Feb. 9, 1926. 1,572,009

C. C. HANSEN

SHOVELING AND LOADING MACHINE

Filed Sept. 11, 1925 3 Sheets-Sheet 1

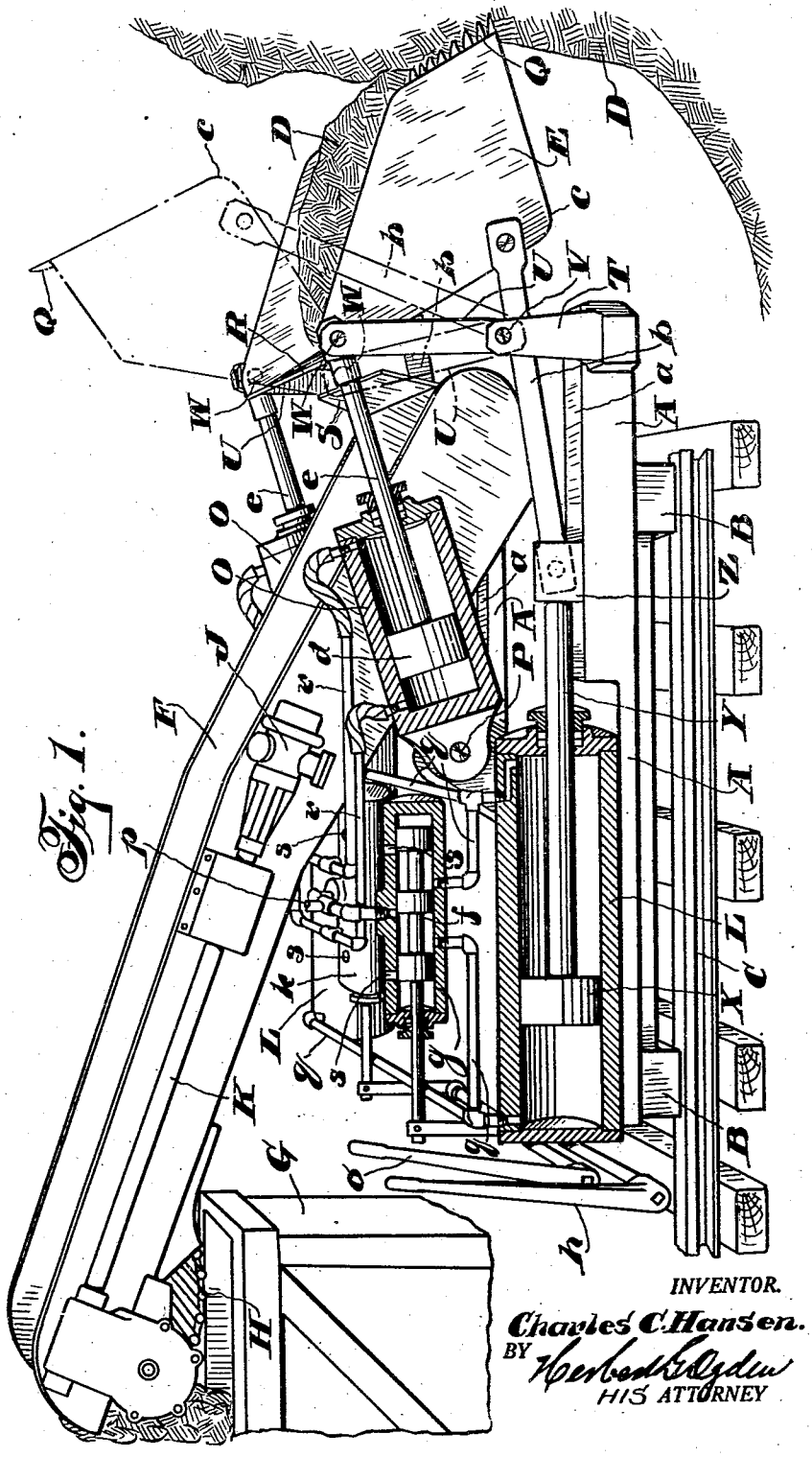


Fig. 1.

INVENTOR.

Charles C. Hansen.

