T. Williams,

Treadle.

No 31,649. Patented Mar. 5, 1861.

Fig 3.

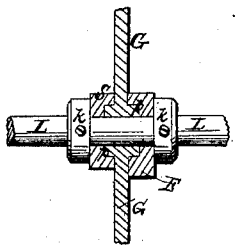


Fig 2.

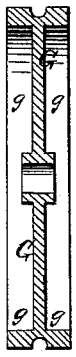


Fig 1.

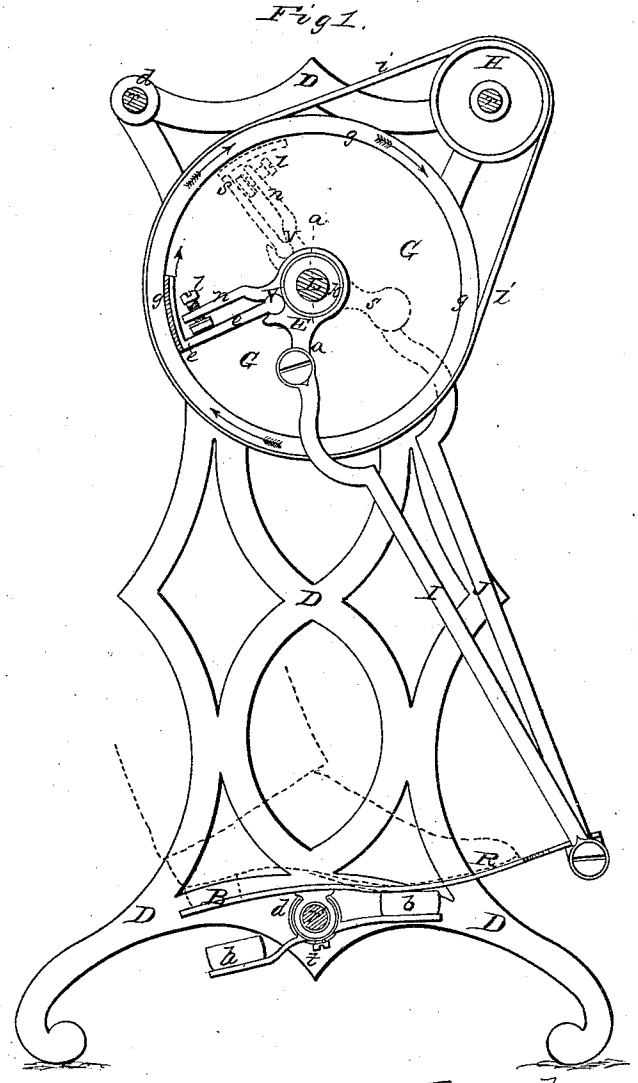


Fig 4

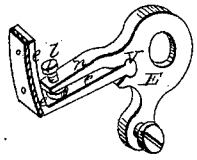


Fig 5

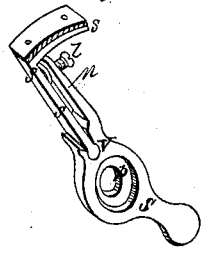
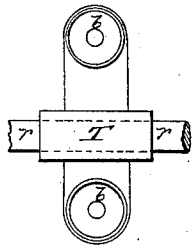


Fig 6



Witnesses.
Edw.d A Osborne
Isaac A Brunell.

Inventor
Turner Williams

A.M. PHOTO-LITHO. CO. N.Y. (OSBORNE'S PROCESS)

UNITED STATES PATENT OFFICE.

TURNER WILLIAMS, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO HIMSELF AND DAVID HEATON, 2D, OF SAME PLACE.

IMPROVEMENT IN CONVERTING RECIPROCATING INTO ROTARY MOTION.

Specification forming part of Letters Patent No. **31,649**, dated March 5, 1861; antedated September 5, 1860.

To all whom it may concern:

Be it known that I, TURNER WILLIAMS, of Providence, in the county of Providence and State of Rhode Island, have invented a new and useful Improvement in Converting Reciprocating Motion into Rotary Motion; and I hereby declare the following specification, with the drawings hereto annexed as a part of the same, to be a full, clear, and exact description of the construction and operation of my machine.

Figure 1 in said drawings is an end elevation of the machine, with the end piece of the frame removed to show the working parts plainly. Figs. 2, 3, 4, 5, and 6 are details, which are referred to in the course of the description.

Similar letters of reference denote like parts in all the figures.

In the drawings, D is the frame, composed of two ornamental end pieces of cast-iron, connected in a firm and substantial manner by means of rods *r r r'*, the ends of which fit snugly, and are fastened in the hubs *d d d* of the end pieces. The rod *r'* serves as an axis for the treadle R to swing or rock upon, said rod passing through two ears formed upon the under side of the treadle for the purpose. Beneath the treadle are two buffers of india-rubber, *b b*, fixed upon the projecting arms of the sleeve T, as shown in Fig. 6, and held in their proper position by the set-screw *t*. These buffers limit the action or stroke of the treadle, but may be adjusted in position upon the rod *r'* to impart the stroke in any desired direction. The treadle is formed to accommodate one or both feet of the operator, and may be made of cast-iron. Projecting from the toe thereof is a hub, to which the rods I and J are attached by screw-studs in a swinging joint upon each side of the treadle. The rods are curved at the upper end to avoid contact with the shaft L in their movements, and are secured in a turning joint to the arms E and S by screw-studs, as shown.

