

No. 692,099.

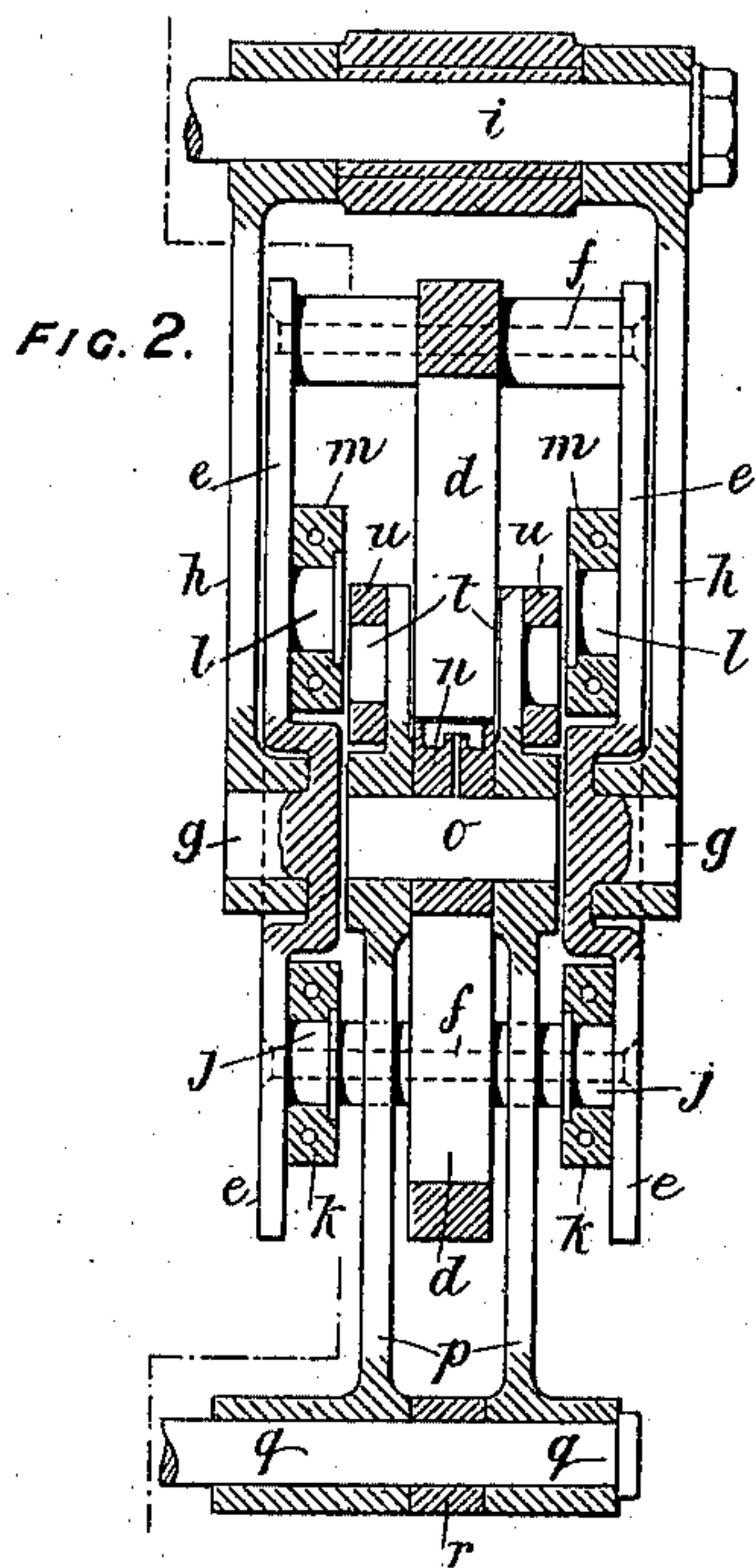
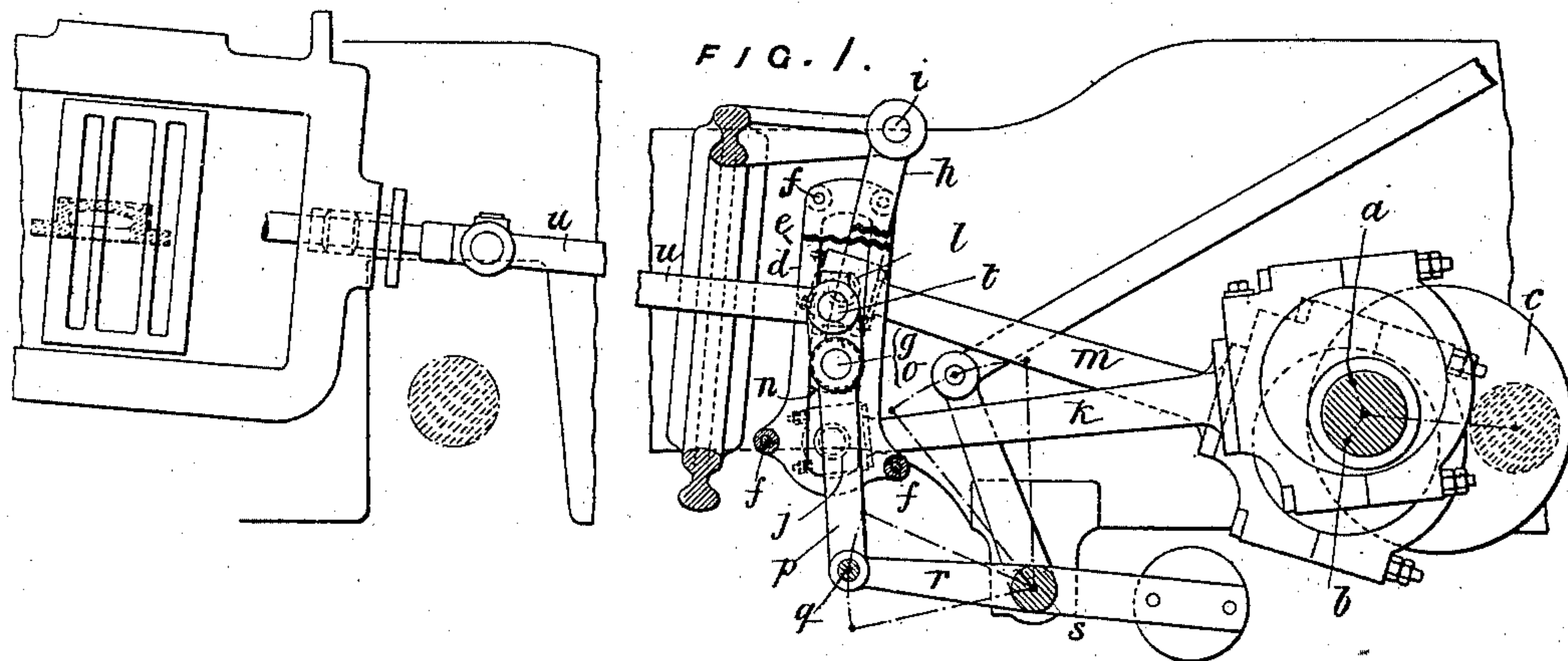
Patented Jan. 28, 1902.

