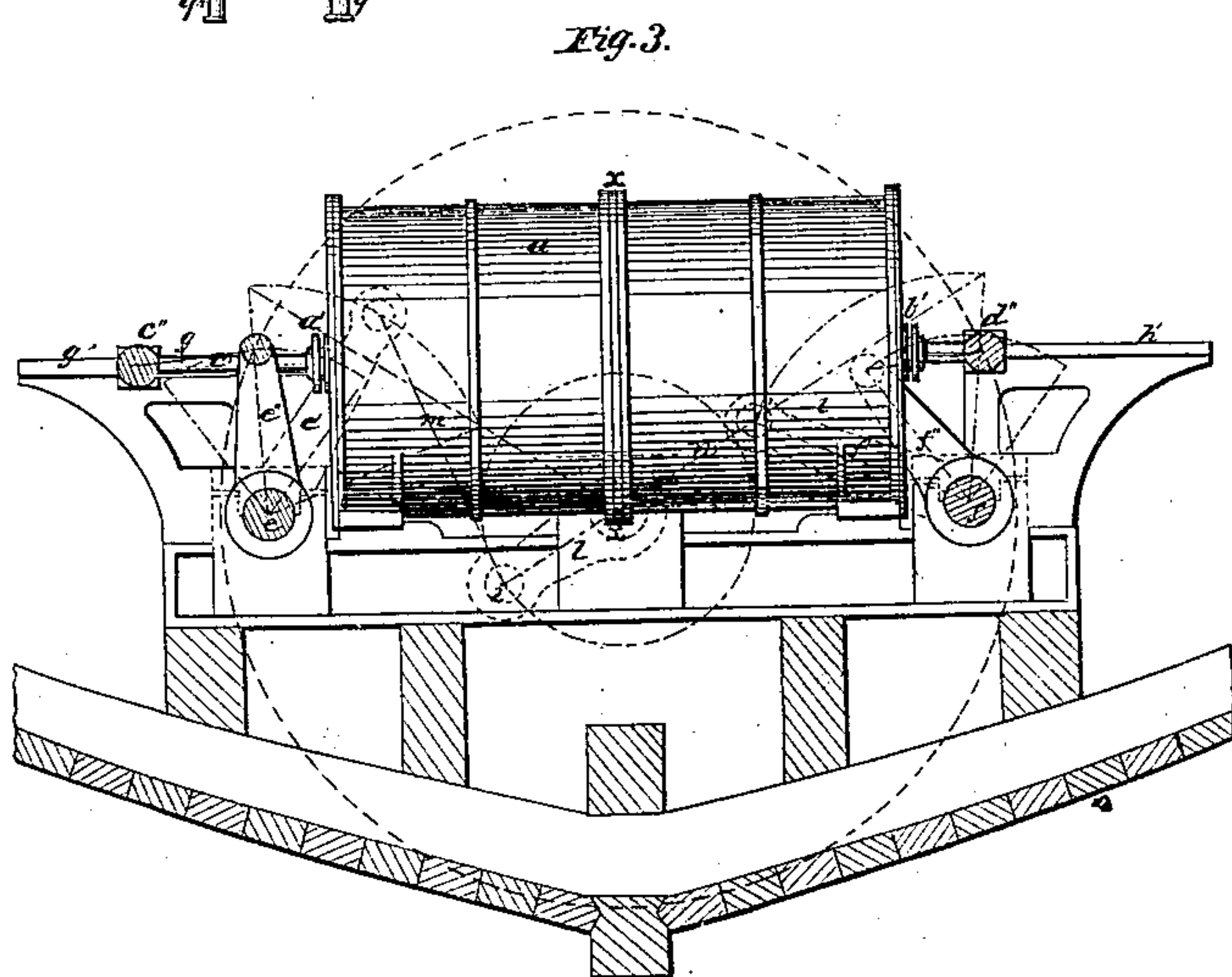
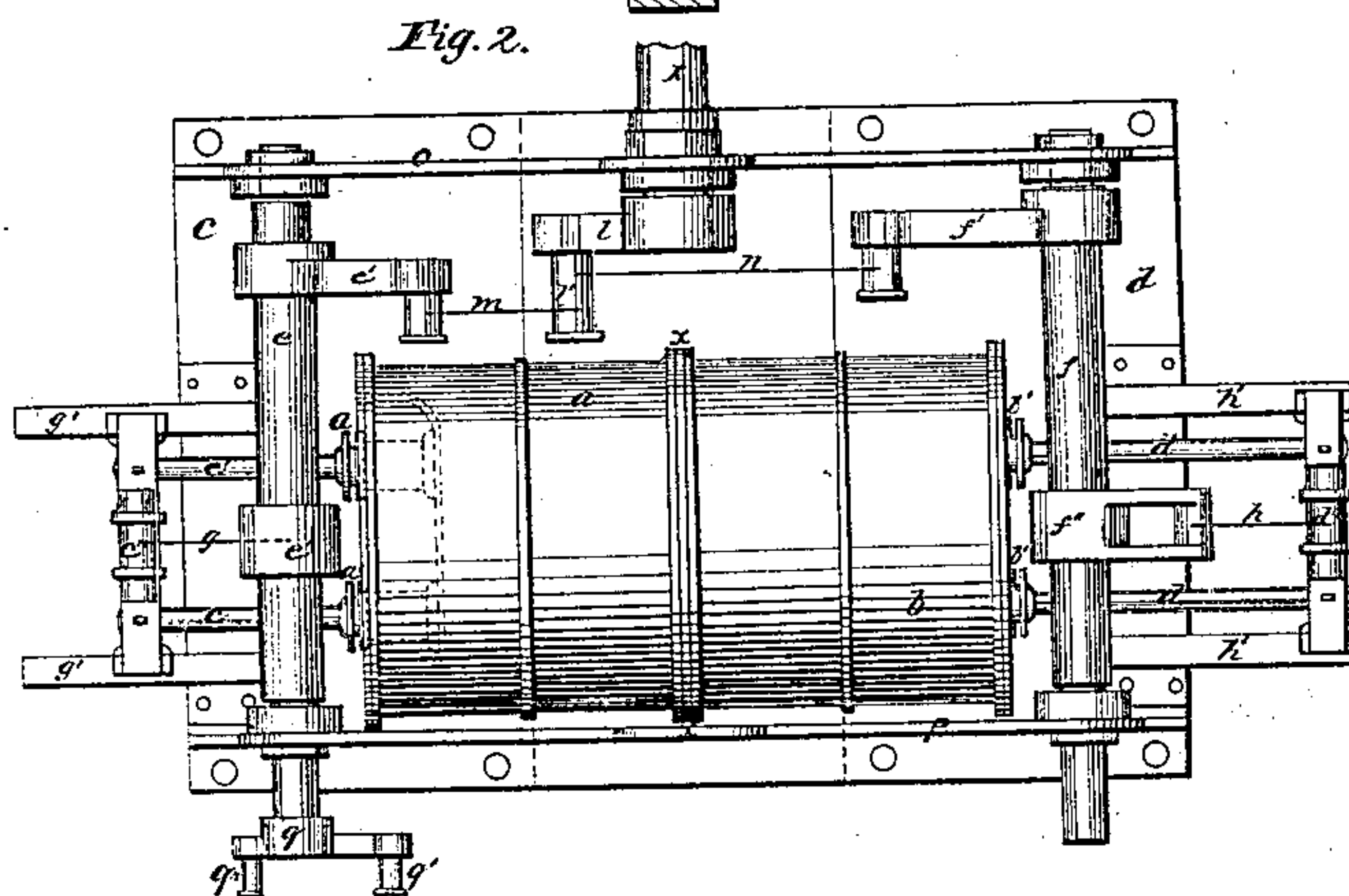
