T. A. SEARLE.

Nail Plate Feeder.

No. 55,722. Patented June 19, 1866.

Fig. 1

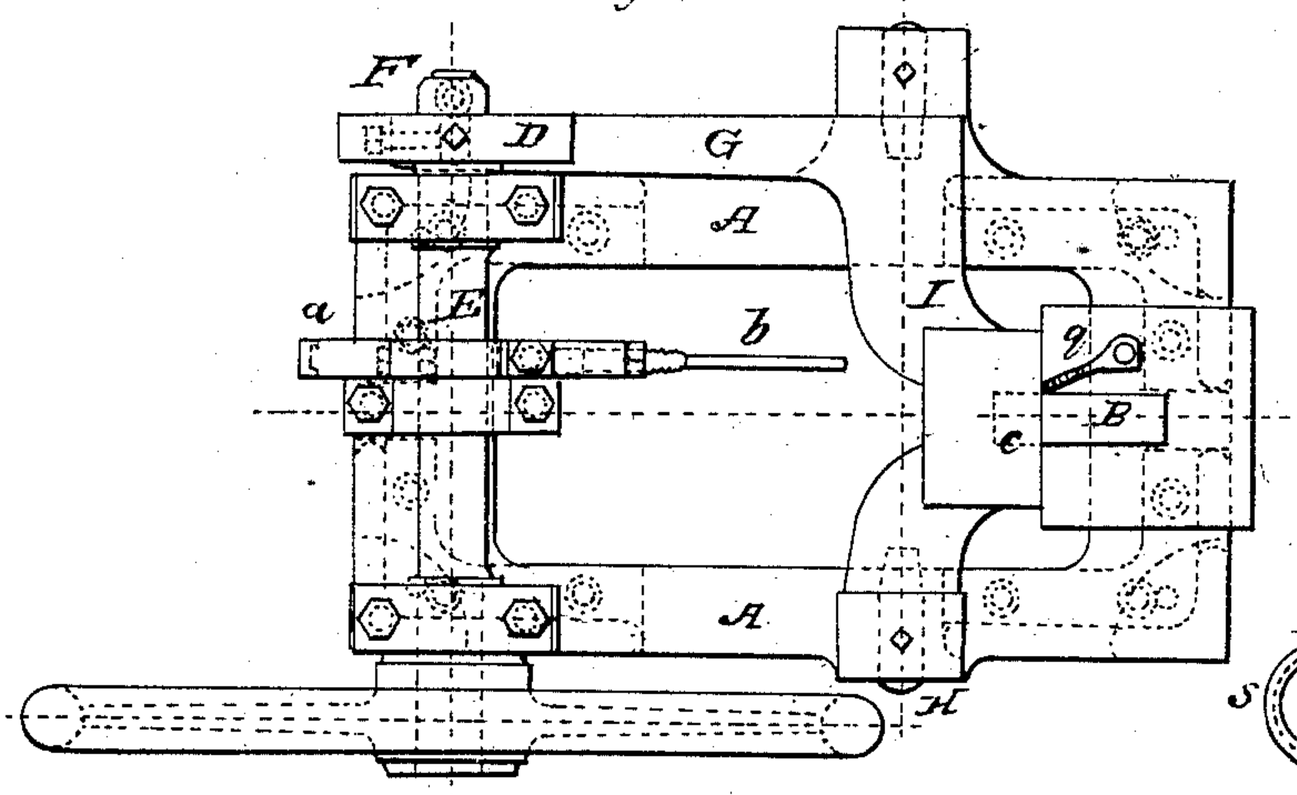


Fig. 2

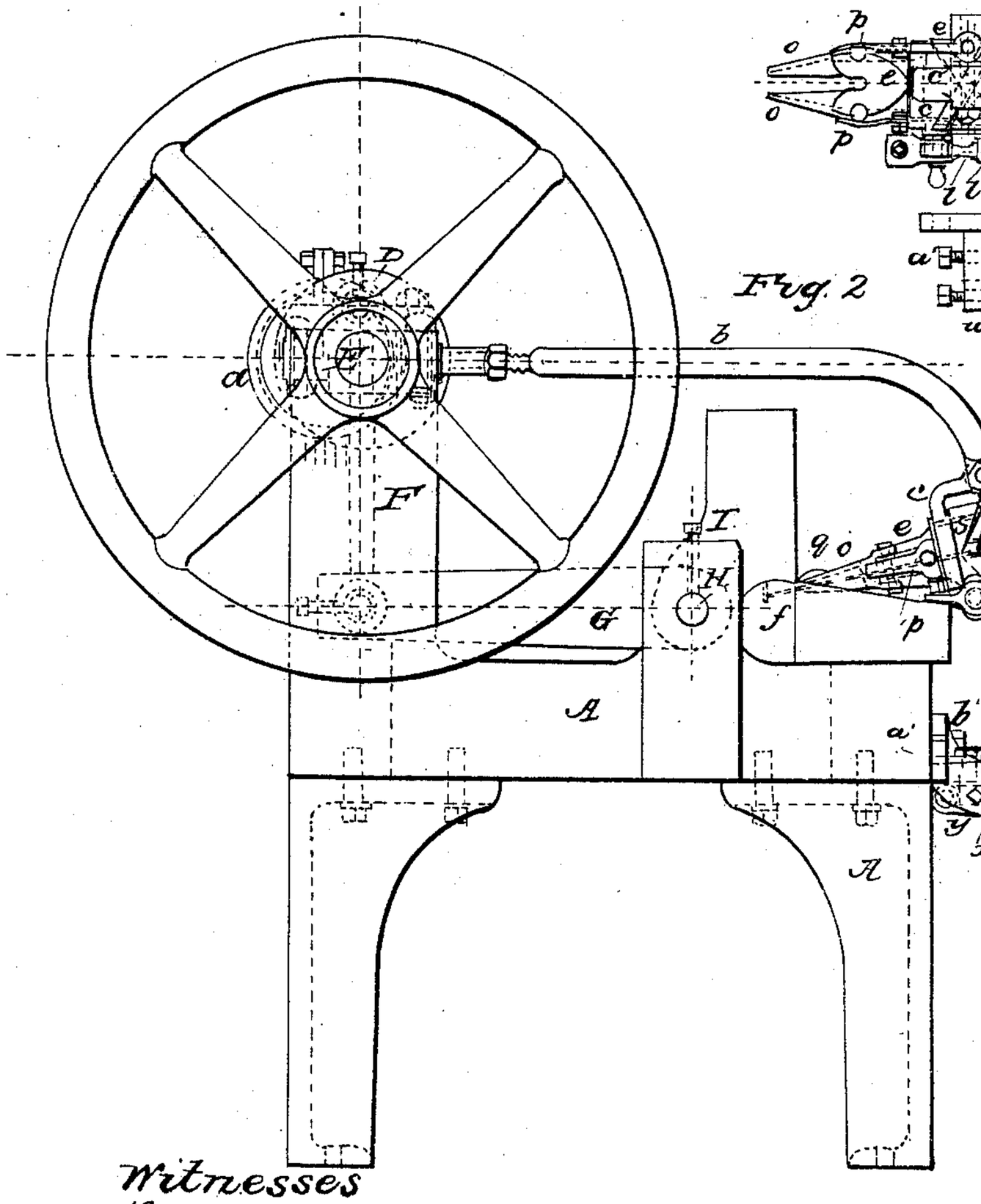


Fig. 5

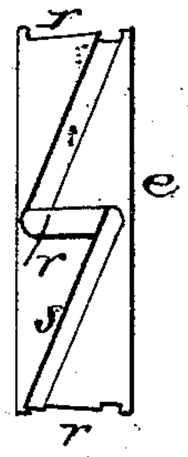


