2 Sheets--Sheet 1.

W. J. LANE.

Hydraulic-Motor for Driving Sewing-Machines, &c.

No. 165,339. Patented July 6, 1875.

Fig. 1

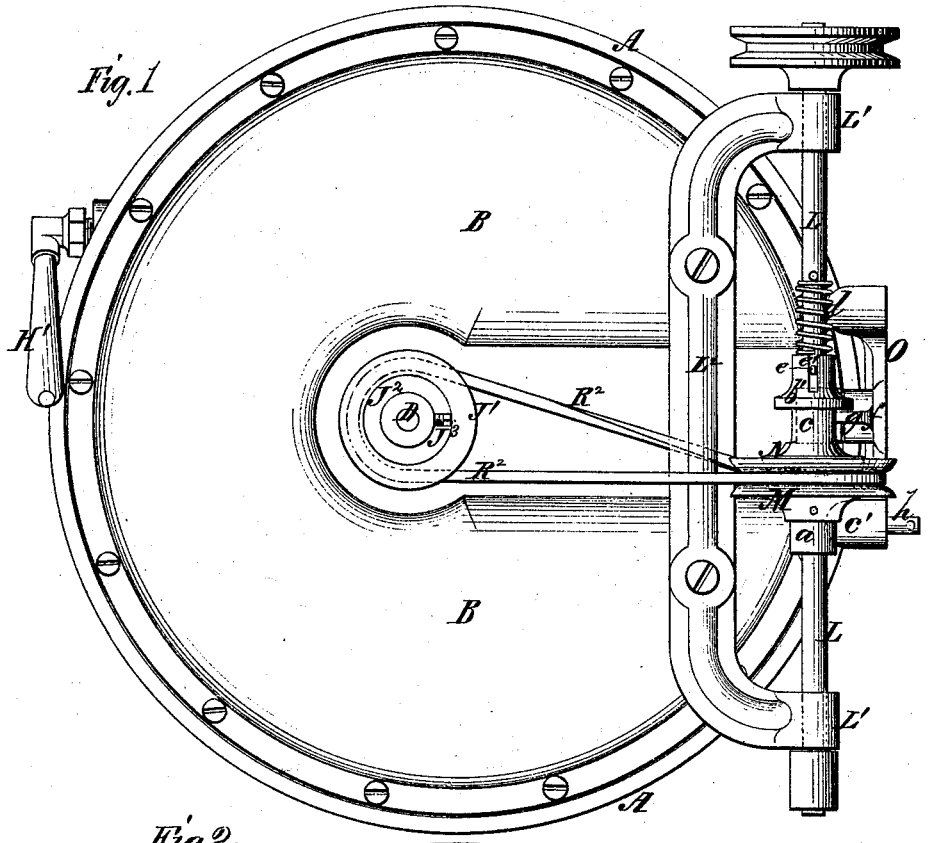
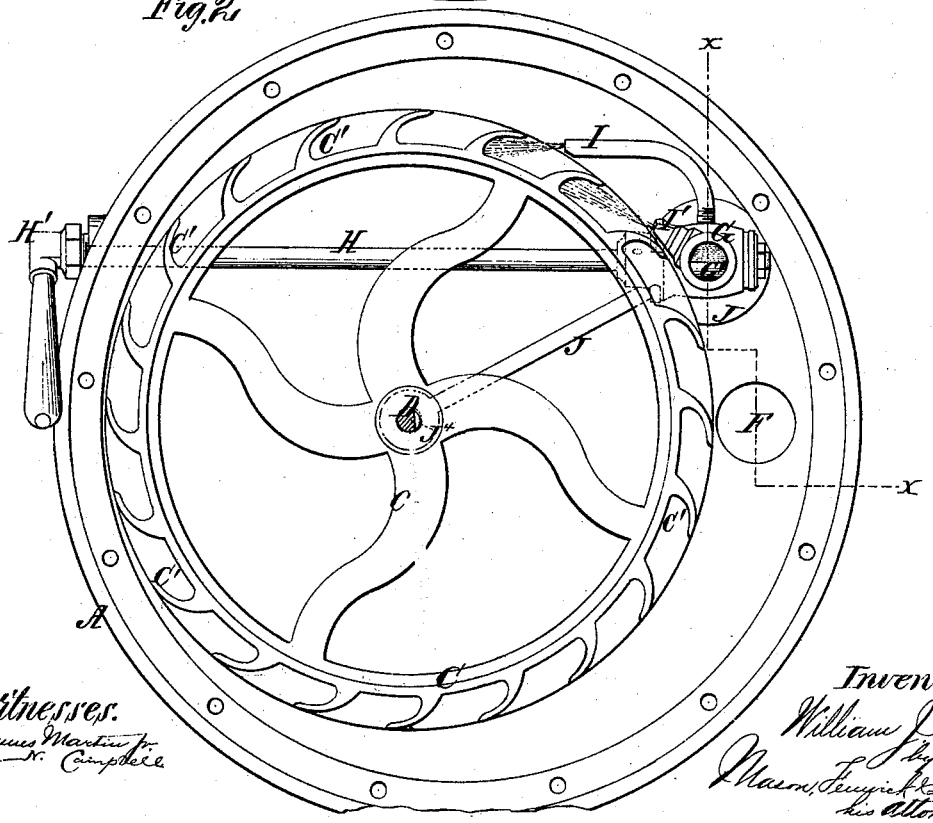


