

No. 754,793.

PATENTED MAR. 15, 1904.

H. A. J. NEUMANN.

PISTON ROD.

APPLICATION FILED JUNE 12, 1902.

NO MODEL.

Fig. 1.

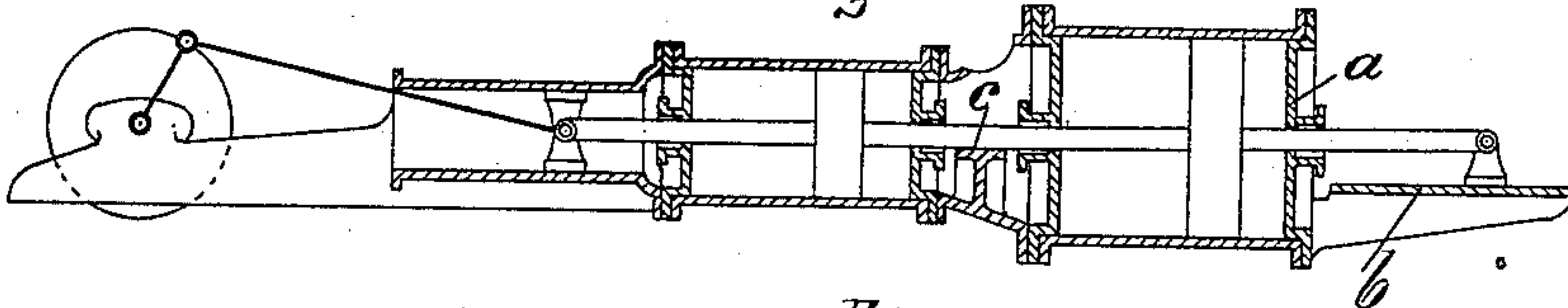


Fig. 2.

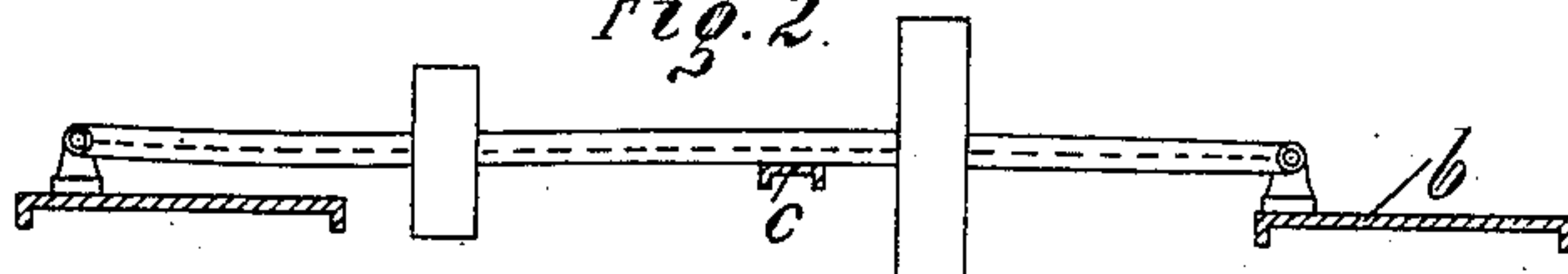


Fig. 3.

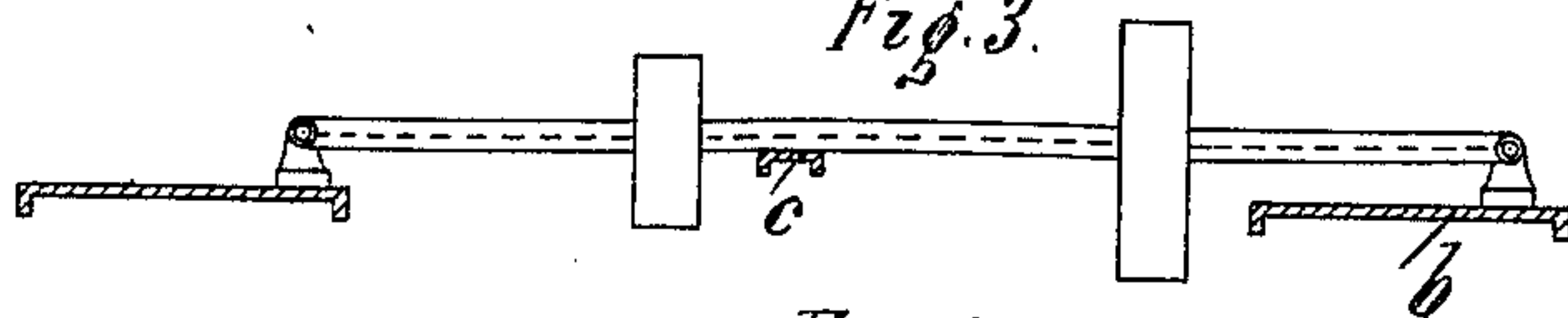


Fig. 4.