S. S. YOUNGHUSBAND.
SLIDE VALVE GEAR FOR ENGINES.

(Application filed May 21, 1901.)

(No Model.)

2 Sheets—Sheet 1.



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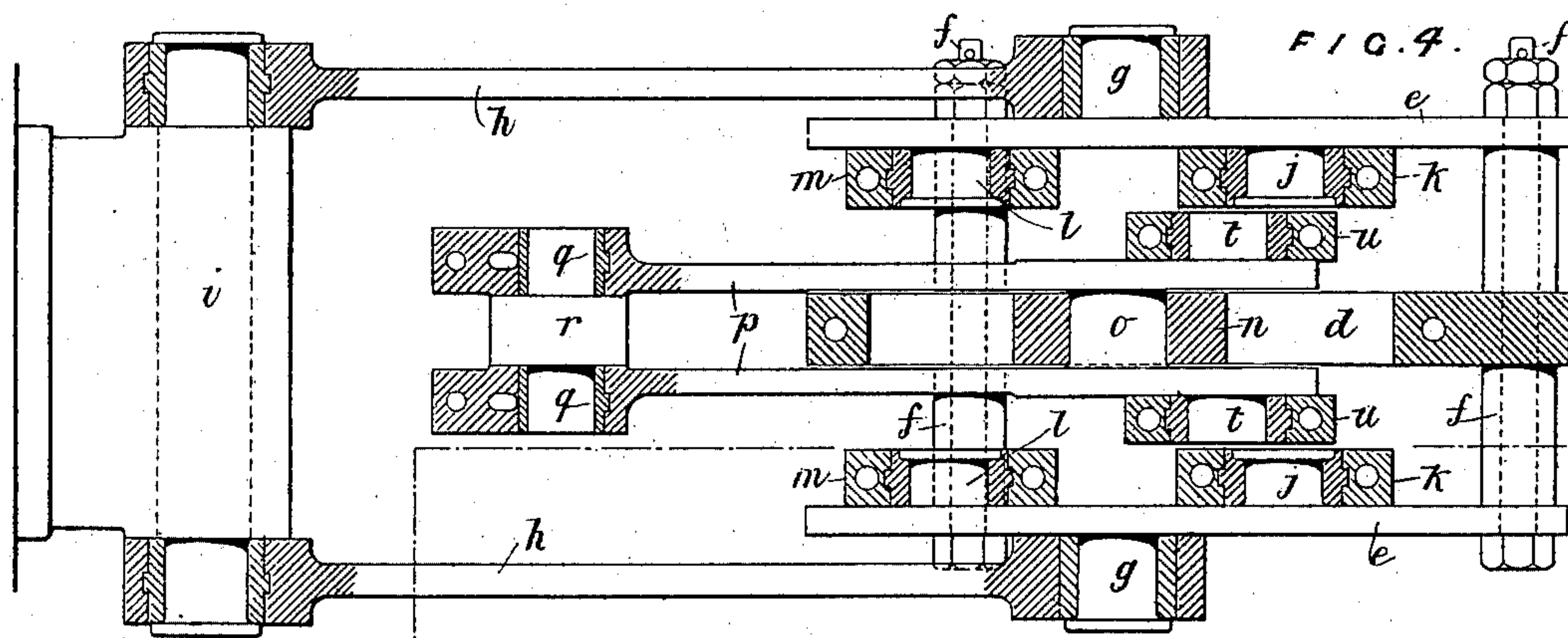
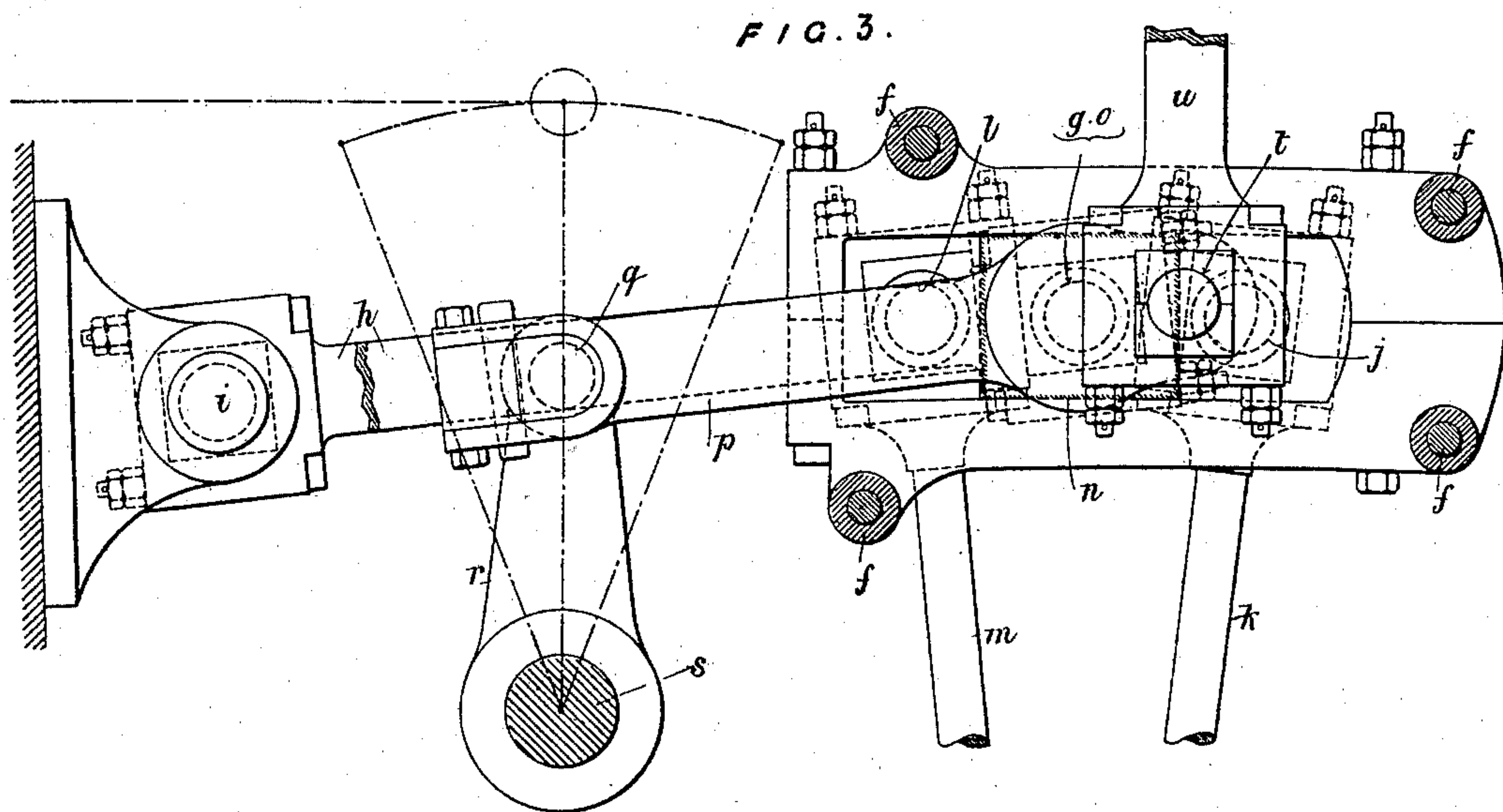
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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