The shaft L revolves in bearings formed in hubs provided for the purpose upon the two cast-iron end pieces, and upon said shaft is a fixed pulley, G, a transverse section of which is shown in Fig. 2. This pulley has a wide rim, which may be turned flat upon its face to accommodate a flat driving-belt; or an oval groove may be turned therein to drive with a round belt. The under side of the wheel-rim is turned to a true surface upon both sides of the rib-plate, so as to present two flat circular paths, *g g*, to be traveled by the pawls *e s*. These pawls are formed with a foot projecting at right angles, with its shank in the direction in which it is intended the wheel shall revolve, and the said foot is shod with leather next to the wheel-rim to create friction between the two surfaces. The shanks of the pawls are hinged at V in the hub or circular portion of the arms E and S, respectively. A finger, *n*, extends from the hub of each arm, in advance of and nearly parallel with the pawls, through the end of which passes a screw, *l*, having a metal washer upon the point, which is shod with leather to prevent wear. By means of this adjusting-screw the swinging of the pawl in the joint V is limited and controlled to regulate the action of the pawls with respect to the surface with which the foot-piece acts.

The arms L and S are formed respectively as shown in Figs. 4 and 5, and are arranged upon each side of the driving-wheel, the shaft L passing through the hub of each and revolving freely therein. The hub of the wheel is let into a circular cavity, *p*, formed in each arm for its reception, as shown in Fig. 3, so that the hub of both arms may have a bearing upon the shaft directly beneath the wheel-rim, and close as possible to the wheel, in which position they are held, by the fixed collars *k k*, upon the shaft outside of each. The relative position of the arms E and S upon the shaft is such that the pawls act in the same space upon opposite sides of the wheel-rim, and the said arms extend each side of the shaft in the same angle with respect to the direction of the line of motion communicated thereto from the treadle, as shown in Fig. 1.

The motion of the wheel G is imparted to the wheel H by the belt *i*, running in the oval groove in the face of wheel G, and a similar one formed in H, and from thence motion and power may be transmitted to other machinery.

The several parts of the machine, being constructed and arranged as described, constitute a driving mechanism which may be successfully applied to sewing-machines, turning-

lathes, and other machines of similar character. In the form presented the machine is arranged for driving sewing-machines, the operation of which is as follows: The foot of the operator is applied to the treadle in the position shown by the dotted lines in Fig. 1, the arch of the foot resting directly over the axis of the treadle, and a rocking motion imparted thereto by pressing down alternately with the heel and toe of the foot, which imparts a reciprocating motion at the point of the treadle, to which the rods I and J are attached. If in the position shown in Fig. 1 the rear end of the treadle be pressed downward, the forward end is raised, and the motion of the upward stroke is communicated through the rods I and J to the arms E and S, swinging the said arms upon the shaft in opposite directions, as indicated by the arrows. This opposite movement produces an opposite effect upon the two pawls *e* and *s*, producing in *e* an instantaneous nipping action with its path upon the wheel-rim, to which it is thereby attached, and communicates the motion received from the treadle to the wheel, causing the latter to revolve in the direction shown by the arrows. At the same time the opposite movement of arm S destroys the nipping action in the pawl *s* and frees the foot-piece of said pawl from close contact with its path on the wheel-rim, and it returns to attach itself by the nipping action just mentioned in a position in the rear of and near the point from which pawl *e* first started, which attachment takes place instantly upon the change of motion of the two arms, produced by the downward stroke of the treadle, which next follows, when pawl *s* takes up and continues the rotary movement of the wheel. At the same movement of the treadle pawl *e* retreats, preparatory to transmitting a successive movement to the wheel in its turn. In this alternate action of the two pawls no perceptible variation from a perfect rotary motion is seen, the wheel revolving steadily in one direction only, which direction may be secured by exchanging the arms upon the wheel or by substituting others in which the pawls act in opposite directions. Thus it will be seen that the reciprocating motion of the treadle is converted, through the medium of the rods I and J, the arms E and S, and the alternate nipping action of the pawl *e* and *s*, into the rotary motion of the wheel G.

This mechanism is peculiarly adapted for driving sewing-machines, as a steady rotation of the wheel is produced by the slightest movement of the treadle; and, as the wheel revolves in but one direction, all disarrangement of the sewing parts is avoided which arises from revolving the driving-wheel in the opposite direction from that intended. Again, as the power is applied directly at the point from which it is imparted to the machine driven, the best effort of the operator is transmitted in power to the machine, at the same time the driving-wheel is wholly under the control of the operator to produce a very slow positive revolution, which is often found desirable in adjusting and regulating the working of sewing-machines and in connecting any accidental disarrangement which may happen. Finally, this mechanism places the positive revolutions in one direction of a driving-wheel, in whatever capacity it may be employed, wholly under the control of the operator.

I have conceived the idea of arranging my machine with but one rod and vibrating arm by supplying a spring force which will return the single pawl to perform its successive strokes or motions; but I prefer the arrangement herein described, as producing a more perfect rotary motion and for other advantages it is found to possess. A more equal motion may be imparted to the pawls by substituting racks and pinions for the rods I J and arms E S; but said arrangement is not deemed as practicable on many accounts.

I do not claim the within-described treadle R and rods I J, the same having been previously used for the purpose.

I claim—

1. The peculiar friction-pawls *e* and *s*, constructed in the manner substantially as described, for the purpose specified.

2. The combination of the said friction-pawls or their equivalent with the surfaces *g g* of the driving-wheel, arranged and operating therewith, substantially as described, for the purpose set forth.

TURNER WILLIAMS.

Witnesses:

EDWD. A. OSBORNE,

ISAAC A. BRUNNELL.