Fig. 2.



Witnesses.
James Martin Jr.
N. Campbell

Inventor.
William J. Lane.
by Mason, Fenwick & Lawrence
his Attorneys.

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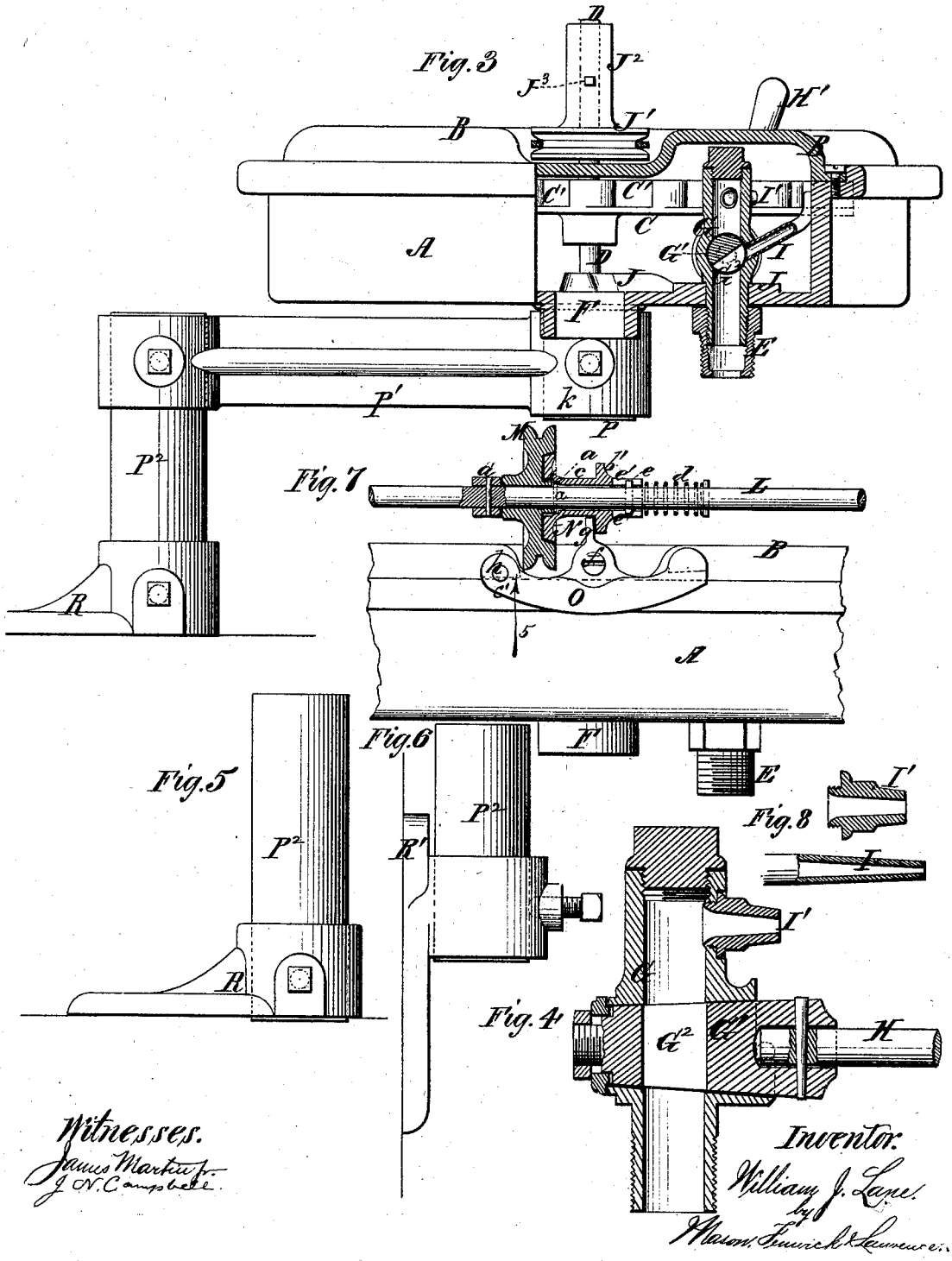