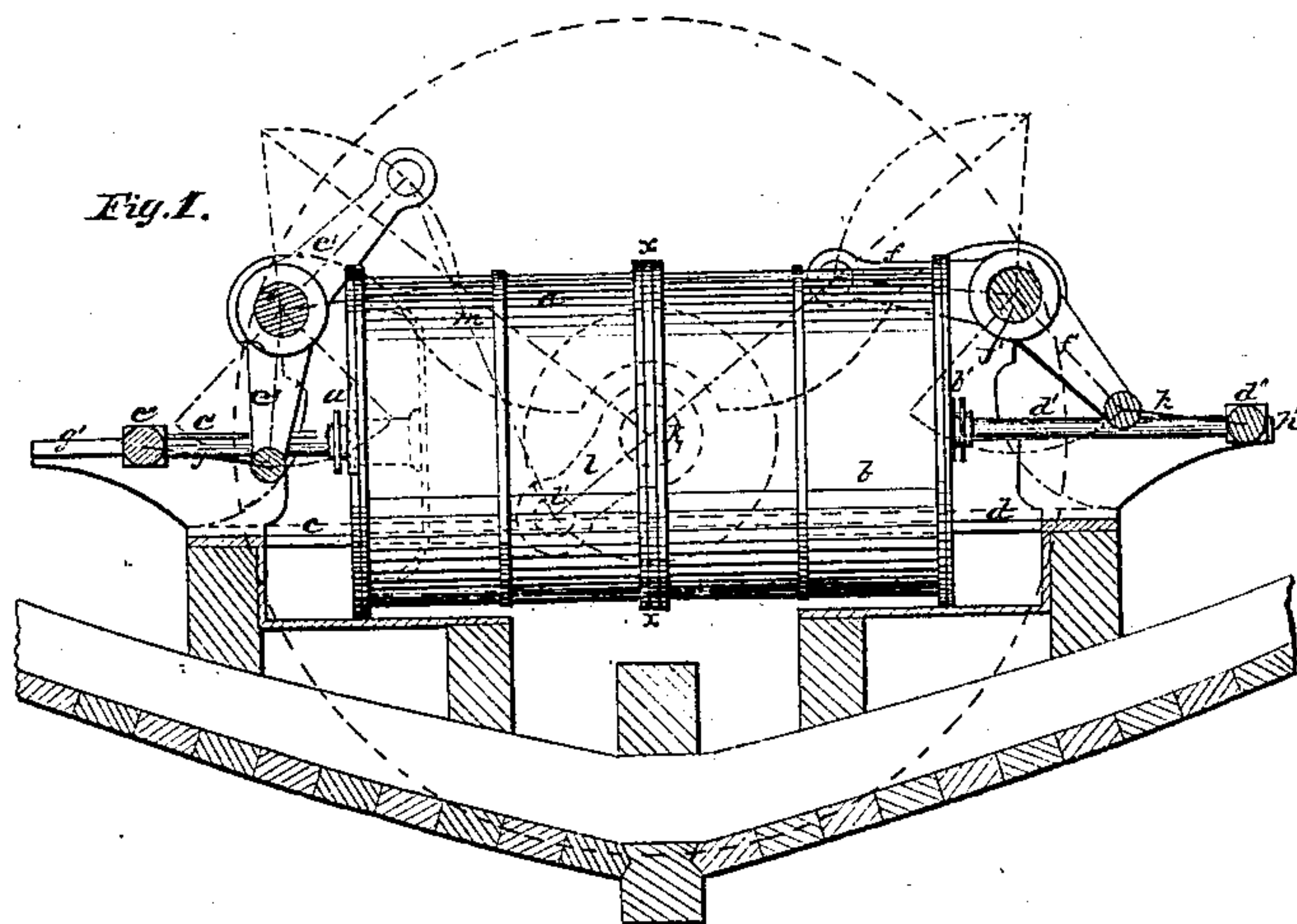


