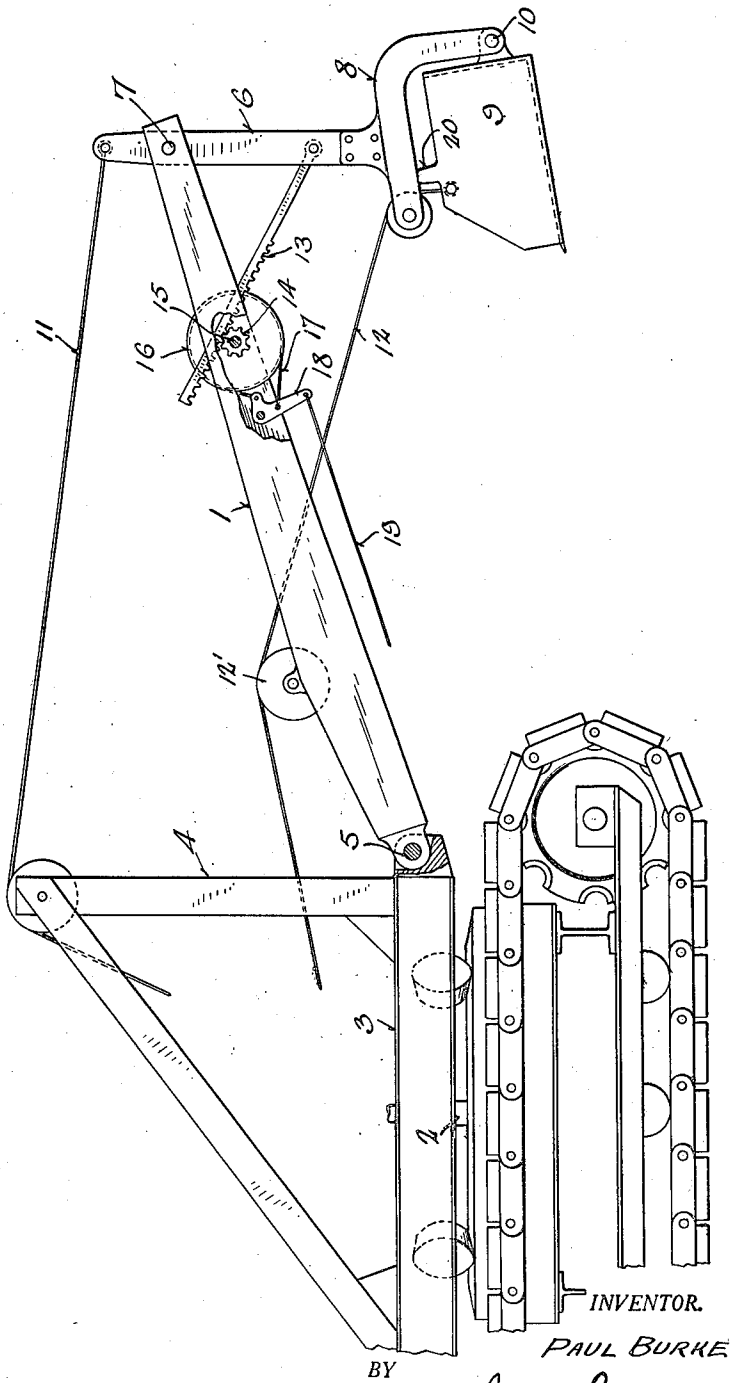

Fig. 1.

INVENTOR.
PAUL BURKE
BY
Louis Pearlman
ATTORNEY.

