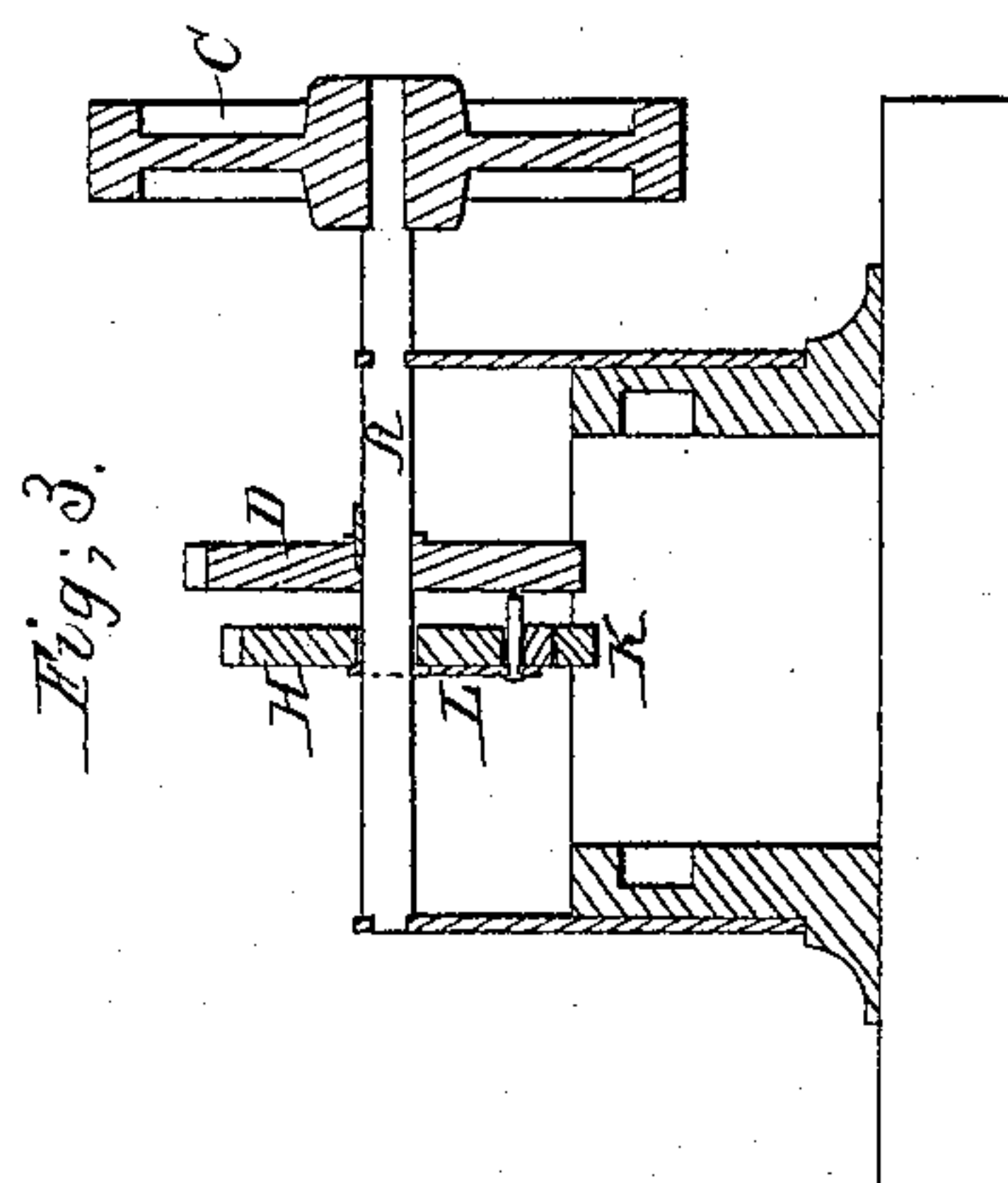
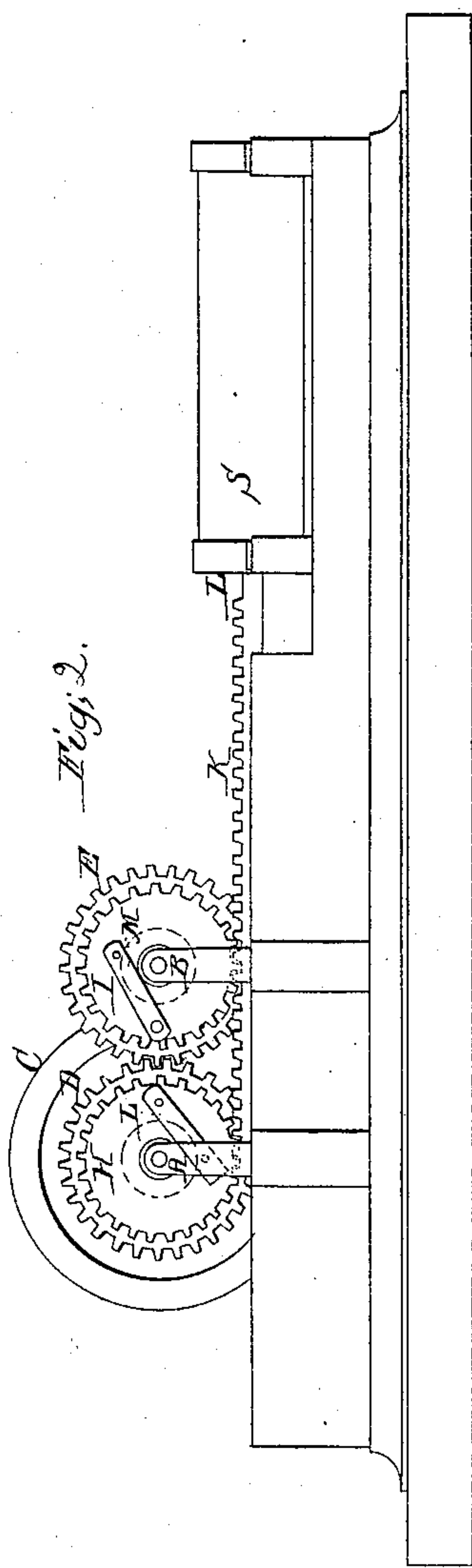