SAMUEL SMITH YOUNGHUSBAND, OF DARLINGTON, ENGLAND.

SLIDE-VALVE GEAR FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 692,099, dated January 28, 1902.

Application filed May 21, 1901. Serial No. 61,240. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL SMITH YOUNGHUSBAND, engineer, a subject of the King of Great Britain, residing at Granville Terrace, Woodlands road, Darlington, in the county of Durham, England, have invented new and useful Improvements in Slide-Valve Gear for Steam-Engines, of which the following is a specification.

10 My invention relates to expansion and reversible slide-valve gear by means whereof a truer and better motion is given to the valve.

In the valve-gear to which the present invention relates motion is transmitted from the reversing or expansion link to the slide-valve through an intermediate lever having a pivotal connection with the die-block of the link, the lever being connected by its shorter arm to the valve-rod and suspended by its other arm from an arm or arms on the weigh-shaft, the operation of the intermediate lever and connected parts being such that with a given throw of eccentric the travel of the valve is increased, so that the admission and cut-off are more sudden in consequence of their taking place when the valve is moving at a higher speed than would otherwise be the case.

My invention consists of an improved means of connection with the expansion or reversing link whereby the pivotal centers whereat the link-suspension device and the rods of the forward and backward eccentrics are connected to the link are so situated that their axes intersect the line traversed by the axial center of the link die-block in its movement along the link-slot, the said pivotal centers being carried not by the expansion-link itself, but by a pair of cheek-plates fixed to the expansion-link at either side thereof, so as to move as one together therewith.

Reference is to be had to the accompanying drawings, forming part of this specification, wherein—

Figure 1 is an elevation showing the general arrangement of the valve-gear as applied to a locomotive, the gear being "linked up" to the mid-position. Fig. 2 is an end elevation of the reversing or expansion link and connected parts, partly in section. Figs. 3 and 4 are a side elevation and plan, partly in section, of the valve-gear as adapted for a marine engine.

Referring to the drawings, *a b* are the centers of the forward and backward eccentrics, respectively, and *c* the crank-center. *d* is the reversing or expansion link, and *e e* are two cheek-plates, one at either side of the link *d* and rigidly secured thereto, so as to move therewith as one by bolts or rivets *f* and distance-pieces which preserve a sufficient distance between the cheek-plates *e* and link *d* for the passage between them of the various connections with the link.

The purpose of the cheek-plates *e* is to enable the gudgeons by which the link is suspended and the pivotal connections of the eccentric-rods with the link to have their axes in each case so placed as to intersect the center line of the link-slot or the line traversed by the axial center of the die-block pin in the movement of the die-block along the link. This position of the gudgeons enables a truer and more even action to be given to the valve than if the eccentric-rods were coupled to the link at the side thereof toward the crank-shaft, as usual.

The cheek-plates affixed to the link, as described, also admit of the use of a pair of swing links or carriers acting together as one for supporting the expansion-link by gudgeons so situated that their common axial center intersects the center line of movement of the die-block pin, as above described, and forms a compact arrangement by which the weight of the gear is better supported especially in cases where the space is limited, as in locomotive-engines having inside cylinders and valve-chests. The said cheek-plates *e* are provided on the outside with gudgeons *g* for the attachment of the carrier-links *h*, by which the reversing or expansion link is supported from a fixed point *i*, these gudgeons being carried by countersunk or dished central portions of the cheek-plates *e*, so as to enable sufficient length of bearing-surface of the gudgeons and of the eyes of the links *h* to be obtained without projection beyond the outer faces of the carrier-links, the rear faces of the cheek-plates projecting correspondingly inward as close as possible to the lever *p* without touching it. The cheek-plates are also provided on the inner side with gudgeons *j* for connection with the forked end of the rod *k* of the forward eccentric and with simi-

lar gudgeons *l* for connection with the forked end of the rod *m* of the backward eccentric, the combined link *d* and cheek-plates *e* thus supported being free to oscillate, but constrained to move bodily only toward and away from the crank-shaft.

