

No. 617,506.

Patented Jan. 10, 1899.

J. E. JOHNSON, JR.
SAND SHOVELER.

(Application filed Apr. 1, 1898.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

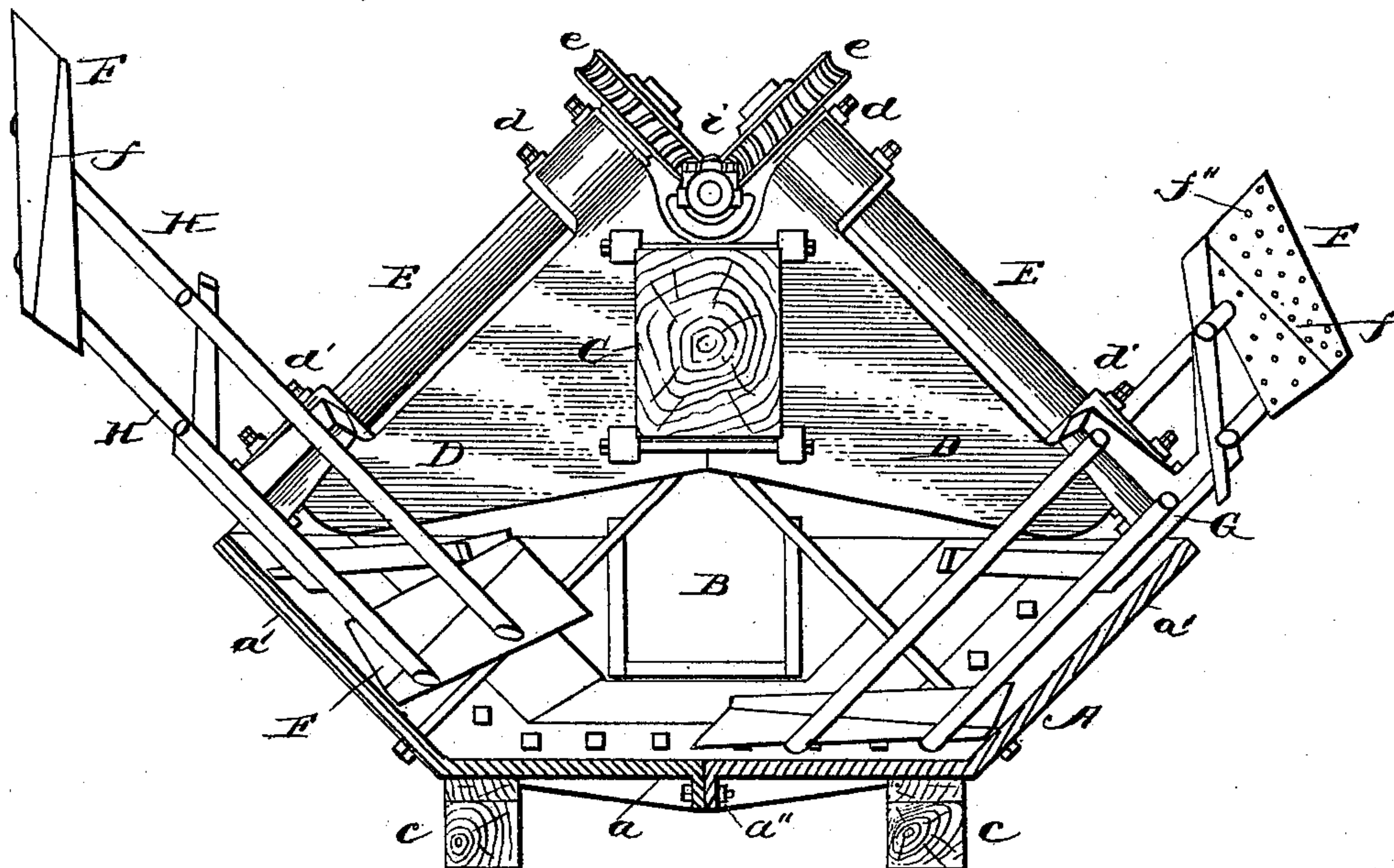
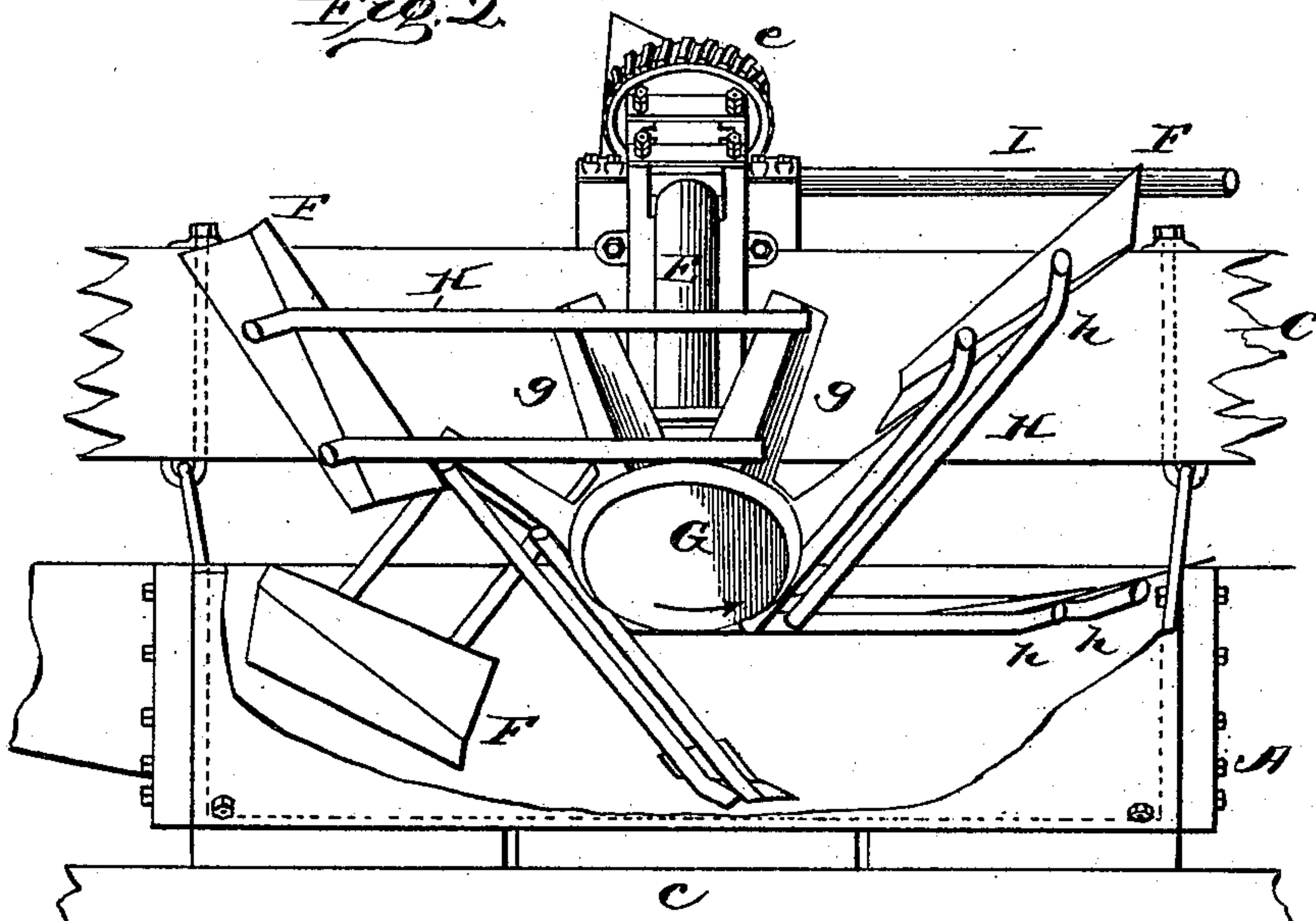


