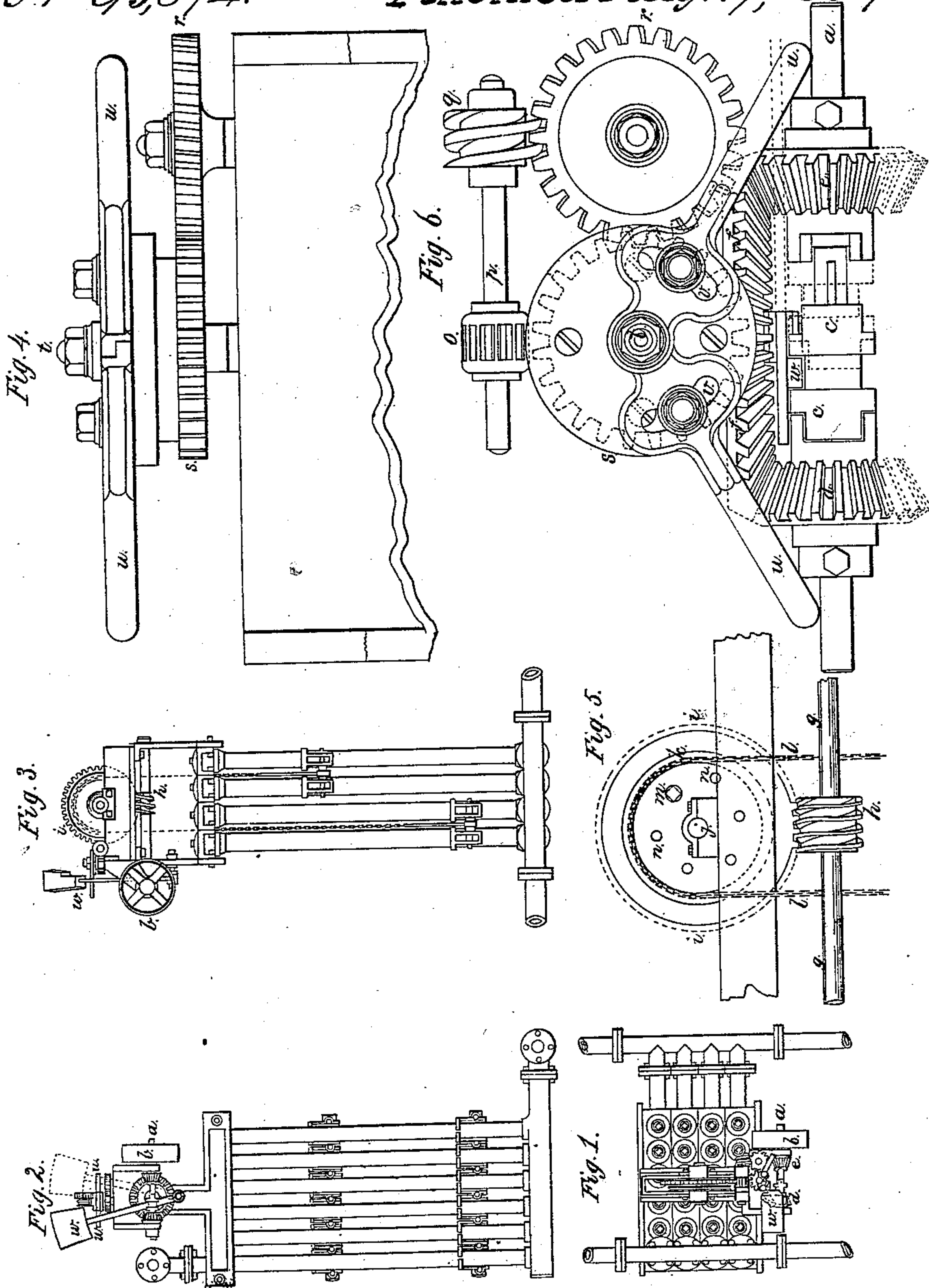


*E. Green.*  
*Boiler Cleaner.*

*N<sup>o</sup> 93,844.*

*Patented Aug. 17, 1869.*



*Witnesses*  
*Smith*  
*Scott*

*Inventor,*  
*Edward Green*



# United States Patent Office.

EDWARD GREEN, OF WAKEFIELD, ENGLAND.

Letters Patent No. 93,874, dated August 17, 1869; patented in England, August 25, 1866.

## IMPROVEMENT IN BOILER-TUBE-SCRAPING DEVICE.

The Schedule referred to in these Letters Patent and making part of the same.

To all to whom it may concern:

Be it known that I, EDWARD GREEN, of Wakefield, England, engineer, have invented or discovered certain "Improvements in Gearing or Apparatus for Driving Scrapers, Employed in Cleansing the Flues and Tubes of Boilers and Heating-Apparatus;" and I do hereby declare that the following is a full, true, and exact description thereof, reference being had to the drawings hereunto annexed; that is to say—

My invention relates chiefly to the scrapers used in what are known as "fuel-economizers," for keeping the surface of the pipes of the economizers clean, and free from soot, and other deposit. These scrapers are ordinarily worked by chains passed over pulleys formed with a V-groove.