Aug. 5, 1924. 1,503,813

P. BURKE

EXCAVATOR

Filed Nov. 27, 1922 2 Sheets-Sheet 2

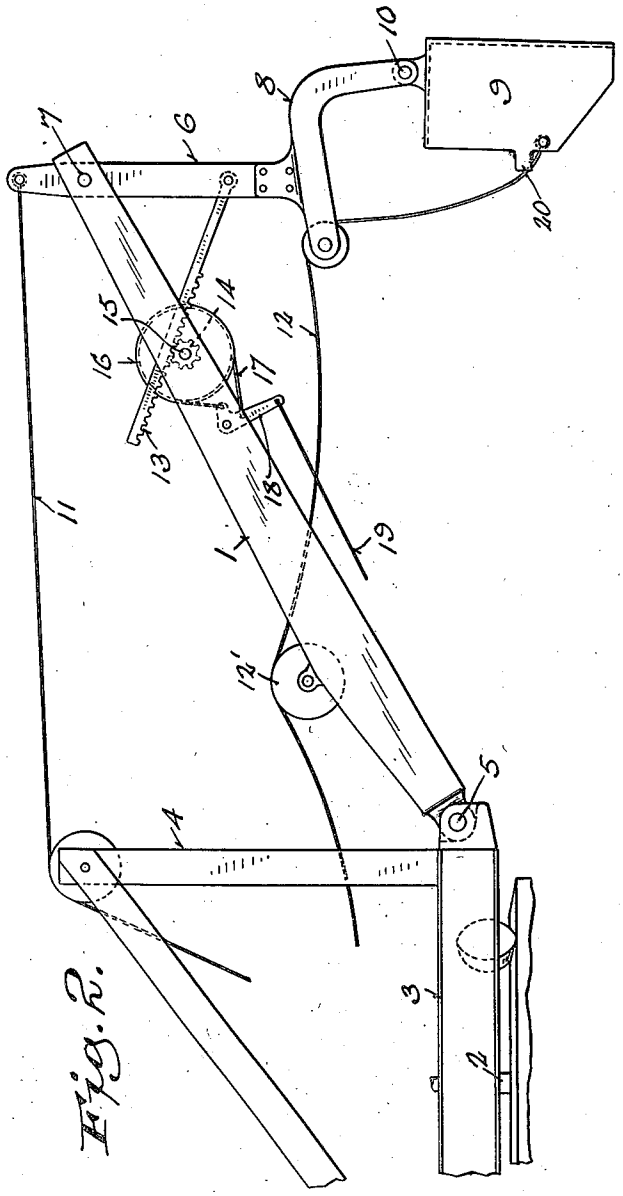

Fig. 2.

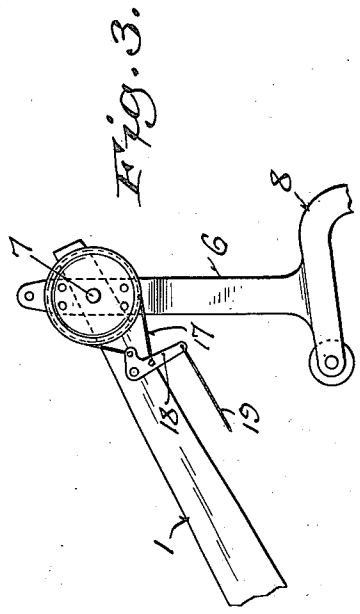

Fig. 3.

INVENTOR.

PAUL BURKE

BY Louis Lucas

ATTORNEY.

Patented Aug. 5, 1924. 1,503,813

UNITED STATES PATENT OFFICE.

PAUL BURKE, OF GREEN BAY, WISCONSIN, ASSIGNOR TO NORTHWEST ENGINEERING COMPANY, OF GREEN BAY, WISCONSIN, A CORPORATION OF WISCONSIN.

EXCAVATOR.

Application filed November 27, 1922. Serial No. 603,535.

To all whom it may concern:

Be it known that I, PAUL BURKE, a citizen of the United States of America, and a resident of Green Bay, Brown County, Wisconsin, have invented a certain new and useful Improvement in Excavators, of which the following is a specification.

My invention relates particularly to excavators of the type known as modified drag line wherein the bucket that does the excavating is carried by a handle mounted on the boom and loaded by being dragged toward the machine by a drag line. The handle and boom are so mounted and connected that the bucket may be raised and lowered, the handle may be swung back and forth so that it either projects beyond the end of the boom or is retracted toward the machine, and the whole may be swung from side to side for either digging or dumping.

Among the objects of my invention are the construction of an excavator of the class described that will be simple and rugged in construction, that will permit of the use of a one-piece dipper body that will avoid the necessity of movable doors together with the attendant latches for holding the same, that will permit the dipper body to be emptied completely at a predetermined point no matter what type of material is being excavated, and in which the working parts are few and easily accessible.

In the drawings Figure 1 illustrates a side view of my improved excavator showing the bucket ready for digging; Fig. 2 is a side view of the end of the boom and attendant mechanism showing the bucket in dumping position; and Fig. 3 shows a side view of a modified form. Parts are broken away in each of these views to facilitate inspection and like numerals denote like parts throughout.

