

(No Model.)

W. HARGREAVES & W. INGLIS.

ENGINE FOR STARTING OR TURNING LARGE ENGINES.

No. 316,776.

Patented Apr. 28, 1885.

FIG. 2.

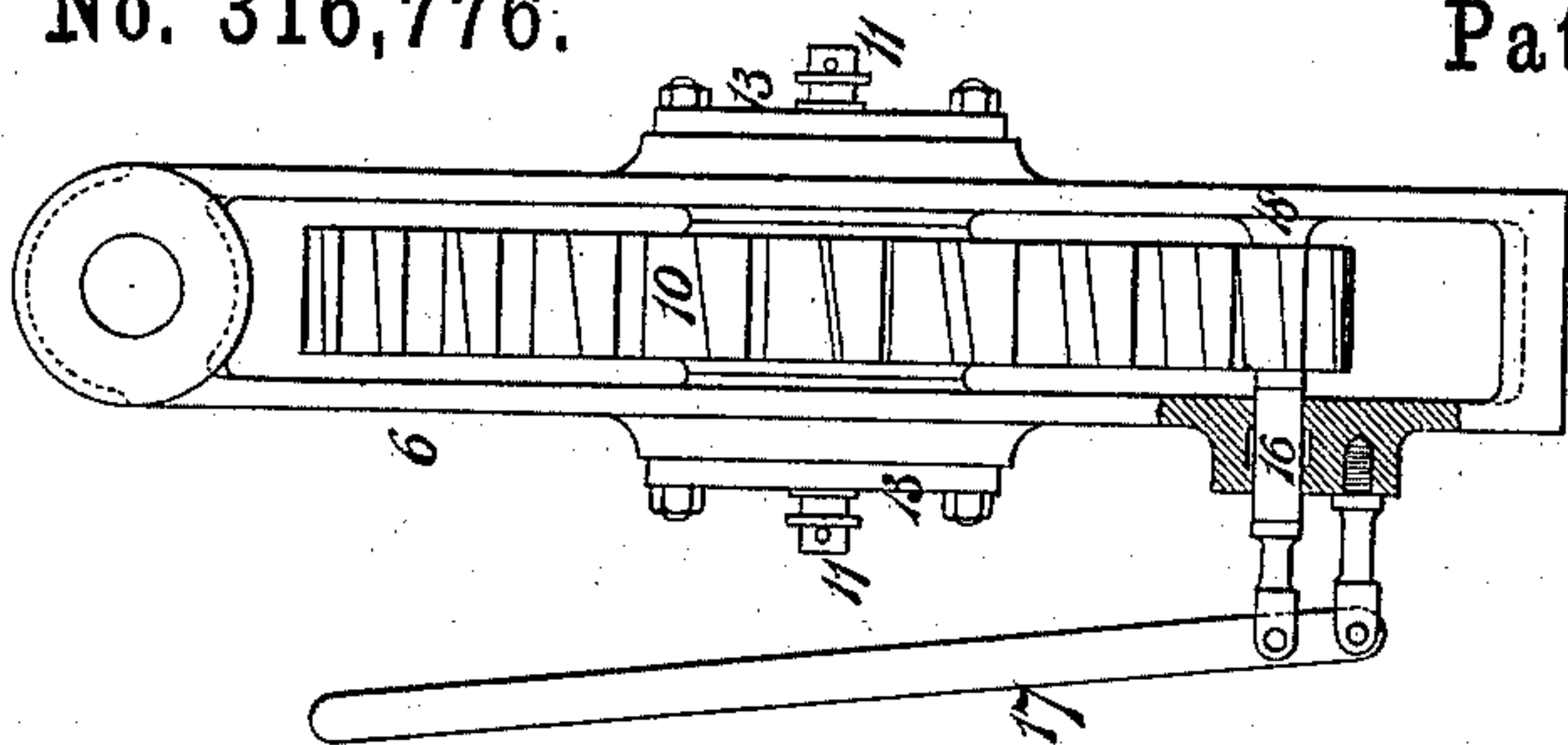


FIG. 1.