n is the die-block, fitted to slide in the slot of the reversing or expansion link *d* and carrying a cross-pin *o*, forming a pivotal connection with the die-block for the intermediate or valve-driving lever *p*, which is constructed of two members symmetrically placed at either side of the link *d* and between the latter on the one hand and the cheek-plates and eccentric-rod forks on the other hand. This lever *p* is fulcrumed at *q* on the ends of a pair of arms *r*, carried by the weigh-shaft *s* of the reversing-gear, whereby the position of the die-block *n* in the slot of link *d* may be varied, as required, for "linking-up" or reversing. This lever *p* extends beyond the die-block center *o* in the direction opposite to its pivotal center *q*, thus forming a short arm, to which at point *t* is connected the forked end of the rod *u* of the slide-valve. In consequence of this point *t* being situated at a greater radius from the center of motion *q* of the lever *p* than is the point *o* at which motion is applied to said lever *p* through the eccentric-rods *k m*, cheek-plates *e e*, link *d*, and die-block *n* the travel of the slide-valve will be greater than it would be if its rod *u* were connected directly to the die-block center *o*.

The arrangement shown in Figs. 3 and 4 only differs from that shown in Figs. 1 and 2 in that the different wearing parts are adapted (as usual in marine-engine practice) to be adjusted for wear, and the foregoing description applies to both arrangements indifferently.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a link-motion, the combination with the reversing or expansion link, of cheek-plates fixed to the link at opposite sides thereof and at a distance therefrom and provided with gudgeons for connecting the link-suspension and eccentric rods to the said cheek-plates and link, said gudgeons having their centers axially intersecting the center line of the link-slot, substantially as specified.

2. In a link-motion, the combination with the reversing or expansion link, of cheek-plates fixed to the said link at opposite sides thereof and at a distance therefrom, said cheek-plates being provided at the outer sides thereof with a central pair of gudgeons for the connection thereto of link-suspension rods pivoted to a fixed point, and at the other sides thereof with pairs of gudgeons for connection

thereto of the forked ends of the forward and backward eccentric-rods respectively.

3. In a link-motion, the combination with the reversing or expansion link, of the cheek-plates fixed to the said link at opposite sides thereof and at a distance therefrom, said cheek-plates being provided at the outer sides thereof with a central pair of gudgeons for the connection thereto of link-suspension rods, said gudgeons being carried by sunk portions of the cheek-plates so as to afford the necessary length of bearing without external projection beyond the link-suspension rods, and the cheek-plates being provided at the other sides thereof with pairs of gudgeons for connection thereto of the forked ends of the eccentric-rods.

4. In a link-motion, the combination with the reversing or expansion link, of cheek-plates fixed to the said link at opposite sides thereof and at a distance therefrom, said cheek-plates being provided at the one side thereof with a central pair of gudgeons for the connection thereto of link-suspension rods pivoted to a fixed point, and at the other sides thereof with pairs of end gudgeons for connection thereto of the forked ends of the forward and backward eccentric-rods respectively, and of a valve-actuating lever having a pivotal connection with a die-block fitted in the slot of the link, said lever being connected at the one end to the valve-rod and fulcrumed at the other end to arms on a weigh-shaft whereby the position of the die-block in the slot of the link may be varied.

5. In a link-motion, the combination with the reversing or expansion link, of cheek-plates fixed to the said link at opposite sides thereof and at a distance therefrom, said cheek-plates being provided at the one side thereof with a central pair of gudgeons for the connection thereto of link-suspension rods pivoted to a fixed point, and at the other sides thereof with pairs of end gudgeons for connection thereto of the forked ends of the forward and backward eccentric-rods respectively, and of a valve-actuating lever having a pivotal connection with a die-block fitted in the slot of the link, said lever being connected at the one end to the valve-rod and fulcrumed at the other end to arms on a weigh-shaft, the valve-actuating lever being formed of two members acting together as one and passing at either side of the link between the link and the cheek-plates, the two members of said lever being connected to the same cross-pin in the die-block and pivotally connected to a fork on the end of the valve-rod.

SAMUEL SMITH YOUNGHUSBAND.

Witnesses:

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