*J. Ericsson,*  
*Reciprocating Steam Engine,*  
*Patented July 6, 1858.*

*No. 20,782,*





# UNITED STATES PATENT OFFICE.

J. ERICSSON, OF NEW YORK, N. Y.

## STEAM-ENGINE.

Specification of Letters Patent No. 20,782, dated July 6, 1858.

*To all whom it may concern:*

Be it known that I, JOHN ERICSSON, of the city, county, and State of New York, have invented a new and useful Improvement in Steam-Engines for Working Screw-Propellers; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a side elevation of an engine constructed according to my invention. Fig. 2 is a plan of the same. Fig. 3 is a side elevation of an engine exhibiting a modification of my invention.

Similar letters of reference indicate corresponding parts in all of the figures.

The several direct-acting screw-propeller engines hitherto constructed are all more or less objectionable in the following particulars, viz: The horizontal engines occupy too much space transversely in the vessel to admit of being placed in the run. The vertical engines pass through the decks and project so far above the water line as to be useless for war purposes; and all approved double cylinder engines operate on cranks placed at right angles to each other, which involves a series of bearings, much friction, and liability to derangement from the shafts getting out of line. In addition to these imperfections, the extreme shortness of the cranks, with the attendant great friction on the crank pins and journals, to say nothing of the heavy diagonal thrust of the connecting rods, are serious defects in the direct acting screw propeller engines now in common use.

