T. WOLCOTT.

Gear-Cutting Machine.

No. 223,088. Patented Dec. 30, 1879.

Fig 1.

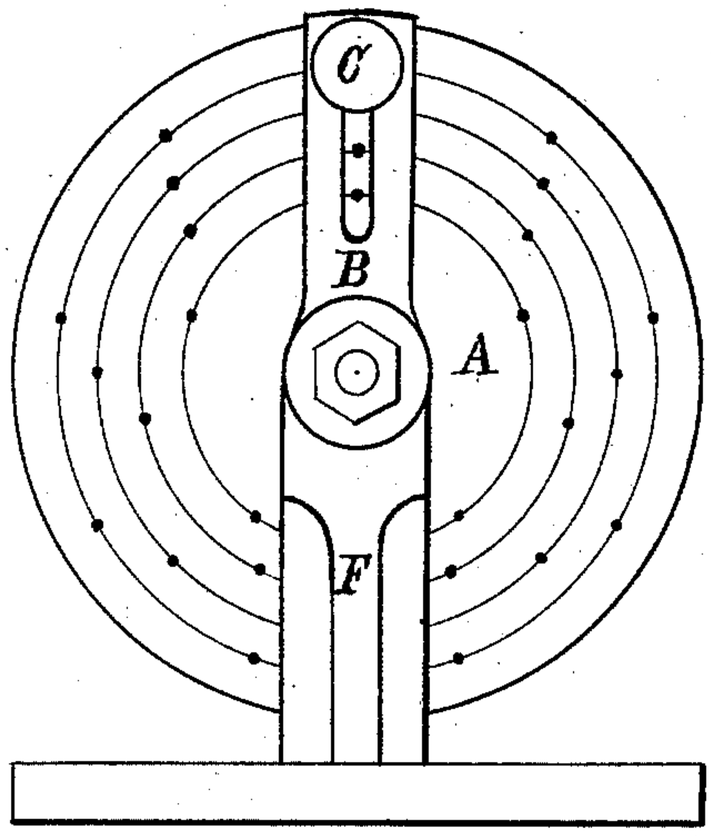
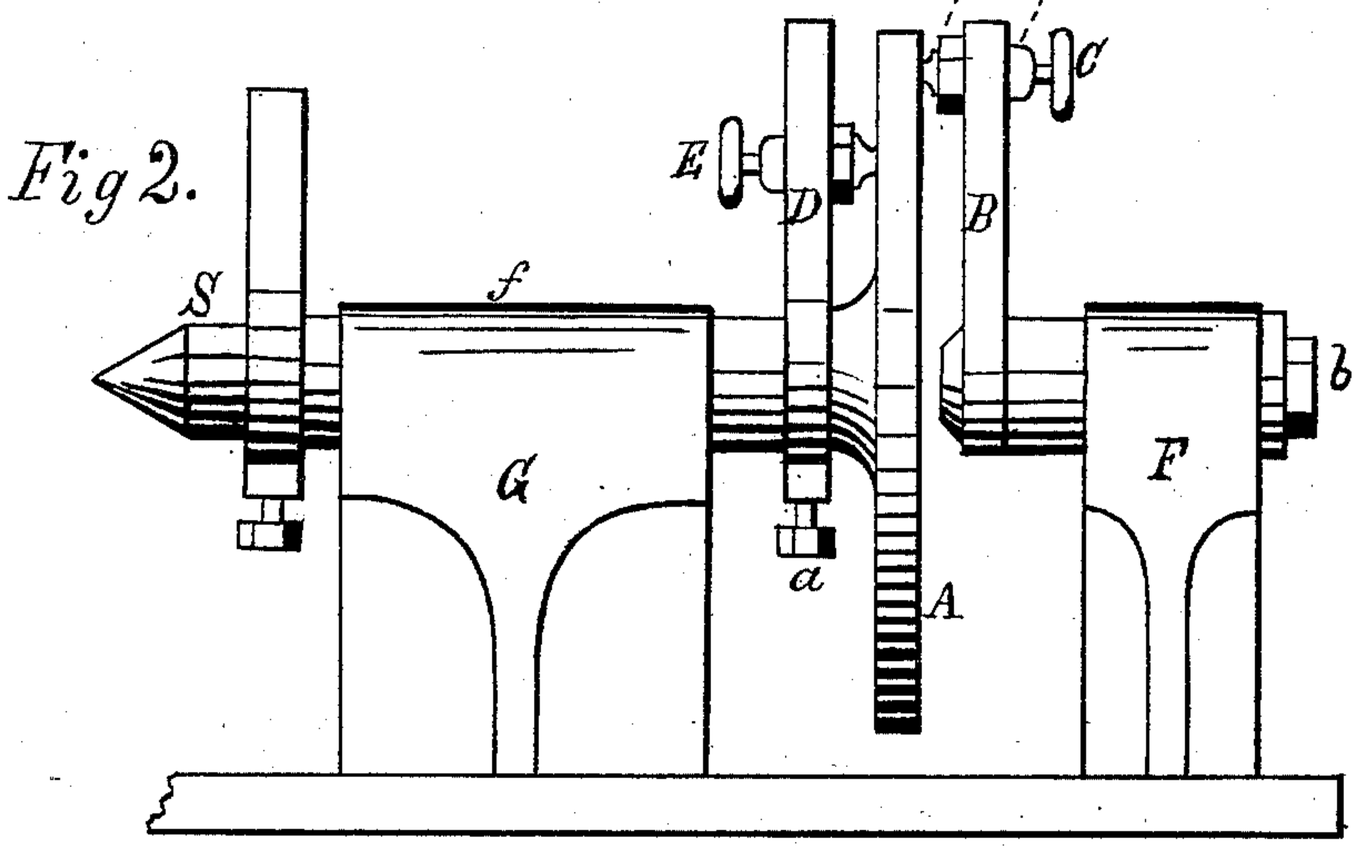