My invention consists—

First, in devices for one reversing motion for several pulleys, round which the scraper-chains pass, such pulleys being driven by worms, or other gearing;

Secondly, in the arrangement of the gearing and arms, whereby to obtain a reciprocating motion;

Thirdly, in devices for altering the length of traverse;

Fourthly, in the devices for fitting the worm-wheels loosely upon the shafts of the V-pulleys, so that they may be fastened thereon at pleasure, or any one or more of them thrown out of gear; and

Fifthly, in the devices for removing the weight from the driving-clutch box and gearing, when the clutch-box is getting just into gear, and reversing, by means of a slot in the pulleys, all as hereafter described.

Figure 1, of the accompanying drawings, is a plan;

Figure 2, a side elevation;

Figure 3, an end elevation, representing my improvements; and

Figures 4, 5, and 6, are enlarged views of the principal actuating-parts, shown, in the previously-named general views, detached.

Upon a shaft, *a*, on which is mounted a pulley, *b*, driven from the engine, or otherwise, I fit, by means of a feather or key, a sliding-clutch box, *c*, which drives a pair of bevel-pinions, *d e*, mounted thereon.

These pinions drive a bevel-wheel, *f*, on the end of a shaft, *g*, formed, at intervals, with worms, *h*, to gear into and drive worm-wheels, *i*.

These worm-wheels are mounted loosely upon and drive shafts, *j*, of the V-pulleys *k*, round which the scraper-chains *l* pass.

The worm-wheels *i*, or other gearing, are mounted loosely upon the shafts of the V-pulleys *k*, but each is fastened, when required, by means of a set-screw, *m*, passed through a slot, *n*, in the pulley.

The chains *l* thus receive motion for working the scrapers; but, in order to convert this positive motion

of the chains into a reciprocating motion, I adopt the following arrangement:

I cause one of the worm-wheels *i*, by preference that next the bevel-wheel *f*, to gear, as shown, into a pinion, *o*, on a worm-shaft, *p*, the worm *q* of which drives an idle worm-wheel, *r*, and this, in its turn, gears into and drives another wheel, *s*, working on a stud, *t*.

On this stud or centre, I place a pair of arms, *u u*, the position of which is adjustable by means of a set-screw and slot-hole, *v*, to allow these arms *u u* to be set to any position, with the object of altering the length of traverse of the chains *l*.

As these arms *u u* move round, one of them, at the proper time, comes against a knock-over lever, *w*, which is pivoted at its lower end, while its upper end is, by preference, weighted.

When this lever is carried by the arm *u* past its centre, it falls, by its own weight, into the opposite position to that it before occupied, and, in so falling, it moves the clutch-box *c*, and thereby reverses the motion.

By removing any one of the set-screws *m*, which fasten the V-pulleys *k*, no further motion will be given to the particular pulley, as its worm-wheel *i*, or other gearing, would then run idle. This pulley may then be repaired without stopping the others, and a handle may be fitted to the square end of its shaft, to allow of the scraper or scrapers, connected therewith, being worked by hand.

When the clutch-box *c* is getting just into gear, and reversing; the weight is thrown off it by means of the slots *n*, allowing the worm-wheels *i* to travel a certain distance without driving the V-pulleys *k* and chains *l*.

Sometimes, instead of the arrangement of reversing-gearing, hereinbefore described, I employ other well-known motions, and, in this case, as the V-pulleys *k* and scrapers stand for a short time when the reversing is taking place, owing to the driving set-screws *m* working in the slots *n*, before described, the weight is thrown off the main driving-gearing when reversing is taking place.

I do not, however, claim the employment of other motions for giving the reciprocating motion, except when used in conjunction with two or more sets of pulleys, and the set-screws, and slots, and disconnecting-wheels, as hereinbefore explained.

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

1. The clutch-box *c*, bevel-pinions *d e*, bevel-wheel *f*, constructed and arranged to operate as described.
2. The worm-wheel *i*, mounted loosely on shaft of pulley *k*, in combination with said pulley, set-screws *m*, and slots *n*, substantially as described.

3. The arms *u*, in combination with the knock-over lever *w*, and clutch-box *c*, substantially as described.

4. The slot *v*, and set-screw, in combination with the arms *u u*, substantially as described.

5. The combination of a reversing or reciprocating motion, of two or more pulleys, set-screws, and slots, and disconnecting-wheels, substantially as hereinbefore described, and represented in the accompanying drawings.

In witness whereof, I, the said EDWARD GREEN, have hereunto set my hand, this      day of 1869.

EDWARD GREEN.

Witnesses:

J. SMITH, *Wakefield.*

J. SCOTT, *Wakefield.*