Fig. 2.



Witnesses
J. M. Fowler Jr.
Walter B. Payne.

Inventor:
Joseph E. Johnson, Jr.
By Henry H. Bates,
Attorney.

No. 617,506.

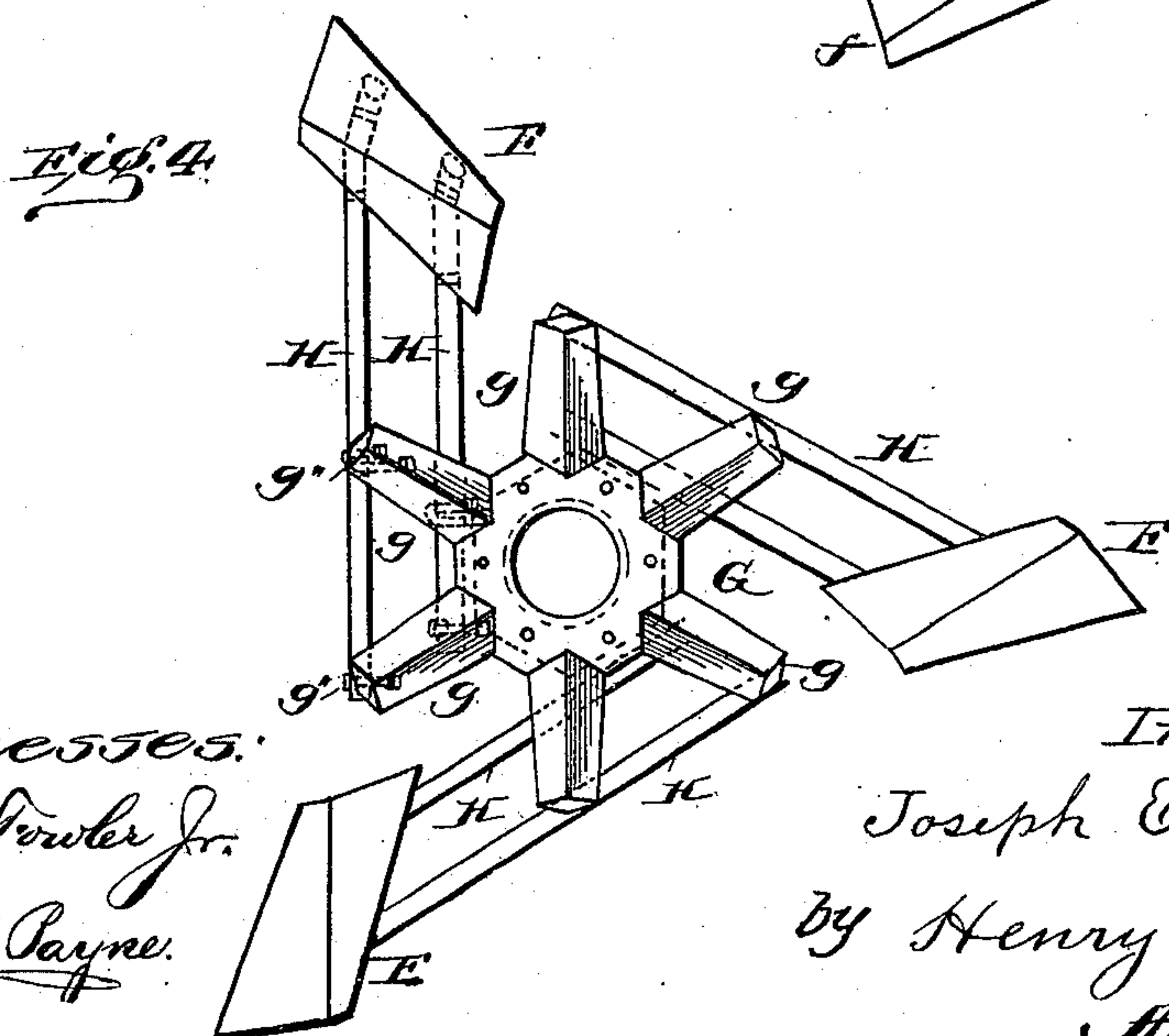
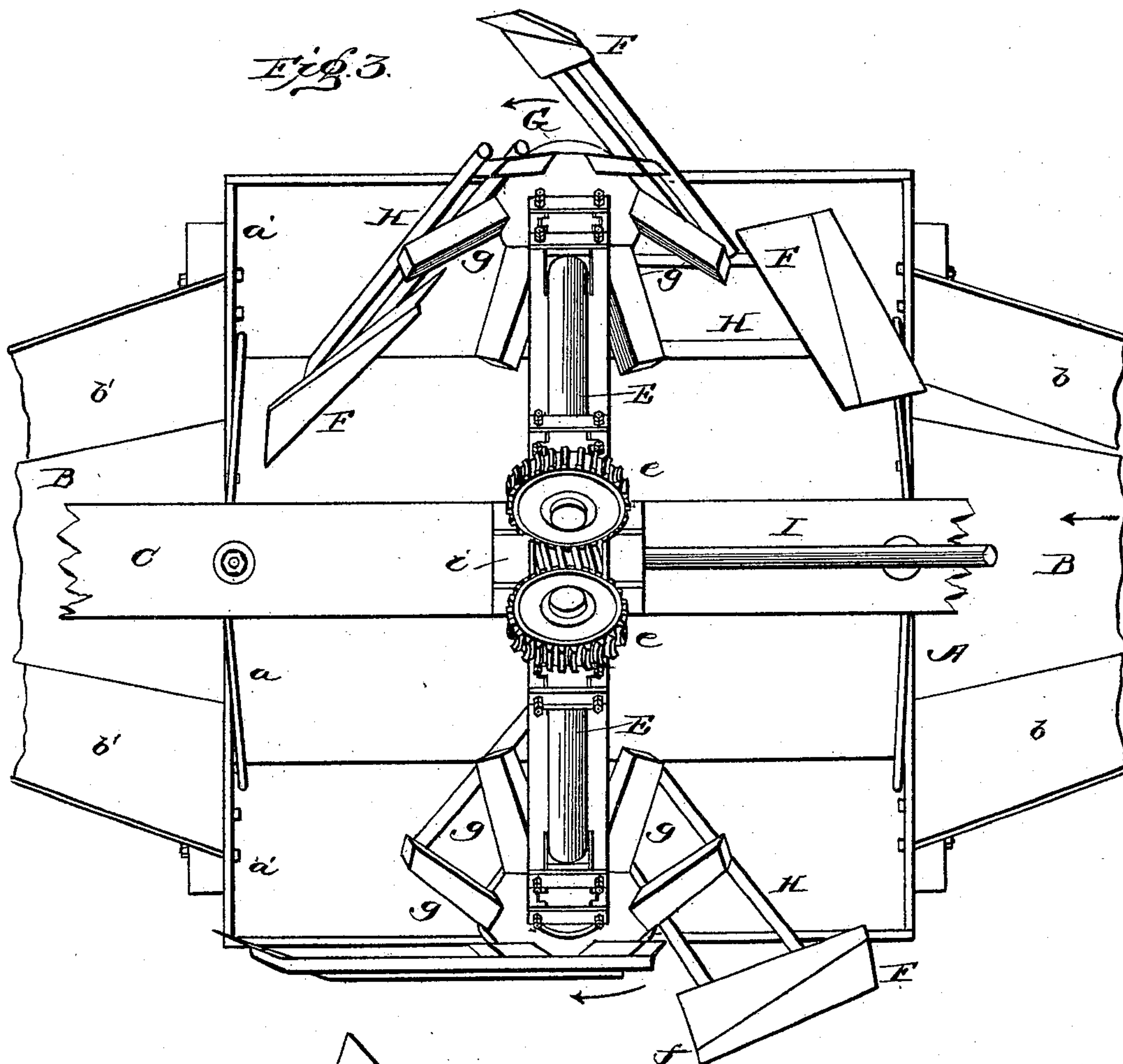
Patented Jan. 10, 1899.