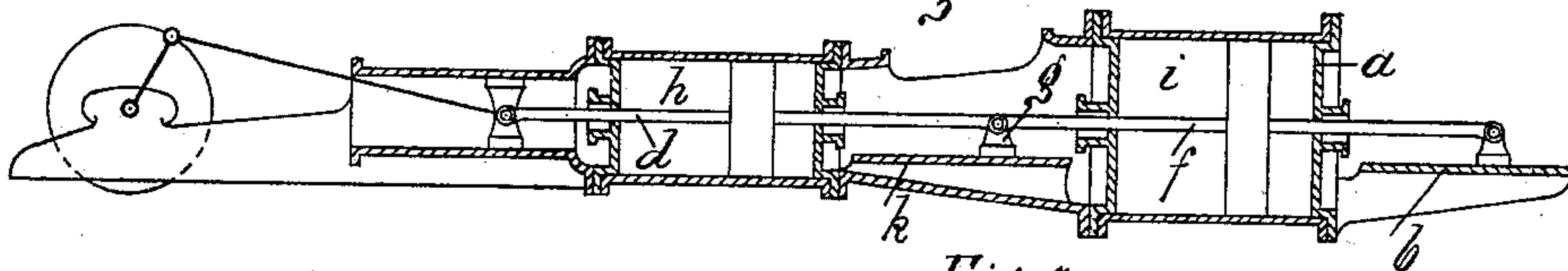


Fig. 5.

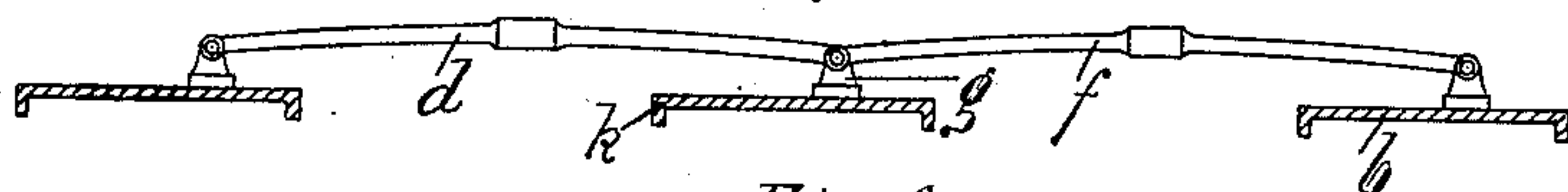


Fig. 6.

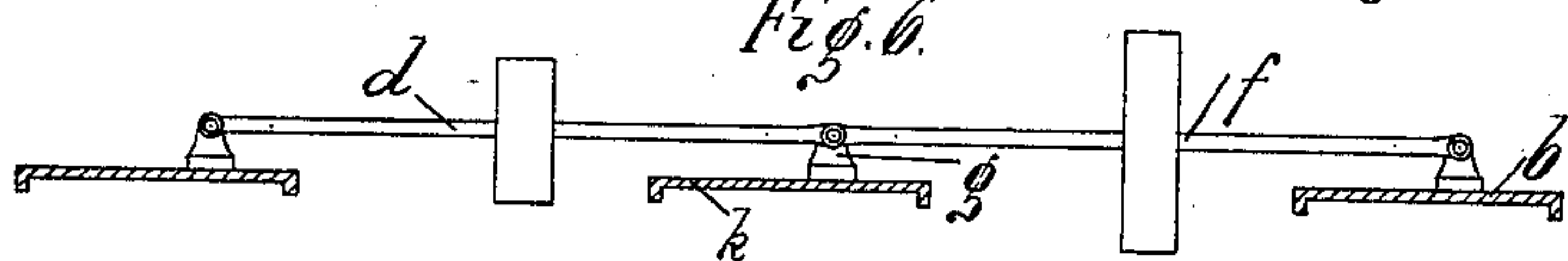


Fig. 7.

