

(No Model.)

2 Sheets—Sheet 1.

A. C. HANDS & F. PARKES.

DIRECT ACTING ENGINE.

No. 353,134.

Patented Nov. 23, 1886.

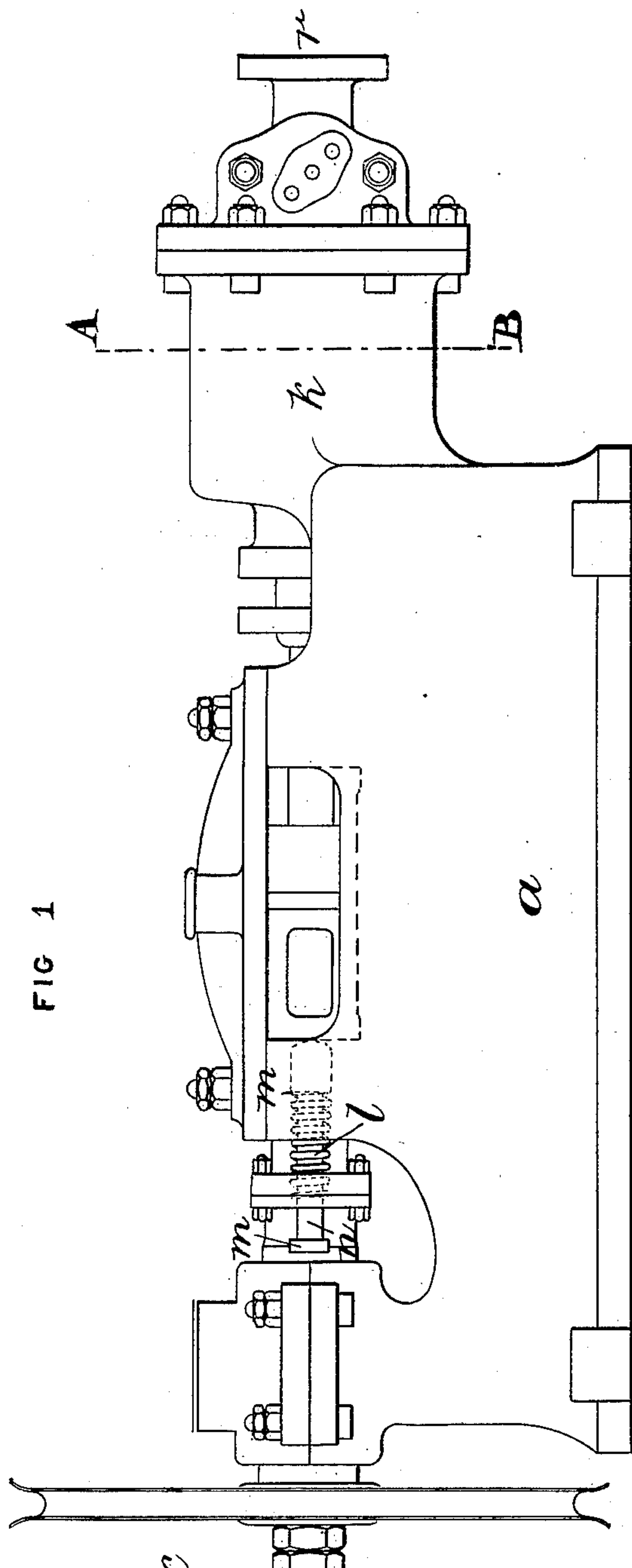