J. E. JOHNSON, JR.
SAND SHOVELER.

(Application filed Apr. 1, 1898.)

(No Model.)

2 Sheets—Sheet 2.



Witnesses:
J. M. Fowler Jr.
Walter B. Payne.

Inventor:
Joseph E. Johnson, jr
by Henry H. Bates
Attorney.

UNITED STATES PATENT OFFICE.

JOSEPH ESREY JOHNSON, JR., OF LONGDALE, VIRGINIA.

SAND-SHOVELER.

SPECIFICATION forming part of Letters Patent No. 617,506; dated January 10, 1899.

Application filed April 1, 1898. Serial No. 676,080. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH ESREY JOHNSON, Jr., a citizen of the United States, residing at Longdale, in the county of Alleghany and State of Virginia, have invented certain new and useful Improvements in Sand-Shovelers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates, primarily, to devices for handling and removing the sand occurring in the waste water from ore-washers, but is capable of being applied to other analogous uses.

In the drawings forming a part of this specification, Figure 1 is an end elevation of the device, partly in section. Fig. 2 is a side elevation of the same, showing the trough partly broken away to exhibit both sets of shovel-blades as when in operation. Fig. 3 is a top or plan view, and Fig. 4 is a detail view of the spider-head and arms carrying the shovel-blades.