To obviate these several imperfections is the object of my invention which consists in the arrangement of the two cylinders of a double engine in such a manner that their base or bottom ranges with a plane passing through the axis of the propeller shaft, or nearly so, in combination with a certain arrangement of rockshafts, crank-arms, and connecting rods for imparting motion from the pistons to the shaft, whereby I am enabled, 1st, to bring the cylinders nearer to the propeller shaft, and hence to economize space and construct the frame of the engine of great strength and compactness; 2nd, to avoid the diagonal thrust and friction of the slides unavoidable when the connecting rod is attached directly to the cross-

head; 3rd, to operate the two connecting rods nearly at right angles to each other, which enables me to produce a continuous motion with a single crank on the propeller shaft and with a single crank-pin common to both engines; 4th, to employ a crank on the propeller shaft much longer than half the length of stroke of the piston, thereby diminishing the heavy pressure on crank pins and on journals, which has heretofore caused so much trouble by the overheating of the bearings, and at the same time diminishing the strain on the engine frame.

In Figs. 1 and 2 of the drawings, *a*, and *b*, are the steam cylinders, arranged horizontally and transversely of the vessel, in line with each other and close together and supported on bedplates *c*, and *d*, bolted to the engine keelsons, the said cylinders to be provided with pistons, valves, and passages as usual. *x*, *x*, is a plate separating the two cylinders and forming a bottom common to both. *c'*, *c'*, and *d'*, *d'*, are piston rods working through stuffing-boxes *a'*, *a'*, and *b'*, *b'*, in the cylinder-heads and connecting the pistons to the crossheads *c''*, and *d''*, which work on guides *g'*, *g'*, and *h'*, *h'*. *k* is the propeller shaft, the axis of which is in a plane which passes through the bottom *x*, *x*, of the cylinders. *l*, is the driving crank attached to the propeller-shaft, and *l'*, is the crank pin common to both engines. *e*, and *f*, are rockshafts arranged outside the cylinder heads in suitable bearings upon side frames *o*, and *p*, which are bolted to the bedplates *c*, and *d*. *e''*, and *f''*, are crank levers secured to said rockshafts opposite the cylinders, and connected by links *g*, and *h*, with the crossheads *c''*, *d''*; and *e'*, and *f'*, are other crank levers secured to said rockshafts near their aft ends and connected by connecting rods *m*, and *n*, with the crank pin *l'*. The crank levers *e'*, and *f'*, which are connected with the crank pin, are made considerably longer than those which are connected with the crossheads in order that the driving crank on the propeller shaft may be made longer than half the length of stroke of the pistons and of ample "throw" to reduce the pressure on the journals and crank pins. The levers *e'*, *e''*, and *f'*, *f''*, are so arranged upon their respective rockshafts, that, at the termination of each stroke of either piston, its connecting rod will be in line with the driving crank of the propeller



shaft, and the rockshafts are so placed that the connecting rods will operate nearly at right angles to each other.  $q$ , is a lever attached to the forward end of one of the  
5 rockshafts and carrying pins  $q'$ ,  $q''$ , for working air pump and force pump. A similar lever is to be applied to each rockshaft.

The engine represented in Fig. 3 differs principally from that shown in Figs. 1 and  
10 2, in having the rockshafts placed below the center line of the cylinders, nearly on a level with the bedplates. Its corresponding parts are indicated by the same letters as are used in the other figures, and therefore will be  
15 understood by comparison without further description. It will be seen that by placing the rockshafts as represented in this figure, the cylinders become somewhat more elevated relatively to the propeller shaft, which  
20 renders this location of the rockshafts better adapted to trading vessels than vessels of war. For the former class of vessels, however, I prefer the depressed position of the rockshafts here delineated, as it admits of

their bearings being attached directly to the 25 bedplates without side frames.

What I claim as my invention, and desire to secure by Letters Patent, is:—

The arrangement of the two cylinders in such manner that their base or bottom 30 ranges with a plane which passes through the axis of the propeller shaft or nearly so, in combination with a system of rockshafts, crank-levers, and connecting rods, so proportioned, applied, and arranged that the 35 use of a driving crank on the propeller shaft of greater length than half the stroke of the piston is permitted, and that the connecting rods will operate nearly at right 40 angles to each other and will be in line with each other at the termination of each stroke of either piston, substantially as herein set forth.

J. ERICSSON.

Witnesses:

O. D. MUNN,  
J. W. COOMBS.