BY Herbert E. Ogden

HIS ATTORNEY

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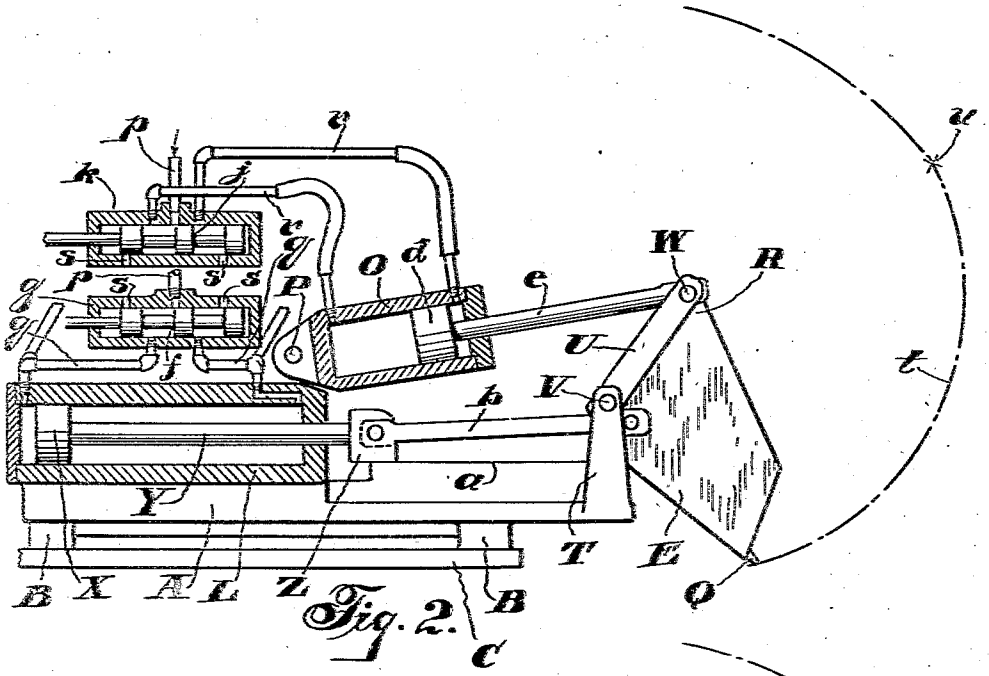


Fig. 2.

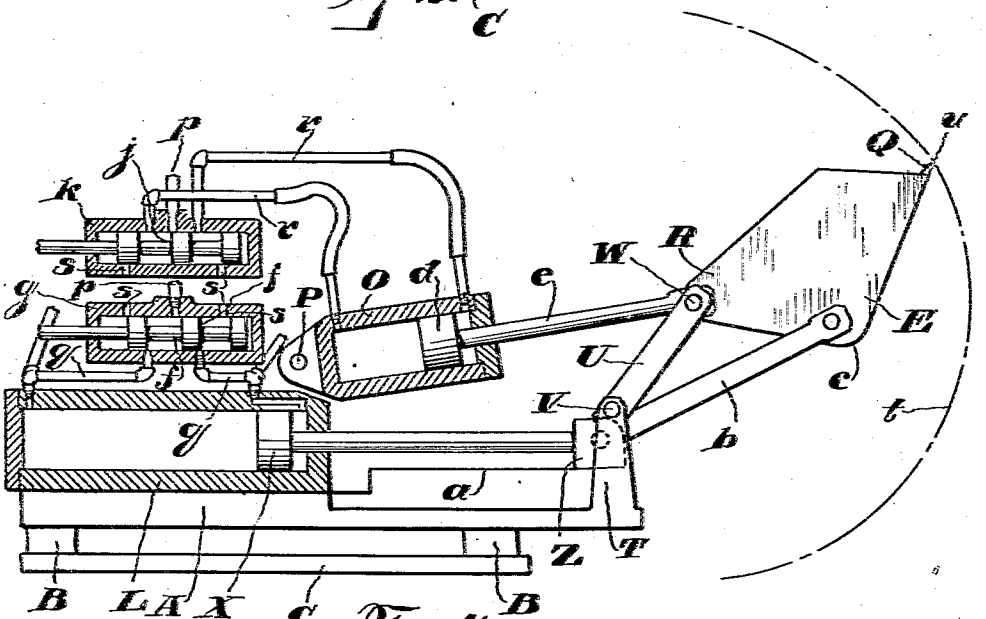


Fig. 3.