Fig. 4

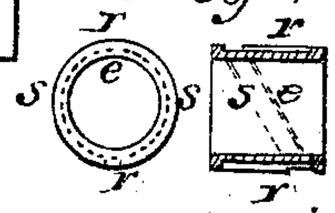


Fig. 3

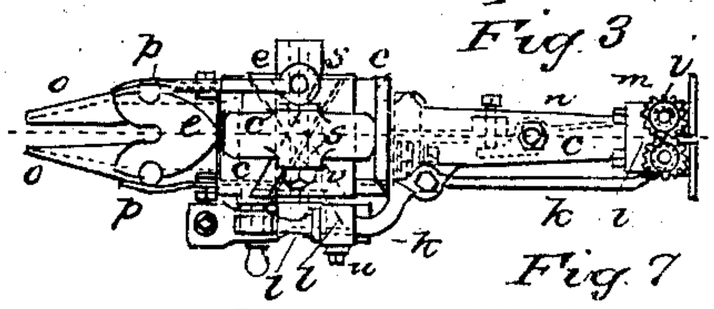


Fig. 7

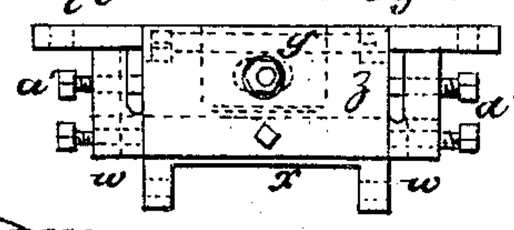
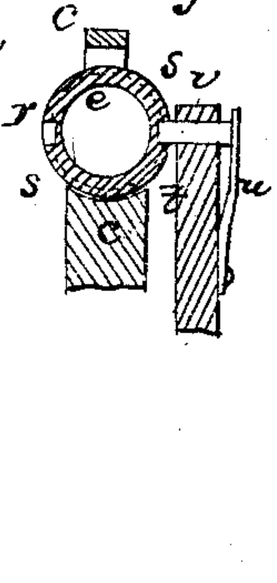