FIG 1

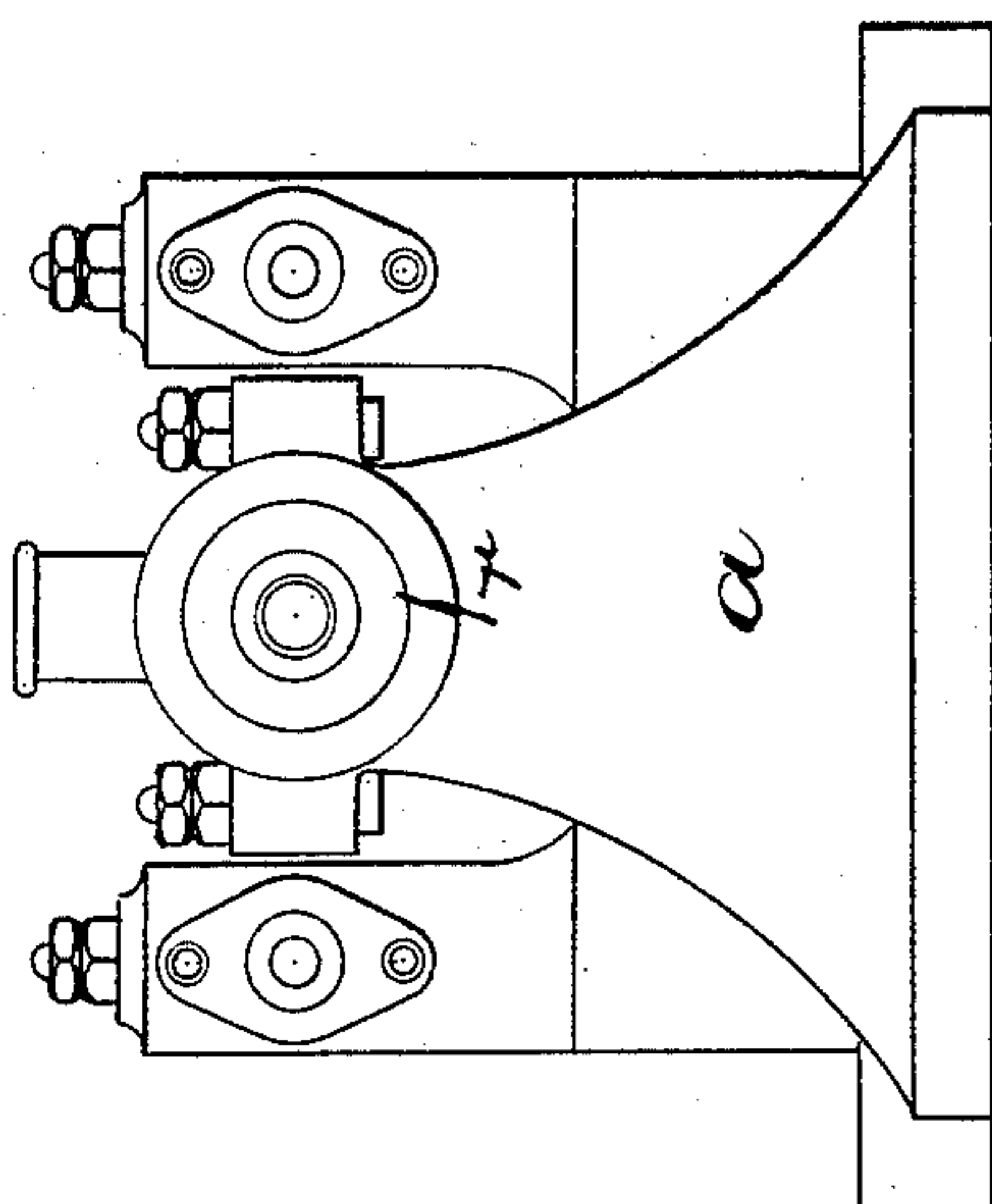


FIG 3

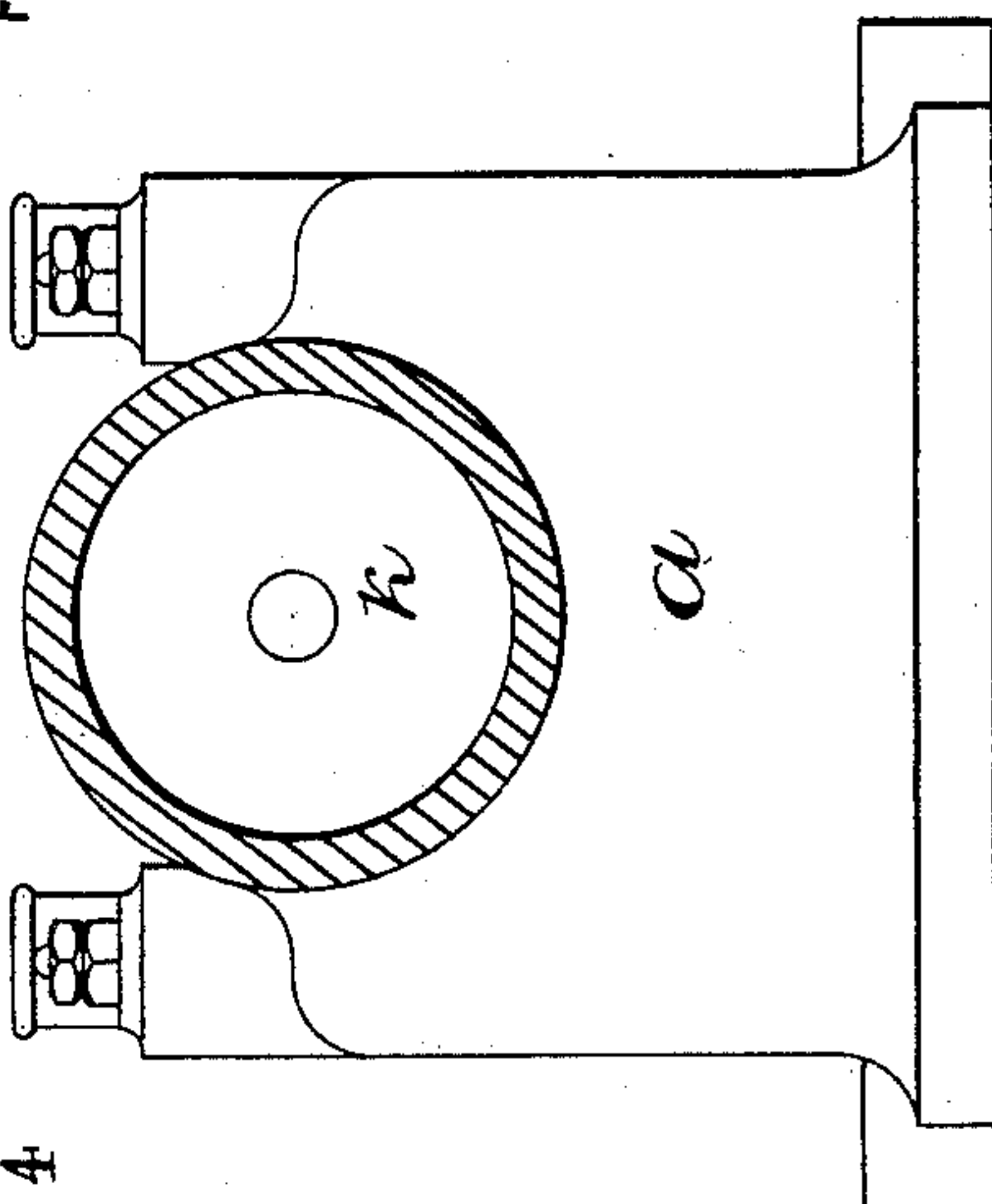


FIG 4

