

No. 724,990.

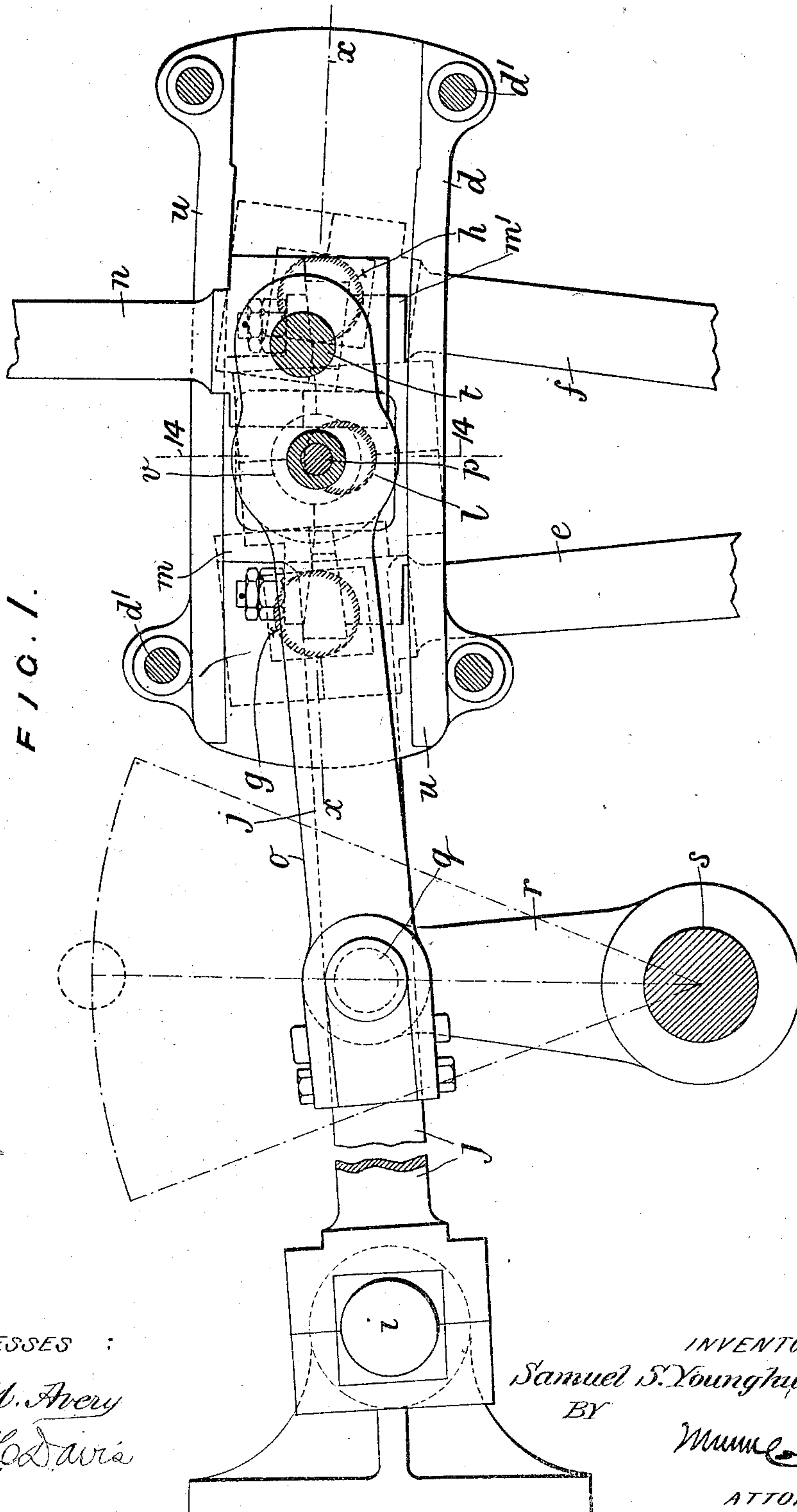
PATENTED APR. 7, 1903.

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

APPLICATION FILED FEB. 25, 1903.

NO MODEL.