Fig. 6



Witnesses
Benjamin Hall
Henry C Hemborg

Inventor
Thomas A Searle

N. PETERS. Photo-Lithographer. Washington. D. C.

UNITED STATES PATENT OFFICE.

THOMAS A. SEARLE, OF PROVIDENCE, RHODE ISLAND.

IMPROVEMENT IN NAIL-PLATE FEEDERS.

Specification forming part of Letters Patent No. **55,722**, dated June 19, 1866.

To all whom it may concern:

Be it known that I, THOMAS A. SEARLE, of Providence, in the State of Rhode Island, have invented a new and useful Improvement in Machinery for Feeding Nail-Plates to Nail-Cutting Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a plan of a nail-cutting machine without the feeding mechanism; Fig. 2, a side elevation with the feeding mechanism; Fig. 3, a separate top view of the feeder-frame; Fig. 4, a longitudinal section and end view of the cam for turning the nail-plate; Fig. 5, a view of the said cam developed; Fig. 6, a cross-section of the feeding mechanism, taken at the line A *a* of Fig. 2, and Fig. 7 a separate view of the means by which the feeder-frame is connected with the main frame.

The same letters indicate like parts in all the figures.

In nail-cutting machines the range of motion of the movable knife or cutter is made as short as possible, because the shorter it is the greater will be the leverage of the mechanism that impels it; and, besides, experience has proved that the machines which give to the movable knife the shortest range of motion can be run so as to make the greatest number of cuts in a given time, and are the least liable to wear and tear.

An automatic nail-plate feeder, to be of general practical utility, must be adapted to the nail-cutting machines in use and to the conditions which experience has shown to be essential. As the machines in general use have but one heading mechanism, and the nails are cut tapering, the plate must be turned over after each cut. To perform this operation of turning the plate must be lifted to clear the bed-knife and drawn back to clear the movable cutter, and then not only moved forward to its original position, but that portion which is to form the next nail must be moved forward between the knives. If the turning motion be derived (as in some of the machines heretofore tried for this purpose) from the mechanism which gives the back and forward motion to the plate, the turning motion will not be completed until the end of the forward or feeding-in motion, and the forward end of the plate, in entering between the knives, being still elevated above the bed-knife, will strike against the movable knife, which at that time is descending to make the next cut. On the plans heretofore tried this conflict could be readily avoided by either retarding the downward motion of the movable knife, which would materially reduce the quantity of nails made in a given time, or by increasing the range of motion of the movable knife, which it is not desirable to do, for the reasons before given.

The desideratum is to produce an automatic feeder practically adapted to the existing condition of the nail-machines in use.

I have discovered that the difficulty last referred to can be avoided by completing the turning motion before the motion forward has progressed so far as to cause the plate to enter between the knives, so that no portion of the plate will be between the knives during any part of the turning operation.

In the accompanying drawings, A represents the frame of an ordinary nail-cutting machine; B, the bed-knife, and C the movable knife, which receives motion the usual way from a crank, D, on the main shaft E, by a connecting-rod, F, which extends from the crank to an arm, G, of the rock-shaft H of the stock I of the movable knife.

On the main shaft E there is an eccentric, *a*, the rod *b* of which is connected with a feeder-frame, *c*, which vibrates on a fulcrum-rod, *d*. In this feeder-frame is mounted what I denominate the "feeder-tube" *e*, so that it can turn in the said frame.

The nail-plate *f* is griped by one end in a pair of nippers, *g*, on one end of a cylindrical feeder-rod, *h*, which is griped in the grooves of a pair of feeding-rollers, *i i*, one of which is mounted in fixed bearings in the outer end of the feeder-frame *c*. This roller has a ratchet-wheel, *j*, which is actuated to give the required feeding motion to the feeder-rod to advance the nail-plate the required distance at each operation by a sliding pawl, *k*, when it (the sliding pawl) strikes against a stop, *l*, at the end of the forward motion of the feeder-frame. The arbor of the other feed-roller is mounted in a box, *m*, hinged to the feeder-frame, and provided with a spring, *n*, the tension of which causes this roller to gripe the feeder-rod with sufficient force to insure the movement of the feeder-rod.