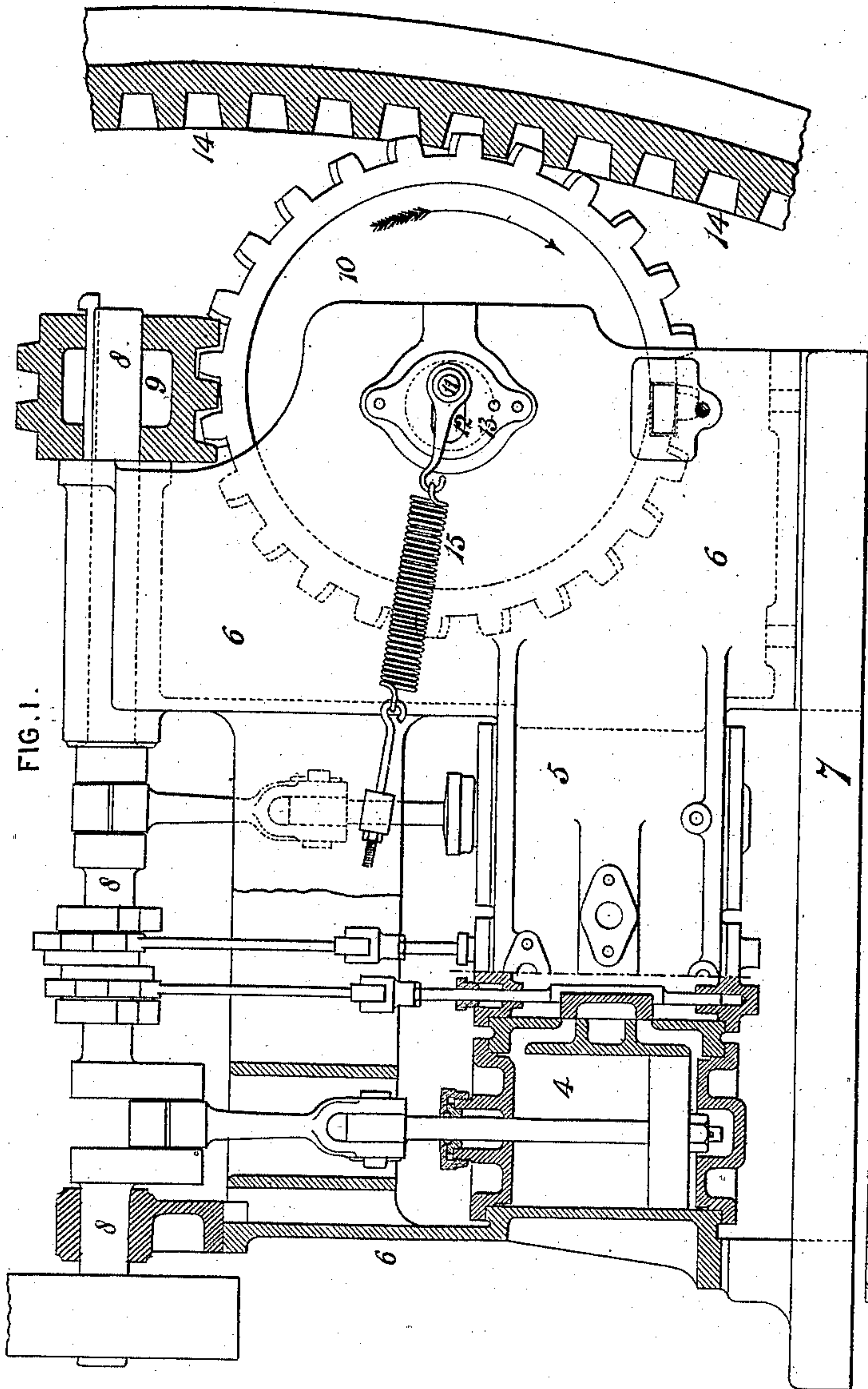