INVENTOR.
Charles C. Hansen
BY Herbert R. Ogden
HIS ATTORNEY

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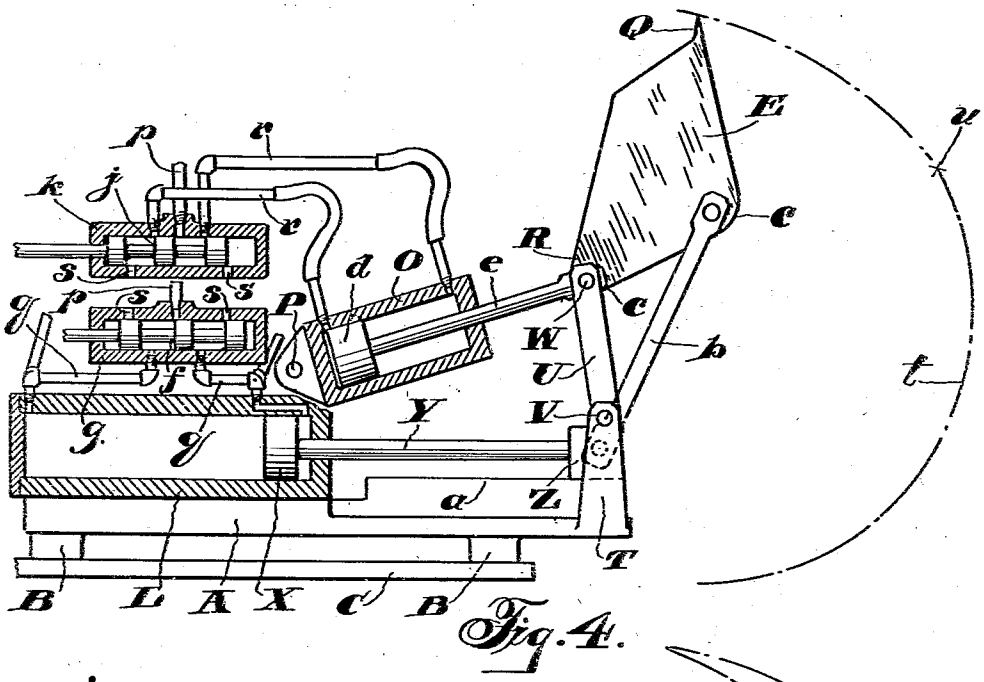


Fig. 4.