3 SHEETS—SHEET 1.



WITNESSES :

W. M. Avery
A. H. Davis

INVENTOR

Samuel S. Younghusband
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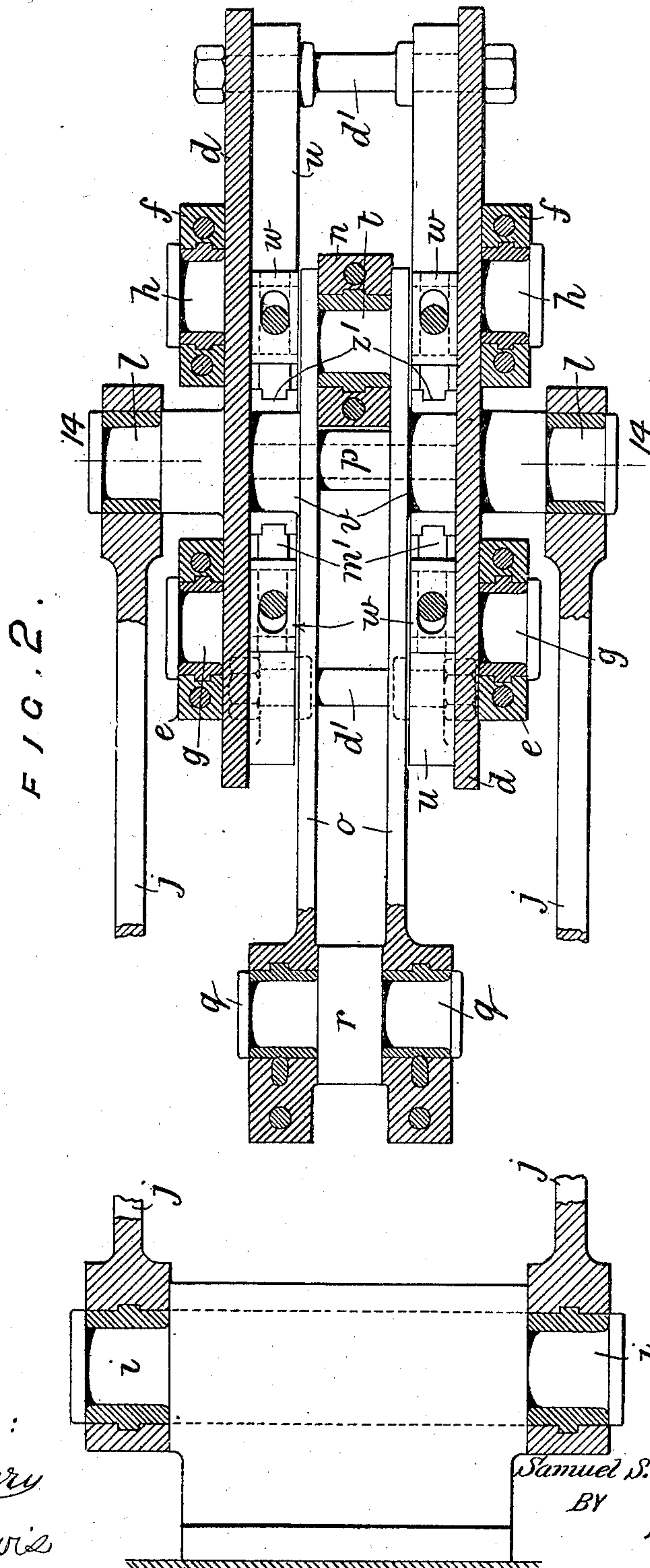
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8 SHEETS—SHEET 2.