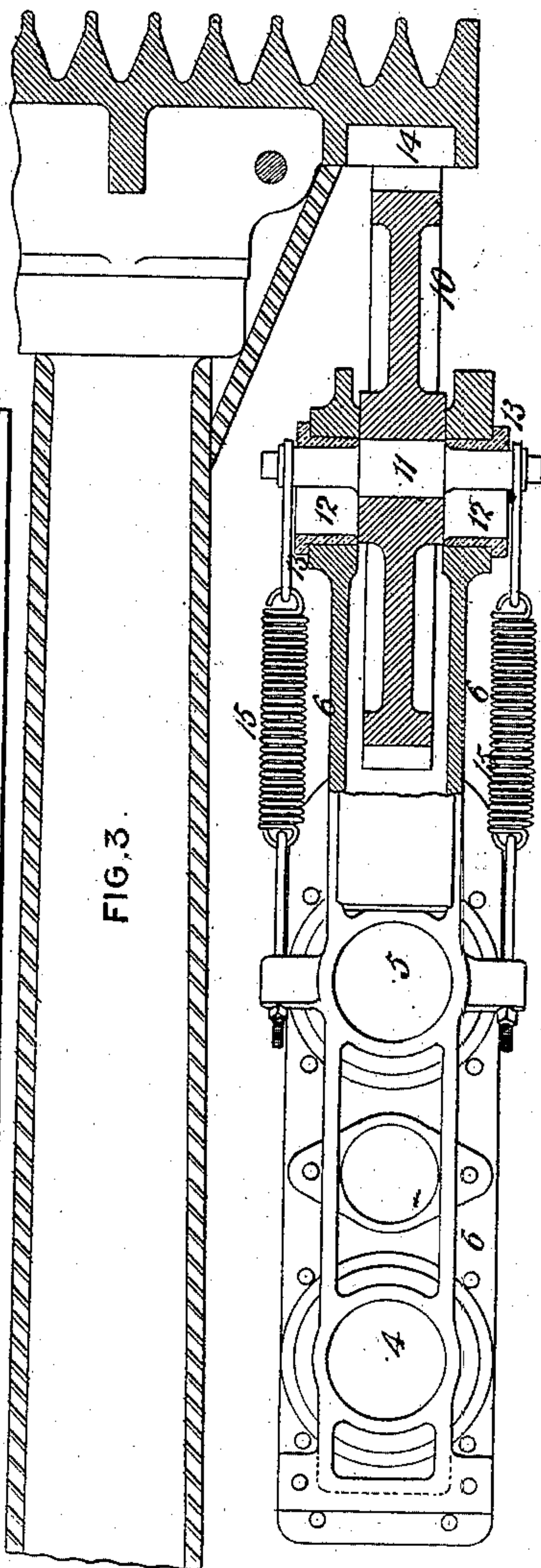