Fig 2.



Witnesses

John Wilson

Charles A Seeley

Inventor

Townsend Wolcott.

UNITED STATES PATENT OFFICE.

TOWNSEND WOLCOTT, OF NEW YORK, N. Y.

IMPROVEMENT IN GEAR-CUTTING MACHINES.

Specification forming part of Letters Patent No. **223,088**, dated December 30, 1879; application filed June 7, 1879.

To all whom it may concern:

Be it known that I, TOWNSEND WOLCOTT, of the city, county, and State of New York, have invented a new and useful Improvement in Machines for Cutting Gear or Teeth of Wheels, and such like purposes; and I hereby declare that the following is a description of the invention, reference being had to the annexed drawings, forming part of this specification, in which—

Figure 1 is a front view of the index-plate, a slotted arm, and spring-pin; and Fig. 2 is a side elevation of the index-plate, adjustable arms, and the spring-pins.

Similar letters refer to like parts on both figures.

In common gear-cutting machines the index-plates are made with a very large number of guide-spaces, and in each plate, for the highest number of teeth to be cut upon a blank, there is an equal number of guide-spaces, such as three hundred and fifteen for three hundred and fifteen teeth, whereas by my improvement I can cut that number of teeth with only nine guide-holes in the largest circle of my index-plate, in which, as represented, there are only four circles; and I do it by three combinations of the circles, while with four or all the circles of holes I can cut no less than two thousand five hundred and twenty, (2,520.)

The nature of my invention consists in providing an index-plate with a series of holes of prime numbers and the powers of prime numbers arranged in several concentric circles of different diameters; also, the combination of my index-plate with adjustable arms and adjustable spring-pins, whereby a very large number of teeth may be cut upon blanks with a very small number of guide-holes in the index-plate.

In the figures, A represents the index-plate. It has four circles of holes. The inner one has five equidistant holes; the next one has seven. These are prime numbers. The outer circle has nine holes. It is the power of three. There is also a circle with the even number of eight holes. It is the cube of two, and is very convenient. The first holes of the circles in the said plate A are on the same radial line, as shown in Fig. 1. This is the first guide-line for laying out the work. This index-plate may also be made with any desired number of concentric circles and suitable holes; but those represented are sufficient for explaining the invention.

S is the spindle or shaft, upon which the plate A is secured, and upon the outer end of which the metal blank to have teeth cut upon it is fastened.

B is a slotted radial arm, attached by its collar on a short shaft, to which it is tightened by the nut *b*. F is a block for sustaining the journal-box of said shaft. C is a spring-pin, which is capable of being adjusted and held at any point in the slot of the arm B by the nut *c*. The pin C works through a small box, *d*, which has a spiral spring in it, and the thrust of said pin is against the face of the index-plate. The object of this spring in the box *d* is to force the pin C into the holes of the index-plate to arrest said plate at the proper intervals.

The tool for cutting the teeth on the metal blank is arranged and operated in the usual way, and need not be further described.

D is another slotted arm, similar to B in construction and operation, but is set on the opposite side of the plate A. It also has an adjustable spring-pin, E, which can be moved and set at any point in the slot of the arm.

The two slotted arms B D are alike, and capable of being moved round with the index-plate A, or of being made fast by their nuts to hold them in any position as required. They hold different offices while the machine is in operation; but their offices are interchangeable. The one spring-pin acts as an intermittent stop-motion, while the other acts as a dividing or laying-out pin.

The index-plate A may also be used like a common one, according to the number of holes in it, by throwing one of the adjustable slotted arms out of action; but this does not require further mention.

I will describe the spring-pin C as the stop of the index-plate, to arrest its motion at the proper cutting intervals.