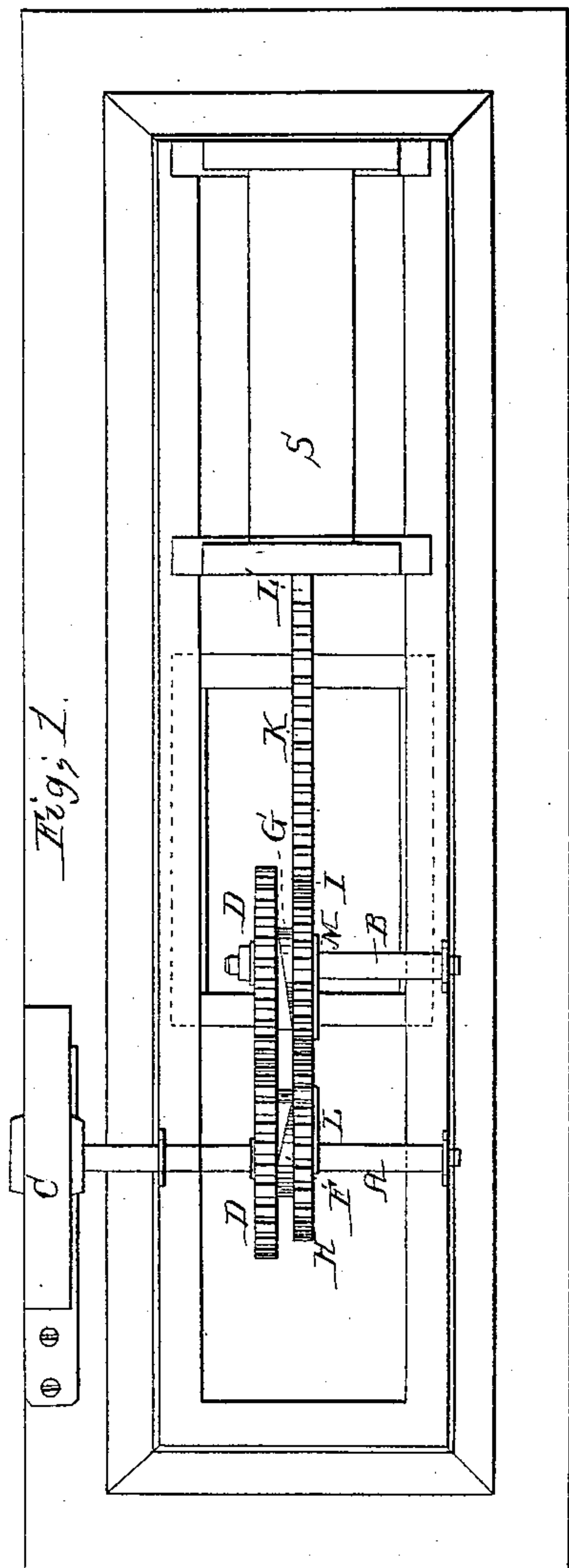