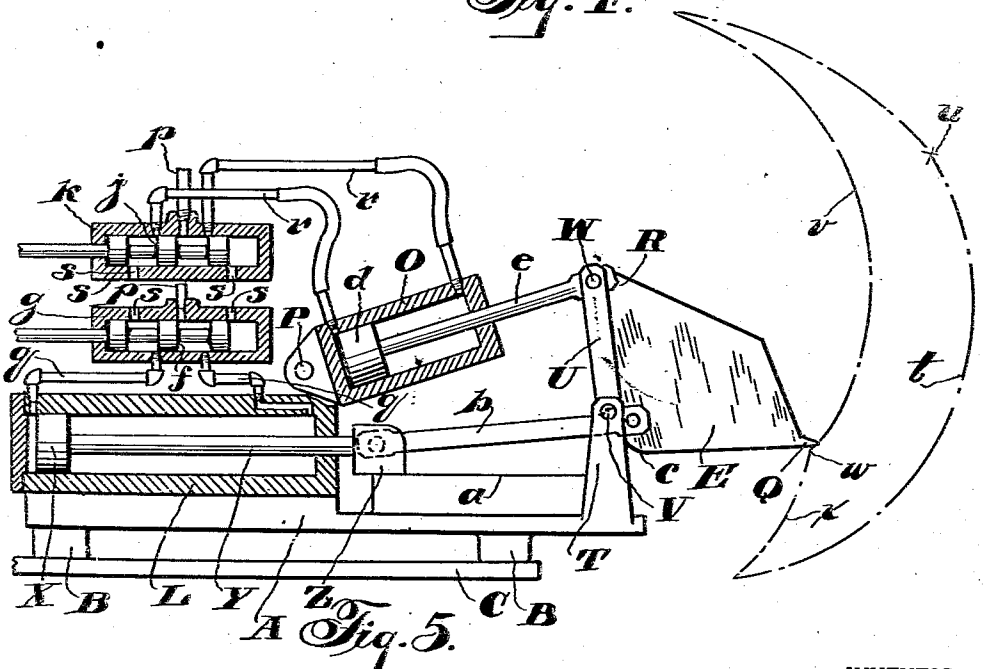


Fig. 5.

INVENTOR.
Charles C. Hansen
BY Herbert G. Ogden
HIS ATTORNEY

Patented Feb. 9, 1926. 1,572,009

UNITED STATES PATENT OFFICE.

CHARLES C. HANSEN, OF EASTON, PENNSYLVANIA, ASSIGNOR TO INGERSOLL-RAND COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SHOVELING AND LOADING MACHINE.

Application filed September 11, 1925. Serial No. 55,678.

To all whom it may concern:

Be it known that I, CHARLES C. HANSEN, a citizen of the United States, and a resident of Easton, county of Northampton, and State of Pennsylvania, have invented a certain Shoveling and Loading Machine, of which the following is a specification accompanied by drawings.

This invention relates to shoveling and loading machines, and the objects of the invention are to enable a scoop or shovel to be actuated for digging and also to be elevated and lowered by one pair or set of pressure fluid cylinders mounted on a carriage, and enable the scoop to be dumped and also adjusted in the course of digging or dumping by another independently controlled pair or set of cylinders.

The resultant of forces actuating the scoop by the two sets of independently controlled cylinders, produces a flexibility of action and control which enables more work to be accomplished in a given time than heretofore and simulates more nearly on a large scale, the movements effected on a small scale by the arms of a manual laborer in shoveling earth or rock with a hand shovel.

The invention is shown in one of its preferred forms in the accompanying drawings in which,

Figure 1 is a side elevation partly in longitudinal section of the shoveling and loading machine, certain parts of the frame and the conveyor not essential to the disclosure of the invention being broken away or omitted for clearness of illustration.

Figures 2 to 5 inclusive are detail diagrammatic views illustrating a complete cycle of movement of the scoop or shovel from initial digging position to elevated dumping position and return.

Referring to the drawings the carriage or frame A of the machine is shown in this instance provided with skids B adapted to slide along the rails C although, if desired, wheels (not shown) could be provided for the carriage or frame A.

The material D is shoveled upwardly and rearwardly by the scoop or shovel E and dumped backwardly into any suitable form of conveyor F which delivers the material upwardly into the car G. The frame or trough only of the conveyor is indicated, it being understood that suitable driving chains H are adapted to be actuated by a motor which may be a pressure fluid motor J shown in this instance mounted on the side of the conveyor trough and having the operating shaft K.

The digging, elevating and lowering movements of the scoop E are effected by a pair of cylinders L mounted side by side and extending longitudinally on the frame A. The dumping of the scoop and also various adjustments of the scoop both in digging, raising, lowering and dumping are effected and controlled by dumping and scoop adjustment cylinders O of which there are two pivotally mounted preferably at their rearward ends on the pivots P conveniently located on the frame above the digging, elevating, and lowering cylinders L. Certain combinations of adjustments of the scoop E may also be effected by simultaneous control of the independent controlling valves for the two sets of cylinders L and O as will hereinafter appear.

The scoop E is provided with a front digging element Q indicated in the form of digging teeth and the rearward end R of the scoop E is open as indicated so that the material filling the scoop is dumped rearwardly into the conveyor F. A shield S is preferably provided at the lower end of the conveyor F over which the material is dumped.

At the forward end of the frame A, guiding and supporting links U are pivoted at the points W to the rearward end of the scoop E. These links U support the scoop and rock on their pivots V as the scoop is manipulated.