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James Martin Jr.
J. N. Campbell.

Inventor.
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by
Mason, Fenwick & Lawrence.

UNITED STATES PATENT OFFICE.

WILLIAM J. LANE, OF MILLBROOK, NEW YORK, ASSIGNOR OF ONE-HALF HIS RIGHT TO JOHN G. LANE, OF SAME PLACE.

IMPROVEMENT IN HYDRAULIC MOTORS FOR DRIVING SEWING-MACHINES, &c.

Specification forming part of Letters Patent No. **165,339**, dated July 6, 1875; application filed April 3, 1875.

To all whom it may concern:

Be it known that I, WILLIAM J. LANE, of Millbrook, county of Dutchess and State of New York, have invented a new and Improved Hydraulic Motor for Driving Sewing-Machines, Coffee-Mills, and other light machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing making part of this specification, in which—

Figure 1 is a top view of my motor as used in a horizontal position. Fig. 2 is a top view of the same with the cap or top plate and the attachments thereof removed. Fig. 3 is a view showing the motor partly in its vertical section and partly in its side elevation; this section is taken in the line *x x* Fig. 2. Fig. 4 is a section of the cock and one of the nozzles through which the water passes to the water-wheel. Fig. 5 is a side view of a foot or support for a hydraulic motor, adapted for being bolted to the floor or top of, or on under side of, a table. Fig. 6 is a side view of a foot or support for the hydraulic motor, adapted for being bolted to a side wall or other surface perpendicular to the horizon. Fig. 7 is a broken view, partly in elevation and partly in section, showing the vibrating shifter, loose pulley, counter-shaft, wheel-case and other parts. Fig. 8 is a diagram, showing the relative sizes of the nozzles.

The nature of my invention consists, first, in the combination, with an impact water-wheel, of two or more regulated nozzles for directing water, at will, in one, two, or more streams against the buckets of said wheel, whereby a machine connected either with the shaft or a counter-shaft of the motor can be driven by a small expenditure of water passing through one of the nozzles when slight work is to be done, and may be driven by a greater expenditure of water passing simultaneously through two or more nozzles when a greater amount of work is to be done. It consists, second, in employing several regulated nozzles, the diameters of which are unequal—viz: the first of the several being the smallest, and the last being the largest—whereby when little work is to be done by the machine driven by the motor the nozzle having the smallest diameter may be used for conducting water upon the wheel, and when a large amount of work is to be done a nozzle or nozzles of increased diameters may be brought into use as auxiliaries to the nozzle having the smallest diameter. It consists, third, in having the nozzles and their regulated cock or cocks proper constructed entirely within the case of the water-wheel, and operated by a stem extending through the case to the outside, so that all leakage of the cocks shall be discharged into the chamber in which the used water passes, and thus parlors, dental rooms, and other neat places where the motor is used shall not be injured by leakage of water upon the floor. It consists, fourth, in a water-wheel case having one or more narrow ribs extending up from its bottom a short distance, for the purpose of preventing a revolution of the water after its force has been expended upon the wheel, and thus insuring its proper flow to the discharge-passage. It consists, fifth, in a swinging arm connected to a stationary foot, for receiving the hub of the water-wheel case, whereby the hydraulic motor can be conveniently suspended and adjusted in any desired position.