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

B is the waste-trough conducting the water charged with sand from the ore-washer or other source of supply. This is widened by the gradual enlargements $b\ b'\ b'$ into the tank or box A, where the shoveler works, which may be of cast or wrought metal or of any other suitable material, and when of metal is preferably in two pieces secured by bolts, as at a'' .

$c\ c$ are the timber-supports. The sides a' of this tank slope outward at an angle of forty-five degrees, and the ends are joined to the flume or trough B by the aforesaid inclined connections $b\ b'\ b'$ both above and below the tank. These inclined connections, which may be made of sheet-steel, slope both horizontally and vertically, so as to make a gradual inlet and discharge to and from the tank and prevent eddies and excessive velocity of the material as it passes through the tank, thus enabling the solid matter carried thereby to be deposited. In or over this tank revolve one or more shovel-heads G, (preferably two,) fixed upon inclined shafts E, revolv-

ing from the vertical in opposite directions in the same plane, meeting approximately at the top over the center of the tank. These shafts may be rotated by any suitable means; but, as shown, they terminate at the top in worm-gears $e\ e$, gearing into a single worm i on a horizontal shaft I, receiving rotary motion from a band-wheel or other gear connected with a prime motor. Said worm-gear i revolves in a bath of oil fixed over the supporting-beam C in the center of the machine and is provided with a proper abutment fixed to the same beam C to take the thrust of the gears.

The inclined shafts E E are carried and maintained in the inclined position by carriers D, supported on the central beam C and having inclined bearings $d\ d'$, in which the shafts E E are revolvably sustained. At the lower extremities of these inclined shafts are fixed, as before said, the shovel-heads G G, which carry arms to which blades are attached, and may consist each of a six-armed spider, as shown, carrying arms g , inclined at an angle of about forty-five degrees to the axis of the shovel-heads, each pair of which carries, attached to the same by any suitable means, two rods or arms H H, preferably of wrought-iron, extending in planes which are the extended faces of a pyramid, of which said spider-arms form the angles, all in the same direction, which is the direction of revolution of the shovel-heads, each pair of said rods is bolted to a pair of said spider-arms. Each pair of these rods carries at the outer ends a shovel-blade F, of metal, preferably sheet-steel, attached to said pairs of rods in any suitable and practical manner. Said shovel-blades are bent slightly on a diagonal line f , as shown in the drawings, so as to form a sufficient rear abutment for the material to be handled, the rods which carry them being correspondingly bent also, so as to support them fully on each side of the bend. The blades are attached to their respective pairs of rods at an angle of inclination similar to that of the spider-arms, with their axis of rotation—that is, about forty-five degrees—as shown in the several figures of the drawings, the effect of which, in combination with the inclination of the shafts, is to cause them to describe a conical surface concentric with the shaft and to pass by their

forward edges closely along the horizontal bottom of the tank in a position nearly parallel therewith at the lowest point of travel, but with the leading edge and point inclined slightly downward, whereby they pass closely along the bottom of the tank, extending to or beyond the center thereof, with a scoop-shovel action. As they rise from this lowermost position by the revolution of the shaft the point rises relatively faster, being farther from the axis, so that when a half-revolution is completed they have not only cleared the edge of the tank and been raised some distance above it, but the position of the blade has gradually changed from horizontal to vertical. The result of these motions is that the blade goes into the sand exactly as a shovel does when manipulated by hand, picking up the material, lifting it clear of the water, pouring off the water, carrying the sand-load clear of the edge of the trough, and finally allowing it to drop, practically dry, into a vehicle standing beneath to receive it.

In practice with some kinds of material it is found desirable to perforate the blades F to facilitate the drainage of water from the sand, as the buckets rise toward the vertical. One of the buckets or blades is accordingly shown perforated at f'' . It is not absolutely necessary to carry the shovel-blades on skeleton rods, as above described, since any suitable mode of attachment of the same to the revolving heads is within the scope of the invention; but the above construction has been found to work well in practice. The form of the shovel-blades may also be varied in practice to conform to the nature of the material to be operated upon, which differs in different localities. The direction of rotation of the blades should be against the current, and said blades are so set on their respective shafts that each comes half-way between a pair of blades on the other shaft, with the result that two blades do not enter at the same time, but the strain alternates from one shaft to the other, thus tending to distribute the strain on the driving-gear.

I prefer in practice to belt the machine direct to the line-shaft without an intervening loose pulley, so that the shovels may start when the washers start, thereby avoiding the difficulty of burying the shovels beneath a load of sand too heavy for them to overcome at starting. The ordinary speed of rotation of the shovel-shafts is moderate, three and one-third revolutions per minute having been found to be a good working velocity.