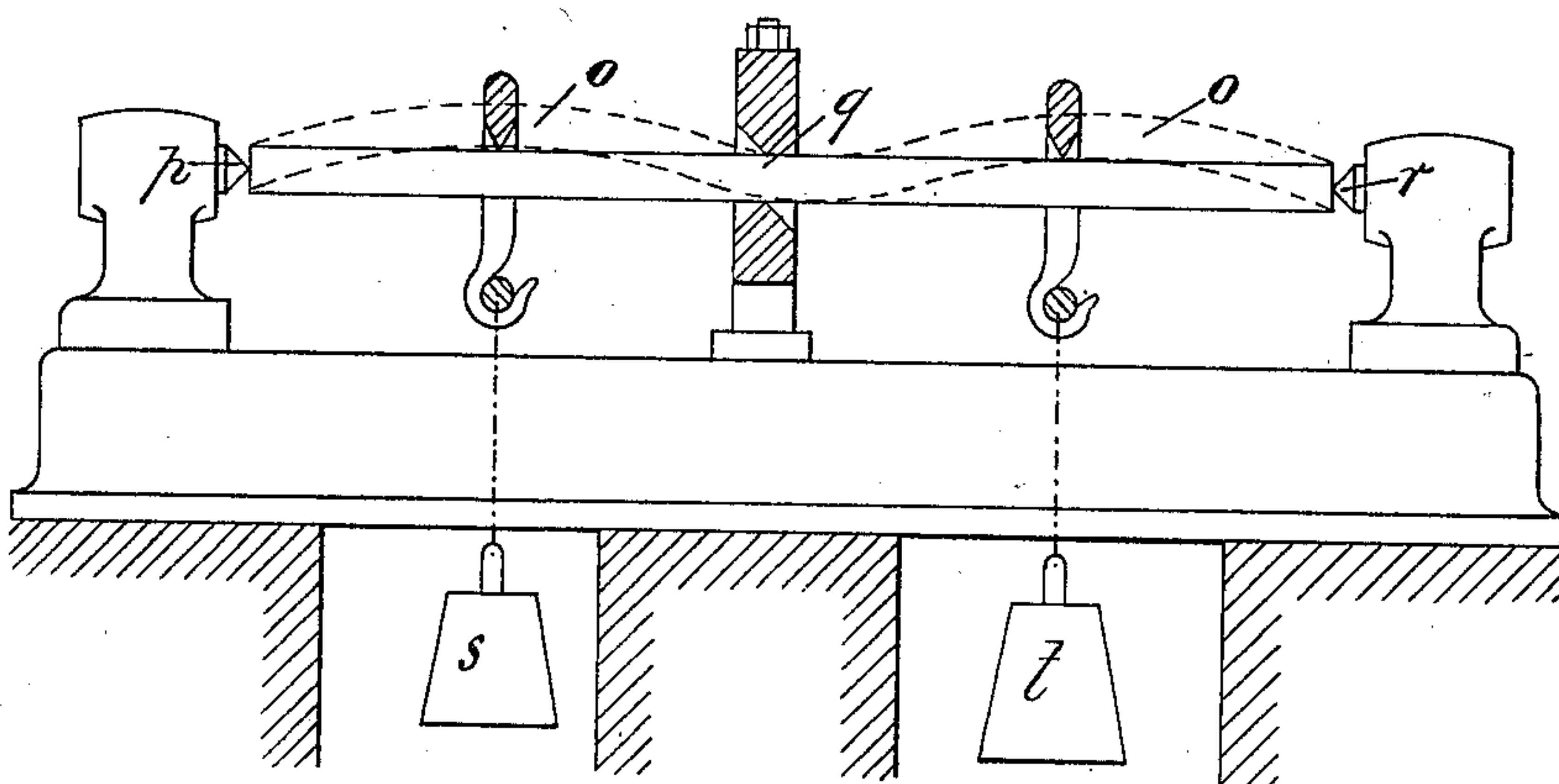
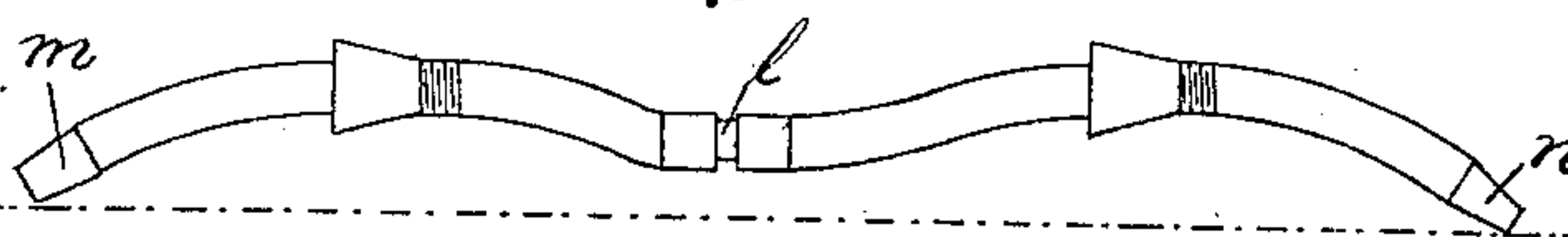


Fig. 8.