In the accompanying drawings, A B represent a circular case, formed of two pieces, inclosing an impact water-wheel, C, having a vertical shaft, D, and curved buckets C′. The wheel C is of smaller diameter than the case, and its shaft is set eccentrically in bearings of the case. E is an inlet water-passage, and F is a discharge-passage through the case. G is a cock, open at one end and closed at the other. The open end of this cock is screwed into the inlet-passage E from the inside of the case, as shown in Fig. 3, and the plug G^1 passes across it at right angles to the bore thereof, and has a passage, G^2, through it, of the form shown in Figs. 3 and 4 of the drawings. H is a vibrating stem passed from the outside of the case A B through the case, and connected to the plug G. By means of this stem, which has a handle, H′, on its outer end, the cock is turned one-quarter or half round in its seat. I I′ are two nozzles, of tapering form, set into the cock, so as to be separately and unitedly

in communication with the chamber of the cock, as occasion requires, and to discharge the water which passes through them upon different buckets of the wheel either separately or unitedly. When the plug is turned one-quarter round the nozzle I is open to the inlet-passage E and the nozzle I′ cut off from the same, and when the plug is turned half round both nozzles are open to the inlet-passage. Thus, it will be seen, these nozzles are in communication with a cock so constructed that the full pressure of water may be admitted to one of the nozzles while the other is shut off, and by a further opening of the cock an additional nozzle may be supplied with water under the full pressure due to the head. More than two nozzles may be connected with the cock, and each successively brought into use under a full pressure due to the head. The nozzles may also be graduated, so that the first is the smallest in diameter, and the next a little larger, and the last the largest. The utility of this part of my invention will be seen when it is considered that the motor is particularly intended to be used for light mills and machines which are kept running by far the largest portion of the time for show, as "dummies" not doing work, in which use the amount of power needed is exceedingly slight; and yet such machines are intended as well for use when occasion demands, and when used for doing work the motor must have sufficient power to work the machines while grinding or doing other light work.

It is not deemed practicable to make one nozzle of a sufficient size to run a mill when grinding, and still attempt to run the mill at the same speed ninety-nine one-hundredths of the time with the same size nozzle by wire-drawing the water behind it, as this would cause waste; but by having a nozzle with a very small opening, just sufficient to run a mill light, to which the water may be admitted at full pressure, and another of sufficient size in connection with the first to run the mill for grinding, the best results will be attained, realizing nearly as high a percentage of theoretical power of the water when running light as otherwise.

In practice, to attain the highest percentage of power, the supply-water passage should in no case be contracted in area of cross-section to less than twelve times the area of the discharge-openings.

J is a narrow rib between the inlet and discharge passages E and F of the wheel-case A B. This rib rises a short distance above the bottom of the case, and serves to prevent waste or used water from revolving. There may be any desired number of these ribs for the same purpose. By preventing the revolution of the water its discharge is facilitated.

I prefer to use a horizontal counter-shaft, L, mounted in bearings L^1, attached to a bracket, L^2, which is screwed to the top B of the case, and connected to the shaft D by a quarter-twist belt, R^2. This shaft L has a loose grooved pulley, M, (over which the belt R^2 passes,) fitted upon it between stops *a a*. This pulley M has its face counter-bored, and into this counter-bore a conical-ring friction-clutch, N, fits snugly when forced home, as shown in Fig. 7.