As is shown in the illustrations the excavator is of that form in which the boom 1 is rotatably mounted upon the pivot 2 and is carried by the turntable 3, which also carries a derrick or mast 4, and the boom 1 is pivoted to the base of the mast 4 by the pivot 5. The dipper handle 6 is pivotally connected to the boom 1 on the pivot 7 and carries on the end thereof a dipper yoke 8 to which is pivotally mounted the dipper body 9 by the pivot 10.

The boom 1 is suspended and the handle 6 is extended by putting tension on the hoisting line 11 by means of a drum (not shown). The dipper handle and dipper is retracted for digging by putting tension on the drag line 12, which passes over the sheave 12′ by a drum (not shown).

For some uses it is advisable to lock the dipper 6 in a fixed relation to the boom 1 and this I do by using the restraining means shown in Fig. 1, as consisting of a rack 13 and pinion 14, the pinion being mounted on the pivot 15 and directly connected to the brake drum 16 which is prevented from turning by a brake band 17 operated through a lever 18 and line 19. If desired I can mount the brake drum 16 directly on the pivot 7 as shown in Fig. 3, in which case the brake band 17 and lever 18 are of course mounted on the boom 1.

In operation the boom 1 is raised and the dipper handle 6 extended by putting tension on the hoisting line 11. This line both extends the dipper handle and supports the boom 1. Sufficient tension is then put on the drag line 12 to cause the bucket 9 to resume the closed or digging position shown in Fig. 1. The hoisting line 11 is then slacked off until the dipper 9 rests upon the earth or material to be excavated. Tension is put upon the drag line 12 causing the dipper to move towards the machine and through the material to be excavated. As soon as the dipper 9 is filled with material it is raised by putting tension on the hoisting line 11 which elevates the boom, at the same time keeping sufficient tension on the drag line 12 so that the bucket is not allowed to dump. The boom 1 is then rotated about the pivot 2 to the desired position and is swung outwardly by putting further tension on the hoisting line 11 and concurrently paying out the drag line 12 to the desired dumping position, such as is shown in Fig. 2, and then preferably locked in position by pulling on the cable 19 which causes the brake band 17 to grip the brake drum 16. The drag line 12 is now slacked off and the dipper assumes the position shown in Fig. 2, dumping its load in the place required. After dumping, tension is again put on the drag line 12, the brake band 17 is released by slacking off on the cable 19, and the boom 1 swung back to the position required for digging, and the cycle is completed.

The bucket 9 is preferably made either of a one-piece casting as shown in the illus-

tration, or may be built up, but in operation acts as a unit and contains no doors, latches, or other moving parts. This permits of a very rugged construction. In digging through certain materials such as clay, gumbo and the like, it is necessary in order that the bucket should dump its load that it be reciprocated or even slammed against a fixed stop without at the same time changing the position of the dipper handle with respect to the boom. In machines of the type illustrated in which the dumping is done by a slacking off of the drag line, unless a restraining means such as I have shown is used, it is impossible to dump the bucket and particularly to slam it at a predetermined point, because as soon as the drag line is slackened the weight of the bucket, material, handle, and boom tend to extend the handle and lower the boom, thus changing the position of the bucket during the dumping. By my improved device I am able to dump the bucket and also to slam it without changing the elevation or position of the dipper handle and boom. The slamming is done by sharp, quick pulls on the drag line 12, while holding the stick 6 by means of the brake causing the bucket 9 to oscillate violently or to impinge sharply upon the stop 20, jarring the material free of the bucket. It will be noted that with my device I am enabled to support the boom and extend the bucket and bucket handle by means of a single line. I use a bucket of rugged, simple construction without moving parts which empties fully when the dipper handle is in position. It can be made to assume the digging or emptying position while the boom is retained at its original height and can be oscillated or slammed for freeing material therefrom and the entire operations are performed with but three lines, only two of which are power lines.