The pistons X of the digging cylinders have their piston rods Y connected to cross heads Z movable on cross head guides *a* on the frame A and these cross heads are connected by links *b* to the heel *c* of the scoop E. The pistons *d* of the dumping cylinders O have their connecting rods *e* pivotally connected preferably at the points W to the rearward end of the scoop.

The two pairs of cylinders L and O have independent controlling means of any suitable character in this instance a controlling valve *f* in the valve chest *g* being connected to be actuated by the hand lever *h* for controlling the movement of the pistons X and a valve *j* in the valve chest *k* being connected to be actuated by the hand lever *o* controlling the pistons *d* of the dumping

cylinders. Pressure fluid as for instance compressed air or steam is supplied to the pipe connection *p* which branches and leads to each of the valve casings *g* and *k* and from the valve casings pipes *q* and *r* lead respectively to the ends of the two sets of cylinders L and O. The valve casings *g* and *k* are provided with the usual vents *s* so that manipulation of the valves controls the movements of the pistons X and *d*.

In the operation of the apparatus let it be assumed that the digging pistons X are retracted while the dumping pistons *d* are at the forward ends of their cylinders O as indicated diagrammatically in Figure 2, in which case the scoop E will be in its lowermost position in readiness for the digging stroke. As the digging pistons X are advanced in the cylinders L to the position indicated in Figure 3 while the dumping pistons *d* are maintained in the forward positions, the scoop E is thrust forward and filled with material and carried upwardly to the position indicated in Figure 3. The cylinders O and pistons *d* form abutments for the rearward end of the scoop which swings about the pivots W as the digging element Q of the scoop passes upwardly through the arc *t* indicated by dot and dash lines, finally arriving at the point *u*.

At this point the pistons X are held stationary at the forward ends of their cylinders L and the pistons *d* of the dumping cylinders O are retracted to the position indicated in Figure 4, and also in Figure 1, in which case the material is dumped over the rearward end of the scoop into the conveyor F.

As shown in Figure 5 by retracting the pistons X of the cylinders L the digging element Q of the scoop is lowered through the arc *v*, indicated in dotted lines, to the point *w*, and then by actuating the pistons *d* of the cylinders O forwardly the digging element Q of the scoop is further lowered through the arc *x* to the starting position indicated in Figure 2.

During these digging, raising, dumping and lowering movements of the scoop, the supporting links U swing about their pivotal points V so that the pivotal supporting points W of the scoop change position as required for the various operations.

One of the important advantages of this construction resides in the fact that by manipulating the valves *f* and *j* during any of the movements described, the scoop may be adjusted so that it does not pass through a fixed cycle of operations, because the pivotal supporting point W of the scoop may be altered by actuating the pistons *d*, and at the same time the digging pistons X may be moved backward and forward to obtain additional thrust on the scoop and release it from boulders or lift the digging element of the scoop over the boulders or other obstructions.

I claim:

1. In a shoveling and loading machine the combination of a carriage, a scoop, a pair of digging, elevating and lowering cylinders on the carriage having pistons and piston rods and links connecting said piston rods to the heel of the scoop, a pair of dumping and scoop adjusting cylinders on the carriage above the digging cylinders having pistons and piston rods and links connecting the said piston rods to the back end of the scoop, and links connecting the said back end of the scoop to the carriage at a point near the forward end of the carriage, whereby the scoop may be thrust forward and swung upwardly and downwardly by the digging cylinders, and may be adjusted and tipped into rearward dumping position by the dumping cylinders.

2. In a shoveling and loading machine the combination of a carriage, upright forwardly and backwardly swinging links pivoted at the forward end of the carriage, a scoop having a front digging element, and an open rearward end out of which the material is discharged, said rearward end being pivoted to said upright swinging links, digging, elevating and lowering cylinders and pistons operatively connected to the heel of said scoop, and dumping and scoop adjusting cylinders and pistons above the digging cylinders operatively connected to the rearward end of the scoop, whereby the pistons of the dumping cylinders form an adjustable abutment for the rearward end of the scoop while digging and afford means for moving the scoop to rearward dumping position.