The clutch N has a tubular sleeve, *c*, formed on it, and this sleeve, with the clutch, is slid over the shaft L, and held in its position longitudinally by a spiral spring, *d*, placed upon the shaft, and prevented from turning free of the shaft by a pin, *e*, passed through the shaft and into open slots *e′* cut in the end of the sleeve *c*, as shown. O is a vibrating shifter, pivoted as at *f* to the edge of the case A B. The toe *g* of this shifter takes hold of a collar, *b′*, of sleeve *c*, and forces the clutch out of contact with the pulley M when the arm *c′* of the shifter is forced upward in the direction indicated by the arrow 5. The pin *h* of this arm of the shifter is to be connected to a treadle of a sewing-machine or other machine, and by placing the foot upon the treadle the arm *c′* is to be pressed upward. The aforesaid treadle connection is to be secured to the end *h* of vibrating shifter O in such a manner that the weight of treadle and connection when left at rest shall cause the counter-shaft and machine to be in gear with the wheel C. And the object of this arrangement is to prevent waste of water by accidentally leaving cock G open, for should the operator leave or remove the foot from the treadle the machine would at once run and attract attention. With this arrangement the machine cannot be left out of gear, except by design. If it were otherwise, the wheel might be accidentally left running, as it runs so quietly as to attract no attention, and is entirely hidden from view. The pin *e* arrests the revolution of the shaft L, even though the water-wheel is revolving rapidly, as soon as it interlocks with the slots *e′* of the clutch-sleeve. The clutch N enables the operator to get an instantaneous start of the machine being driven without sudden jars, as the friction-surfaces will slide upon one another until the parts are perfectly in gear.

This manner of starting with the full pressure of the head of water upon the wheel has advantages over known modes, as only a very slight motion of the treadle of the machine being driven is required to bring the wheel and machine into gear with one another, and greater promptness of action is secured than can be by overcoming the inertia of the water-wheel itself each time the machine is started. Especially is this plan beneficial in operating sewing-machines, where the operator wishes to stop at once from full speed, and to start again at full speed with equal promptness, for the momentum of the wheel causes the sewing-machine to attain its full speed instantly, and yet without jar, as it is relieved by the friction-clutch and slip-band. The arrangement also allows a less speed to be attained when desirable by applying a less force on the treadle of the machine driven.

Whenever it is desired to reverse the direction of revolution of the shaft L it can be effected by slipping the pulley J′ off the shaft D and inverting it, and fastening it by the same screw-pin and seat therefor. This adjustment of the pulley reverses the cross of the belt, and of course reverses the motion of the shaft L.

For supporting the motor in relief from the ground, wall, or table, so that the connecting-pipes may be readily applied to it, a circular boss or stud, P, is formed on the bottom of the case, and this stud is inserted into an eye, *k*, of a radial arm, P^1, which arm has its other end fitted over a stem, P^2, of the foot R or R′, accordingly as said foot-pieces may be brought into use. The arm is fastened to the stud or boss P and to the stem P^2 of the foot by clamp-screws, and before these screws are tightened the case may be raised or lowered, and swung around on the stud P or on the stem P^2, as the necessities of location may require. The arm P^1 may be formed in two or more parts jointed together, so as to permit the motor-case to be adjusted to a greater extent than is practicable with one arm. The connecting-pipes, of course, will require to be made flexible if a pivoted extension arm is used, and under such construction the case A may be adjusted horizontally while the machine is in operation, as required by dentists.

I have shown and described a clutching device, a loose pulley, a counter shaft, a shifter, a reversible pulley, and a quarter-twist belt; but these are not claimed under and as parts of this patent, they being embraced in another machine which I intend to patent.

What I claim is—

1. The nozzles I I′, through which the water is allowed to pass in regulated quantities, as described, in combination with an impact water-wheel, substantially as described.

2. The nozzles I I′, made with different diameters, and through which water is allowed to pass, as described, in combination with an impact water-wheel, substantially as described.

3. The nozzle or nozzles, and their regulating-cock proper, constructed entirely within the case A B, and operated by a stem, H, from the outside of the case, substantially as described.

4. The case constructed with the rib J, in combination with the water-wheel, substantially as described.

5. The combination of the swinging arm P^1, stationary stem P^2 of the foot-pieces R R′, and the stud P of the water-wheel case, substantially as described.

WILLIAM J. LANE.

Witnesses:
JACOB DUREL,
JOSEPH DUBOIS.