FIG. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM HARGREAVES AND WILLIAM INGLIS, OF BOLTON, COUNTY OF LANCASTER, ENGLAND.

ENGINE FOR STARTING OR TURNING LARGE ENGINES.

SPECIFICATION forming part of Letters Patent No. 316,776, dated April 23, 1885.

Application filed August 4, 1884. (No model.) Patented in England April 23, 1884, No. 6,702; in France June 14, 1884, No. 162,754, and in Belgium June 16, 1884, No. 65,487.

To all whom it may concern:

Be it known that we, WILLIAM HARGREAVES and WILLIAM INGLIS, subjects of the Queen of Great Britain and Ireland, and residing at Bolton, in the county of Lancaster, England, have invented certain Improvements in Engines for Starting or Turning Large Engines, (for which we have applied for the following patents: British, dated April 23, 1884, No. 6,702; French, dated June 14, 1884, No. 162,754; Belgian, dated June 16, 1884, No. 65,487,) of which the following is a specification.

Our said invention has for its object to arrange and combine the parts of engines for starting or turning large engines in an improved manner, and especially so that the small engine will automatically become disengaged from the large engine on the latter acquiring a greater motion than that corresponding to the motion of the small engine.

In carrying out our said invention a duplex-toothed wheel or worm-wheel pinion is arranged to act on a toothed part of the fly-wheel of the large engine or on any convenient toothed wheel of the large engine, and is itself acted on by a worm on the crank-shaft of the small engine. The shaft of the worm-wheel pinion can slide in guides parallel to the shaft on which the worm is fixed, the extent of sliding movement provided for being sufficient for putting the worm-wheel pinion into gear with or out of gear from the toothed wheel of the large engine. A brake is arranged for applying a slight frictional resistance to the worm-wheel pinion at the part opposite to that acted on by the worm, and when the brake is applied and the small engine set in motion the worm-wheel pinion is made to move into gear with the toothed wheel of the large engine, and it remains in gear therewith and turns the large engine until the increasing speed of the latter so alters the strains as to make the worm-wheel pinion recede out of gear from it.

In the accompanying explanatory drawings, Figure 1 is a vertical section of the small engine and of part of the toothed wheel of the large engine. Fig. 2 is an end elevation of the worm-wheel pinion and part of the fram-

ing of the small engine, and Fig. 3 is a horizontal section corresponding to Fig. 1.

In these drawings the same reference-numerals are used to mark the same or like parts wherever they are repeated.

The small engine comprises two cylinders, 4 5, with their accessories and carried by a frame, 6, bolted down to a sole-plate, 7. The cylinders 4 5 are arranged to act on cranks at right angles on a horizontal shaft, 8, which has keyed on one end of it a worm, 9. In gear with this worm 9 there is a duplex-toothed wheel or worm-wheel pinion, 10, fixed on a short axle or shaft, 11, having journals projecting on each side and entered into horizontal guide-slots 12, formed in blocks or bushes 13, which are fixed in the sides of the frame 6. The worm-wheel pinion 10 is always turned in the direction of the arrow, and its teeth are made with the sides acted on by the worm 9 of the usual shape of worm-wheel teeth, while the other sides are shaped like ordinary pinion or spur-wheel teeth.

When the worm-wheel pinion 10 is in the position in which it is shown in Fig. 1, it is in gear with the internally-toothed part 14 of the fly-wheel of the large engine, (or it might be any suitable toothed wheel of the large engine,) and with the parts in this position the small engine will start or turn the large engine. While the small engine acts on or drives the large engine, and until the large engine acquires from its own action such a speed as to be no longer driven by the small engine, the strains are such as to keep the worm-wheel pinion in gear; but on the speed of the large engine increasing, the worm-wheel pinion 10, tending to turn faster than the worm is driving it, rolls back along the worm, its shaft 11 moving back along the guide-slots 12, and it moves out of gear from the fly-wheel teeth 14. To insure that the worm-wheel pinion 10 will move completely out of gear, springs 15 are applied to its shaft 11.

When the worm-wheel pinion 10 is not in gear with the fly-wheel teeth 14, and when it is wished to make the small engine operate so as to start or turn the large engine, some fric-

tional resistance is applied to a part of the worm-wheel pinion diametrically opposite to that at which the worm 9 acts on it. This may be done in various ways; but in the example delineated a small brake-block, 16, is fitted in a guide in one side of the frame 6, and a hand-lever, 17, centered on a stud fixed in the frame 6, is connected to the brake-block and can be used for forcing it against the side of the rim of the worm-wheel pinion 10. A projection, 18, is cast on the inside of the frame at the other side of the worm-wheel pinion 10, to resist the pressure applied by means of the brake-block 16, the wheel being nipped between the projection 18 and the brake-block 16. On the frictional resistance being applied in this way and on the small engine being set in motion the worm 9 causes the worm-wheel pinion 10 to move into gear with the fly-wheel teeth 14 of the large engine, and to start or turn the large engine.

What we claim as our invention is—

The combination of a worm driven by a small engine with a worm-wheel pinion having its center capable of movement parallel to the axis of the worm, and by such movement entering into gear with or receding out of gear from the toothed fly-wheel or other wheel of a large engine, substantially as and for the purposes hereinbefore described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

WILLIAM HARGREAVES.
WILLIAM INGLIS.

Witnesses:

CHAS. DUCKERS,
JOHN B. PARKINSON,
Both of Bolton.