The carriers D may be constructed in any suitable workmanlike manner; but as practically used and as shown in the drawings they consist of two corresponding castings having attaching-lugs to provide for securing them to the central timber C, which they embrace, each casting having its own shaft-bearings d d' .

Besides the utility of the device for handling the waste from ore-washers above men-

tioned it has other and perhaps greater fields of usefulness in connection with ore-concentrating plants dealing with the precious metals and in disposing of the waste from coal washings, &c.

The alternate setting of the blades on the two opposite shafts has another good effect besides those before mentioned in minimizing the interruption of the flow of the current, thereby interfering as little as possible with the settling process and enabling the maximum amount of material to be deposited.

I claim and desire to secure by Letters Patent—

1. In a sand-shoveling machine, a settling-tank having a horizontal bottom and inclined sides, an inclined shaft revolvably mounted over said tank, means for rotating said shaft, shovel-blades, one or more, carried by said shaft in a plane inclined to the bottom of said tank, said shovel-blades at their lowest point of travel approximating a position parallel with the plane of the horizontal tank-bottom, substantially as specified.

2. In a sand-shoveling machine, a settling-tank having a horizontal bottom and inclined sides, an inclined shaft revolvably mounted over said tank, means for rotating said shaft, arms on said shaft carrying shovel-blades in a plane of rotation inclined to the bottom of said tank, said shovel-blades set at an angle to the plane of rotation approximating the angle between the horizontal bottom and said plane of rotation, substantially as specified.

3. In combination, a settling-tank having inclined sides, a pair of rotary shafts mounted over said tank at an inclination in opposite directions of about forty-five degrees from the vertical, means for simultaneously rotating said shafts on their respective axes, arms on said shafts, and shovel-blades mounted on said arms, inclined to the plane of rotation at such an angle that they pass close along the bottom of the tank at the lowest point of travel, and inclined also to the axial plane, substantially as specified.

4. In combination, a settling-tank having inclined sides, a waste-trough leading to said tank and discharging from it, inclined connections between said tank and said trough, inclined rotary shafts located above said tank with means for rotating the same, and shovel-blades mounted on said rotary shafts by means of tangential arms so as to sweep in a conical path, passing at one point of their travel close to the bottom of the said tank, and at the opposite point passing beyond the inclined side of the tank in a nearly vertical position, substantially as specified.

5. In combination, a settling-tank having inclined sides, carriers D set over said tank, inclined rotary shafts E E borne by said carriers, worm-gears e , e , worm i , tangential arms H H, and blades F, F, borne at an angle on said arms, substantially as specified.

6. In a sand-shoveler, an inclined revolu-

ble shaft E with means for rotating the same, a spider-head G, pairs of tangential arms H, H, in planes inclined to the axis of said shaft, and shovel-blades F F at the extremities of
5 said arms, inclined outwardly and forwardly at the upper extremities in the direction of rotation, substantially as specified.

7. In a sand-shoveler, an inclined revoluble shaft E, with means for rotating the same, spider-head G, tangential arms H, H, and shovel-blades F F, said shovel-blades bent on a diagonal line *f*, to afford a backing for the excavated material, substantially as specified.

15 8. In a sand-shoveler, an inclined revoluble shaft E, worm-gear *e*, worm *i*, spider-head G, having inclined arms *g g*, tangential rods H, H, and shovel-blades F, F, one on each pair of rods, set diagonally, substantially as specified.

20 9. In a sand-shoveler, a settling-tank having sides inclined at an angle of about forty-

five degrees from the vertical, two revoluble shafts set over said tank in a vertical plane, said shafts oppositely inclined from the vertical at an angle of about forty-five degrees, 25 means for simultaneously rotating said shafts, spider-heads on said shafts carrying arms *g*, standing at angles of about forty-five degrees respectively to the axes of said shafts, rods H H secured in pairs to each pair of said arms, 30 and shovel-blades borne on the outer extremities of each pair of rods, set diagonally, whereby they scrape close to the horizontal bottom of the tank, and stand nearly vertical and beyond the inclined sides of the tank at the half- 35 revolution, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

JOSEPH ESREY JOHNSON, JR.

Witnesses:

H. FIRMSTONE,
W. TOWNSEND.