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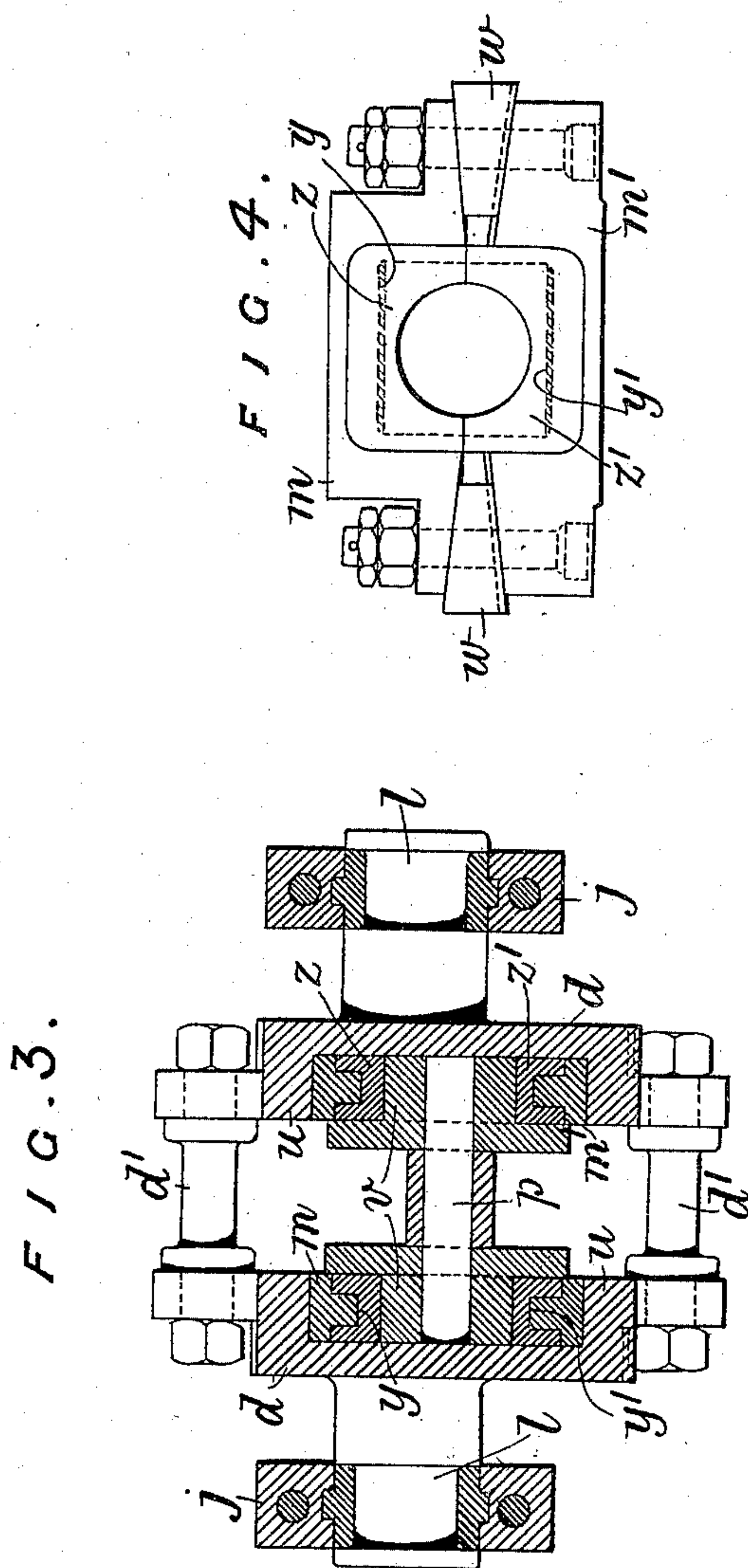
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UNITED STATES PATENT OFFICE.

SAMUEL SMITH YOUNGHUSBAND, OF DARLINGTON, ENGLAND, ASSIGNOR TO
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SLIDE-VALVE GEAR FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 724,990, dated April 7, 1903.

Application filed February 25, 1903. Serial No. 145,095. (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 certain new and useful Improvements in Slide-Valve Gear for Steam-Engines, of which the following is a specification.

My invention relates to slide-valve reversing and expansion gear of the kind wherein motion is transmitted from the expansion and reversing link to the slide-valve through an intermediate lever, which is pivoted to the die-block of the link and connected by its shorter arm or arms to the valve-rod, while its other and longer arm is pivoted to an arm or arms on the weigh-shaft, the expansion and reversing link vibrating as a whole about a fixed axis, to which it is connected by a pair of swing carrier-links and the reversal of the engine being effected by moving the die-block along the slot of the link. This type of valve-gear, while specially designed to secure durability, cheapness, and compactness, gives a fixed amount of lead with all degrees of linking-up, a quick-port opening for the admission of steam, a quick opening at the commencement of exhaust, and a much larger steam-port opening and more sudden cut-off than usual for all degrees of linking-up, thus enabling the engine to be always readily started.

In the accompanying drawings, Figure 1 is a part sectional side elevation; and Fig. 2, a plan, partly in section, of the improved gear, which is shown in mid-position. Fig. 3 is a section on line 14 14, Figs. 1 and 2; and Fig. 4 is a side elevation of the die-block shown separately.