Witnesses
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PISTON-ROD.

SPECIFICATION forming part of Letters Patent No. 754,793, dated March 15, 1904.

Application filed June 12, 1902. Serial No. 111,261. (No model.)

To all whom it may concern:

Be it known that I, HUGO ALBERT JULIUS NEUMANN, a subject of the King of Prussia, residing at Görlitz, Germany, have invented certain new and useful Improvements in and Relating to Piston-Rods for Motive-Power Engines, of which the following is a specification.

In horizontal engines with cylinders arranged one behind another (hereinafter referred to as "tandem" engines) it has been found that the cylinders and the stuffing-boxes are worn unevenly, owing to the bending of the piston-rods as a result of the weight of the rods and the pistons. Many attempts have been made to obviate this disadvantage, but have not hitherto been successful. Even the arrangement shown diagrammatically in Figures 1, 2, and 3 of the accompanying drawings, in which the tail-rod that extends through the rear cylinder, cover *a* is supported by means of a slipper on a special guide *b* and the middle portion of the piston-rod is carried by a fixed neck-bearing *c*, arranged between the two cylinders, has not been successful, because the distance between the supports of the rod—*i. e.*, the movable slippers and the neck-bearing—is constantly varying, with the result that the bending of the rod alters at every point of the stroke, Figs. 2 and 3.

Figs. 1 to 3 are diagrams illustrating one of the known forms of pistons. Fig. 4 is a longitudinal section of part of a tandem engine embodying my invention; Fig. 5, a detail of the unloaded piston-rods; Fig. 6, a detail of the loaded piston-rods; Fig. 7, a side view of a lathe for manufacturing the piston-rod, and Fig. 8 a side view of a modification of the piston-rod.

Now in piston-rods for tandem engines according to this invention such injurious bending is entirely obviated, since the weight of the rods and the pistons is supported by surfaces outside of the cylinders, and the arrangement is such that in every position of the pistons the distance between the supports, which determines the bending, is constant. This object can be attained in either of the two follow-

ing ways: The piston-rod may be made in two parts *d* and *f*, Fig. 4, it being assumed that there are two cylinders, and the adjacent ends of the two parts connected to a common slipper *g*, which slides on a special guide *h* between the cylinders *k* and *i*, which are placed sufficiently far apart for the purpose. Each of these parts is bent upwardly when unloaded, Fig. 5, by an amount equal to that by which it would be bent downwardly by the weight of the rod and the piston, so that when the rod is loaded by the pistons its several parts are straight, Fig. 6, while the middle slipper *g*, which takes part in the movements of the pistons, secures a constant distance apart of the supports of the piston-rod. Again, the piston-rod may be made in one piece whose several sections, corresponding to the number of pistons to be carried, are bent in a manner similar to that of the several parts in the preceding example, while the weight of rod and the pistons is supported by a slipper attached to the middle of the rod at *l*, Fig. 8, and two slippers at the ends *m* and *n*. The pressure on the middle slipper can in this case be decreased or increased by bringing the middle of the unloaded rod more or less above a straight line, joining the ends of the rod, or the weight may even be supported entirely by the end slippers, so that the middle slipper can be dispensed with and the engine can be considerably shortened. Fig. 7 illustrates the method of manufacturing such a rod. The rod *o*, which is forged with a number of curved sections (indicated by dotted lines) corresponding to the number of pistons and the slippers to be subsequently attached to it is operated on when at rest by rotary cutters, while being maintained straight by weights, whose number, positions, and sizes correspond to the pistons to be subsequently mounted on the rod, and the rod being supported at points *p*, *q*, and *r*, at which the slippers will subsequently be applied.

I claim—

1. A resilient piston-rod for tandem steam-engines under tension to bulge upward between its ends, combined with pistons on the

rod, which draw the same axially into a straight line, and slides for supporting the ends of the rod, substantially as specified.

2. A series of pivotally-connected resilient
5 piston-rods for tandem steam-engines under tension to bulge upward between their ends, combined with pistons on the rods, which draw the same axially into a straight line, and

slides for supporting the ends and the joint of the rods, substantially as specified. 10

Signed at Görlitz, Germany, this 27th day of May, A. D. 1902.

HUGO ALBERT JULIUS NEUMANN.

Witnesses:

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OTTO BÖHME.