3. In a shoveling and loading machine, the combination of a carriage, a scoop, a pair of digging, elevating and lowering cylinders on the carriage having pistons and piston rods, cross heads for said piston rods, and links connecting said cross heads to the heel of the scoop, a pair of dumping and scoop adjusting cylinders pivotally supported on the carriage above the digging cylinders having pistons and piston rods, and links connecting the said piston rods to the back end of the scoop, and links connecting the said back end of the scoop to the carriage at a point near the forward end of the carriage, whereby the scoop may be thrust forward and swung upwardly and downwardly by the digging cylinders, and may be adjusted and tipped into rearward dumping position by the dumping cylinders.

4. In a shoveling and loading machine the combination of a carriage, upright forwardly and backwardly swinging links pivoted at the forward end of the carriage, a scoop having a front digging element, and an open rearward end out of which the material is discharged, said rearward end

being pivoted to said upright swinging links, digging, elevating and lowering cylinders and pistons mounted on said carriage, cross heads for said piston rods, links connecting said cross heads to the heel of said scoop, and dumping and scoop adjusting cylinders pivotally connected to said carriage above the digging cylinders, pistons and piston rods for said scoop adjusting cylinders, and links connecting said last named piston rods to the rearward end of the scoop, whereby the pistons of the dumping cylinders form adjustable abutments for the rearward end of the scoop while digging and afford means for moving the scoop to rearward dumping position.

5. In a shoveling and loading machine the combination of a carriage, a scoop, a pair of digging, elevating and lowering cylinders on the carriage having pistons and piston rods and links connecting said piston rods to the heel of the scoop, a pair of dumping and scoop adjusting cylinders on the carriage above the digging cylinders having pistons and piston rods and links connecting the said piston rods to the back end of the scoop, links connecting the said back end of the scoop to the carriage at a point near the forward end of the carriage, whereby the scoop may be thrust forward and swung upwardly and downwardly by the digging cylinders, and may be adjusted and tipped into rearward dumping position by the dumping cylinders, and means for independently controlling each pair of cylinders.

6. In a shoveling and loading machine the combination of a carriage, upright forwardly and backwardly swinging links pivoted at the forward end of the carriage, a scoop having a front digging element, and an open rearward end out of which the material is discharged, said rearward end being pivoted to said upright swinging links, digging, elevating and lowering cylinders and pistons operatively connected to the heel of said scoop, dumping and scoop adjusting cylinders and pistons above the digging cylinders operatively connected to the rearward end of the scoop, whereby the pistons of the dumping cylinders form an adjustable abutment for the rearward end of the scoop while digging and afford means for moving the scoop to rearward dumping position, and means for independently controlling each pair of cylinders.

7. In a shoveling and loading machine, the combination of a carriage, a scoop, a pair of digging, elevating and lowering cylinders on the carriage having pistons and piston rods, cross heads for said piston rods, and links connecting said cross heads to the heel of the scoop, a pair of dumping and scoop adjusting cylinders pivotally supported on the carriage above the digging cylinders having pistons and piston rods, links connecting the said piston rods to the back end of the scoop, links connecting the said back end of the scoop to the carriage at a point near the forward end of the carriage, whereby the scoop may be thrust forward and swung upwardly and downwardly by the digging cylinders, and may be adjusted and tipped into rearward dumping position by the dumping cylinders, and means for independently controlling each pair of cylinders.

8. In a shoveling and loading machine the combination of a carriage, upright forwardly and backwardly swinging links pivoted at the forward end of the carriage, a scoop having a front digging element, and an open rearward end out of which the material is discharged, said rearward end being pivoted to said upright swinging links, digging, elevating and lowering cylinders and pistons mounted on said carriage, cross heads for said piston rods, links connecting said cross heads to the heel of said scoop, and dumping and scoop adjusting cylinders pivotally connected to said carriage above the digging cylinders, pistons and piston rods for said scoop adjusting cylinders, and links connecting said last named piston rods to the rearward end of the scoop, whereby the pistons of the dumping cylinders form adjustable abutments for the rearward end of the scoop while digging and afford means for moving the scoop to the rearward dumping position, and means for independently controlling each pair of cylinders.

In testimony whereof I have signed this specification.

CHARLES C. HANSEN.