# Turner & Stone, Converting Motion.

N<sup>o</sup> 40,965.

Patented Dec. 15, 1863.



Witnesses;  
C. D. Hale Jr.  
Frederick Curtis

Inventors;  
R. G. Turner & H. Stone  
by their attorney R. H. Eddy.

# UNITED STATES PATENT OFFICE.

ROSCOE G. TURNER AND HARLEY STONE, OF DEDHAM, MASSACHUSETTS.

## IMPROVED MODE OF CHANGING MOTION.

Specification forming part of Letters Patent No. 40,965, dated December 15, 1863.

*To all whom it may concern:*

Be it known that we, ROSCOE G. TURNER and HARLEY STONE, residents of Dedham, in the county of Norfolk and State of Massachusetts, have invented a new and useful mechanism for obtaining a rotary from a reciprocating rectilinear movement; and we do hereby declare the same to be fully described in the following specification and represented in the accompanying drawings, of which—

Figure 1 denotes a top view, and Fig. 2 a side elevation, of our invention as applied to a steam-engine piston and its fly-wheel shaft. Fig. 3 is a transverse section taken through two of the gears and their spring-catch.

The purpose of our invention is to avoid the loss of power or useful effect resulting from a crank in its passage of what are termed its "dead points."

The nature of the said invention is to be found in a combination consisting of a rack and four gears, two cams, and two spring-catches, made, arranged together, and applied to two shafts, substantially in manner as hereinafter described.

In the drawings, A and B are the said two shafts, one of which—viz., A—may be a steam-engine driving-shaft provided with a fly-wheel, C. These two shafts, being supported so as to be capable of freely revolving transversely to their axes, are provided with two connecting or engaging gears, D E, of equal size or diameter, each of the said gears being fastened to its shaft so as to revolve with it. Furthermore, the two gears engage with each other and each carries on its inner face an inclined plane or cam, F or G, the two cams being so arranged as to stand in opposite directions with respect to one another. Alongside of each cam, and on the shaft of its gear, there is another and smaller gear, H or I, which is so applied to its shaft as to be capable of freely revolving on it. The two gears H and I engage with a long toothed rack, K, projecting longitudinally from a piston-rod, L'; and furthermore, each of the gears H I is provided with a spring dog or catch, L or M, to operate in conjunction with the next adjacent cam F or G, the whole being arranged as represented in the drawings. During each stroke

or movement of the rack longitudinally, both of the rack-gears H I will be put in rotation simultaneously. They do not, however, have a continuous rotation in one direction, as the forward stroke of the rack will revolve them in one direction and by the backward stroke of the rack they will be rotated in an opposite direction. The two engaging-gears D E will revolve in opposite directions with a continuous motion to each. During the rearward movement of the rack, the spring-catch of the forward rack-gear, by the rotary motion of such gear, will be borne against the heel or shoulder of the cam of the adjacent engaging-gear of the driving-shaft, and, by pressure against the cam, the said catch will produce a semi-revolution of such engaging-gear and driving-shaft. In the mean time the other two gears will be revolved in directions opposite to one another, and each be caused to make a semi-revolution. While this is being done, the spring-catch of that gear of the two which engages with the rack will have been revolved and caused to pass over and engage with the cam of its fellow gear on the same shaft with it, and so as to be ready during and by the forward stroke of the rack to so act against the heel of the cam as to produce rotative motion of the said fellow gear, which in turn will impart a further rotative motion to the gear in engagement with it, and they produce a further or another semi-rotation of the driving-shaft. As each cam and its spring-catch, while the latter is not propelling the former, are in simultaneous rotary movement in opposite directions, the catch has only to be turned through a half-circle to pass over and lock into the cam. So, during a forward stroke of the rack, the spring-catch of the rear-most rack-gear will be caused to put the rear engaging-gear in rotation or revolution, the catch and cam of the two foremost gears being revolved so as to engage with each other at the termination of their semi-rotative movements.

The drawings exhibit a steam-engine cylinder, S, having the rack projecting from its piston-rod. The number of cams and spring-catches to each rack-gear and its engaging-gear may be increased, in which case either



the diameters of these gears should be similarly increased or the stroke of the rack be proportionally diminished.

We claim—

The above-described combination for obtaining a continuous rotary from a reciprocating rectilinear movement, the same consisting of the rack K, the two engaging-gears D E, the two rack-gears H I, and the cams F G, and

spring-catches L M, or their mechanical equivalents, arranged and applied to two shafts, A B, substantially in manner and so as to co-operate as hereinbefore specified.

ROSCOE G. TURNER.  
HARLEY STONE.

Witnesses:

MICHAEL KEELAN,  
WM. A. RICE.