The feeder-tube *e*—that is, the end of it which is nearest the knives—is provided with two nose-pieces, *o o*, which are hinged to it on

opposite sides and provided with springs *p p*, the tension of which forces them toward each other to gripe the nail-plate, which slides in grooves formed in their inner faces. By the side of the bed-knife there is a gage, *q*, to guide the nail-plate, so that the edge of it which is nearest the heading mechanism of the machine (not represented) will be always in the required line, however the plate may vary in width, the spring nose-pieces yielding, however the nail-plate may vary in width.

The outer cylindrical surface of the feeder-tube is formed with a cam-groove, *r r* and *s s*. The two parts *r r* are on opposite sides of and parallel with the axis; the two parts *s s* extend from the rear to the forward end of the parts *r*. The form of this cam-groove is clearly represented in the section, Fig. 5, which exhibits the surface of the feeder-tube developed. The parts *r r* of the said cam-groove are deepest at the end toward the knives, and gradually of less depth toward the other, and the oblique parts *s s* are of like varying depth, but of reversed inclination.

By the side of the feeder-frame there is a standard, *t*, to the outer face of which a spring, *u*, with a pin, *v*, attached to it, which extends through a hole in the standard and into the cam-groove *r r s s*, of the feeder-tube, and the tension of the spring tends always to keep the end of it against the bottom of the groove.

As the main shaft rotates the eccentric on the main shaft imparts a reciprocating motion to the feeder-frame, and as it moves from the knives the nose-pieces of the feeder-tube, with the nail-plate, rise from the bed-knife as they move back, to permit the nail-plate to be turned without touching the knives, and as the frame moves forward or toward the knives they gradually descend to bring the nail-plate back onto the bed-knife after it has been turned.

During the back movement one of the oblique parts *s* of the cam-groove runs on the pin *v*, thereby turning the feeder-tube, with the nail-plate, half a revolution, and at the end of this motion the pin *v* springs from the shallow end of the oblique part *s* of the cam-groove into the deep portion of the straight part *r* of the said cam-groove, so that during the said return motion the straight part *r* of the cam-groove runs on the pin *v*, so that the nail-plate does not turn as it approaches the knives—the feeding motion for advancing the nail-plate the required distance for one nail taking place toward the end of the forward motion last described and as the movable knife is descending to make the cut.

At the end of the forward motion of the feeder-frame the pin *v* springs from the shallow end of the straight part *r* of the cam-groove into the deep end of the other oblique part *s*, to be in readiness to turn the feeder-tube at the next operation.

By the means above described the nail-plate will be turned automatically without conflict with the knives, and as the feeding motion takes place during the latter part of the forward motion of the feeding-frame the nail-plate will be fed in between the knives as the movable knife is descending, and without touching this knife, however short may be its range of motion.

To admit of adjusting the feeder-frame up and down and to the right or left, its fulcrum-pin passes through ears *w* of a plate, *x*, which is secured by a bolt, *y*, to the under side of a wide bracket, *z*, the said bolt passing through an elongated hole in the plate *x*, so that by means of set-screws *a' a'* the plate can be adjusted laterally, and, in turn, the bracket *z* is secured to the main frame by bolts *b' b'*, that pass through elongated holes in the bracket, so that the feeder-frame can be elevated or depressed at pleasure. The length of the eccentric rod *b* is also made adjustable by means of screw-coupling or equivalent means. By means of these various adjustments the inclination of the plane of the nail-plate can be adjusted so as to be in line with the axis of vibration of the movable knife, and as this inclination is obtained the proper bearing of the nail-plate on the bed-knife can be readily secured, the lateral inclination can be readily varied to change the taper of the nails, and the whole feeding-frame shifted laterally without varying the inclination when it is desired to change the size of the heads of the nails.

Although I have above described the form of the cam-groove as being such that the whole of the turning motion takes place during the back movement of the feeder-frame, it will be obvious that by slightly changing the form of the groove a portion of the turning motion may take place during a portion of the forward motion, provided such turning motion be completed before the end of the said forward motion; and although I have described the said cam-groove as being formed on the periphery of the feeder-tube, I do not wish to be understood as limiting my claim of invention to such location of it, as that may be varied without materially changing the mode of operation of my said invention, which consists in the use of such a cam for turning the nail-plate that the said turning motion may be completed before the end of the forward motion of the feeder-frame.

What I claim as my invention, and desire to secure by Letters Patent, is—

The cam, substantially such as described, for giving the turning motion to the nail-plate, in combination with the vibrating feeder-frame for drawing back and lifting the nail-plate, that it may be turned, and returning it to the required position on the bed-knife, substantially as described.

THOMAS A. SEARLE.

Witnesses:
ANDREW DE LACY,
WM. H. BISHOP.