The spring-pin E, I will describe as being used to divide and lay out the intervals or spaces for the teeth to be cut.

With three combinations of three circles of odd holes—namely, nine, seven, and five—I will describe how three hundred and fifteen (315) may be cut on a metal or other blank.

The slotted arm B is screwed tight on its

shaft by the nut *b*, and it is so set that its spring-pin C is the stop-motion which arrests the index-plate A for every tooth to be cut. The said pin is now set on the outer circle of nine holes. The dividing or laying-out spring-pin E of the slotted arm D is set on the circle of seven holes, and it is intended to cut sixty-three teeth by this first combination. The blank is fastened on the spindle S, and the first cut is made upon it at the radial line of all the circles.

For the next cut the spring-pin C is drawn out of the hole in the plate A, and the said plate moved round until the inner end of the pin C snaps or springs into the next hole in the circle of nine, and the index-plate and its spindle, with the blank upon it, are arrested and another cut made on the blank, and so on until a revolution is made and nine cuts made, the arm B having been held fast in position, its shaft being held fast by the nut *b*. The pin *a* is for securing the collar of the arm D fast to the spindle S of the index-plate as it revolves or moves in its journal-box *f* on block G.

For the next divide the nut *b* is slackened so that its shaft and the arm B can be moved round. The spring-pin C is kept in its hole in the index-plate. The pin E is withdrawn out of its hole in the circle, and its inner end presses on the face of said plate. The index-plate A, with the arm B, is now turned or moved round until the spring-pin E of the arm D snaps into the next hole in the said plate of the circle of seven. The nut *b* is then screwed up and its shaft tightened, and the arm B made fast, to commence another revolution of the index-plate, and making another nine cuts on the blank secured on the spindle S, as has been already described.

After every revolution the nut *b* is slackened, the index-plate moved and set one hole in the seven, as has been described, until seven revolutions are completed and sixty-three teeth cut upon the blank. Nine stops are effected by pin C during each revolution of the index-plate, and seven divides are made by the laying-out spring-pin E in cutting the sixty-three teeth.

The next combination to be made is with the inner circle of five holes, the divides of which and the guiding of the index-plate will produce three hundred and fifteen teeth, ($9\times7=63\times5=315$.) The spring-pin E is next shifted in its slot to take into the holes of the inner circle of five, and it is moved one hole from the start on the general radial line, the arm B, with its spring-pin C and the index-plate, being moved and adjusted, with the blank on the spindle S divided for a new cut on the fifth, and the circle of seven is at the same time guided by the circle of five. At this point the pin E is slackened in its slot and moved back to the circle of seven and screwed fast. A new series of stops and movements of the index-plate is now commenced, like as has been described.

At every revolution of the index-plate and its spindle holding the blank the guide-pin E is shifted one hole in the circle, and the arm B, with the index-plate, also moved and shifted, as before described, until sixty-three cuts are made. Then the guide-pin E is shifted down to the circle of five, and moved forward another hole in the said circle, and another divide of five is made, with the aforedescribed movements and changes repeated, until the five divides are made by the five holes of the circle, and three hundred and fifteen stops of the index-plate A made, and as many cuts also made on the blank which is secured on the outer end of spindle S. Thus, with thirty-five revolutions of the index-plate, and the combinations of the three circles, having a total of only twenty-one (21) holes, no less than three hundred and fifteen teeth will be cut; but any number of suitable circles and holes may be made in this index-plate, and other combinations than those described effected.

Thus with the circle of the even number of eight holes in plate A, I make divides of a half, a fourth, and an eighth of an odd number, and teeth from two up to no less than two thousand five hundred and twenty may be cut by four combinations, ($9\times8\times7\times5=2520$.) But three combinations are all that will be required in common manufacturing operations.

The number of combinations and operations presented and described are sufficient to show the great number of products in gear-cutting obtained with my index-plate, having such a small number of holes, combined with the adjustable slotted arms and the adjustable spring-pins.

Common index-plates are expensive and comparatively large, because they are necessarily made with so many guide-spaces. By my invention comparatively small and inexpensive guide-plates may be employed.

I am aware that index-plates having guide-holes on concentric circles are not new, and the novelty of my plate is limited to the peculiar disposition and arrangement of the guide-holes on such plates.

I claim—

1. The plate A, having holes to the number indicated, arranged in concentric circles and otherwise, substantially as described.

2. The combination of the two slotted arms B D, with their adjustable spring-pins C E, and the index-plate A, for the purposes set forth.

3. The two adjustable spring-pins C E, operating, in combination with the index-plate, as interchangeable guide and stop pins, as set forth.

TOWNSEND WOLCOTT.

Witnesses:

CHARLES A. SEELEY,

J. A. FRASER.