This type of slide-valve gear as applied to marine engines, while possessing all the advantages above referred to, is specially designed so that every working part can be adjusted for wear.

The expansion and reversing link is duplex in that it consists of a pair of plates $d d$, held apart by distance-pieces and bolts, as at $d' d'$, the link members $d d$ carrying on their outer faces pairs of gudgeons $g g h h$, forming pivotal connections for the forked ends of the

ahead and astern eccentric-rods $e f$, respectively. The link is supported by being attached to the fixed point i by means of a pair of swing carrier-links j , pivotally connected to gudgeons l , projecting from the outer faces of the link members $d d$. The axes of the gudgeons $g h$ intersect the longitudinal center line $x x$ of each member of the duplex link $d d$, and the axis of the gudgeon l also approximately intersects the same line $x x$, as shown.

The die-block is duplex, its members working between the plates $d d$ and being guided by pairs of inwardly-projecting flanges $u u$ thereon. The die-block members are provided with axially-alined adjustable bearings for a pair of trunnions $v v$ on the outer faces of the lever o , through which the oscillations of the die-block are transmitted to the valve-rod n . This lever o is fulcrumed at q to an arm r on the weigh-shaft s , the lever being continued beyond the die-block center p and pivoted at t to the valve-rod n , which is thus caused to reciprocate through a greater distance than if it were coupled direct to the die-block. The lever o is duplex, its members working close to the inner edges of the flanges $u u$ and receiving between them the ends of the arm r and valve-rod n , which work on the centers q and t .

The preferred construction of die-block for use with this form of the gear is shown separately in Fig. 4 and consists of duplex members each made in two parts $m m'$, connected by bolts, as shown, and held apart by wedges $w w$, whereby the die-block may be adjusted to make a sliding fit between the flanges $u u$ of the corresponding link members d , the bearing for each trunnion v of the valve-lever o being provided by a pair of half-bushes $z z'$, received between and held together by the parts $m m'$ of the die-block member. Wear of these trunnion-bearings is taken up and compensation made for separation (by the wedges w) of the parts $m m'$ of the die-block member by means of liners or packing-strips interposed as required at $y y'$ between the back of each half-bush $z z'$ and the contiguous inner surface of the corresponding die-block part m or m' .

The expansion and reversing link d may be

curved in the direction shown or in the opposite direction or may be made straight, according to the position of the weigh-shaft, as will be readily understood by any one versed in the art of designing link-motions. It is also to be observed that by suitably proportioning the length of the valve-rod n , the weigh-shaft arm r , and the valve-operating lever o the constancy of the lead given by this gear to the slide-valve in all positions of the die-block may be maintained whatever the direction or degree of curvature given to the expansion and reversing link.

I claim—

1. In marine-engine slide-valve gear of the kind described, the combination of a duplex expansion and reversing link formed of a pair of parallel plates held apart by distance-pieces and having each a pair of inwardly-projecting parallel guide-flanges for the die-block; a duplex die-block formed of a pair of members adjustably fitted to slide between the link members and upon the flanges thereof and having adjustable bearings for the trunnions of the valve-operating lever; a valve-operating lever adapted to work between the link members and having a pair of axially-alined trunnions journaled in the die-block bearings; and gudgeons in alined pairs projecting from the outer faces of the link members and approximately intersecting the

longitudinal center lines thereof, two of said pairs of gudgeons being situated toward the ends of the link for the attachment of the eccentric-rods and the third pair being situated midway of the others for attachment to swing carrier-links, as described. 35

2. In marine-engine slide-valve gear of the kind described, the combination with a duplex expansion and reversing link formed of members held apart by distance-pieces and having each a pair of inwardly-projecting parallel guide-flanges, and with a valve-operating lever adapted to work between the link members and having a pair of axially-alined trunnions projecting from its opposite faces, of a duplex die-block whereof the members are adapted to slide between the said link members and upon the guide-flanges thereof; each die-block member being in two parts so held together and so fitted with adjustment-wedges as to permit of wear being taken up between the die-block and the guide-flanges whereon it works, and each die-block carrying a pair of half-bushes adapted to form a bearing for the corresponding valve-lever trunnions and adjustable about the same, as described. 40 45 50 55

SAMUEL SMITH YOUNGHUSBAND.

Witnesses:

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W. H. GOLDING.