Certain modifications would appear to be obvious, such as the substitution of brake shoes for brake bands, extending the boom beyond the pivot and running the hoisting line over the sheave at the end thereof and anchoring it on the dipper handle below the pivot or anchoring the hoisting line on the boom itself and relying either on the inertia, gravity, or an additional operating line to extend the dipper handle, and it is understood that modifications of the structure may be made without departing from the spirit of my invention, provided they are within the limits of the appended claims, and I do not wish to be understood as limiting my invention to the specific means shown and described excepting in those claims wherein it is distinctly claimed.

Having thus fully described my invention, I claim:

1. In a device of the class described, the combination of a boom, a dipper handle pivotally mounted thereon, a dipper pivotally mounted on the dipper handle, a hoisting line operatively connected to the boom, a sheave mounted near the lower end of the dipper handle, a drag line attached to the dipper to swing the same relative to its handle and passing over the sheave, and means for holding the dipper handle from rotating with respect to the boom.

2. In a device of the class described, the combination of a boom, a dipper handle mounted thereon, a hoisting line operatively connected to the boom, a dipper yoke on the dipper handle, a dipper pivoted to the yoke at the rear thereof and abutting at the front thereof against the yoke when in the operative position, a sheave mounted on the yoke, and a drag line attached to the dipper to swing the same relative to its handle and passing over the sheave.

3. In a device of the class described, the combination of a boom, a dipper handle pivotally mounted thereon, a dipper yoke on the end of the dipper handle and forming an abutment against which the dipper may strike, a hoisting line attached to the dipper handle, a sheave mounted on the lower end of the dipper handle, a drag line attached to the dipper to swing the same relative to its handle and passing over the sheave, and braking means operatively connected to the boom and dipper handle for holding the dipper handle against rotation.

4. In a device of the class described, the combination of a boom, a dipper handle pivotally mounted thereon, a dipper pivotally mounted on the dipper handle, a hoisting line attached to the dipper handle, a sheave mounted on the lower end of the dipper handle, a drag line attached to the dipper to swing the same relative to its handle and passing over the sheave, and a brake drum operatively connected to the dipper handle, and a brake band operatively connected to the boom.

5. In a device of the class described, the combination of a boom, a dipper handle pivotally mounted thereon, a dipper yoke on the end of the dipper handle and forming an abutment against which the dipper may strike, a hoisting line attached to the dipper handle, a sheave mounted on the lower end of the dipper handle, a drag line attached to the dipper to swing the same relative to its handle and passing over the sheave, a rack pivoted to the dipper handle, a brake drum pivotally mounted on the boom, a pinion connected with the drum and meshing with the rack, and a brake band mounted on the boom.

6. In a device of the class described, the combination of a boom, a dipper handle pivotally mounted thereon, a dipper pivotally mounted on the dipper handle, a hoisting

line attached to the dipper handle, a sheave mounted on the dipper handle, a drag line attached to the dipper to swing the same relative to its handle and passing over the sheave, and means for locking the dipper handle against rotation in either direction.

7. In a device of the class described, the combination of a boom, a dipper handle pivotally mounted thereon, a dipper pivotally mounted on the dipper handle, a hoisting line attached to the dipper handle, a sheave mounted on the lower end of the dipper handle, a drag line attached to the dipper to swing the same relative to its handle and passing over the sheave, and a toothed member operatively connected to the dipper handle and meshing with a toothed member mounted on the boom and operatively connected with the brake drum.

8. In a device of the class described, the combination of a boom, a dipper handle pivotally mounted thereon, a dipper pivotally mounted on the dipper handle, a hoisting line attached to the dipper handle, a sheave mounted on the dipper handle, a drag line attached to the dipper to swing the same relative to its handle and passing over the sheave, a strut pivoted on the dipper handle and slidably mounted on the boom, and means for holding the strut from sliding.

9. In a device of the class described the combination of a boom, a dipper handle pivotally mounted thereon and carrying a dipper having pivoted dumping means, a hoisting line attached to the dipper handle, a drag line attached to the dipper, and means for holding the dipper handle from rotating with respect to the boom.

10. In an excavator, the combination of a boom, a dipper stick pivoted on the boom, means for holding said stick against rotation relative to the boom, a doorless dipper pivoted on the stick and limited thereby in its swinging movement, means for raising and lowering the boom, and a drag line operatively connected to said dipper and stick to move both the dipper and stick together for digging when the stick is free to turn relative to the boom and to freely swing the dipper relative to and against the stick during dumping when the stick is held against rotation relative to the boom.

PAUL BURKE.