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INVENTOR
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(No Model.)

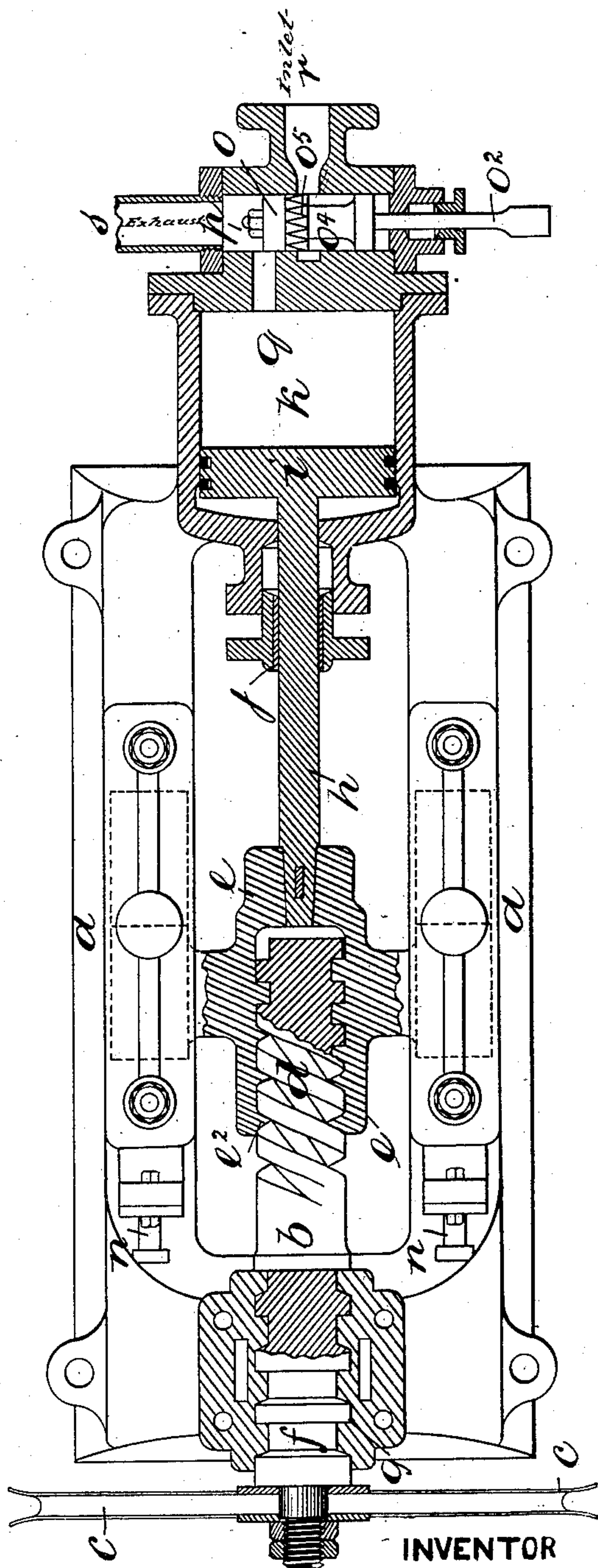
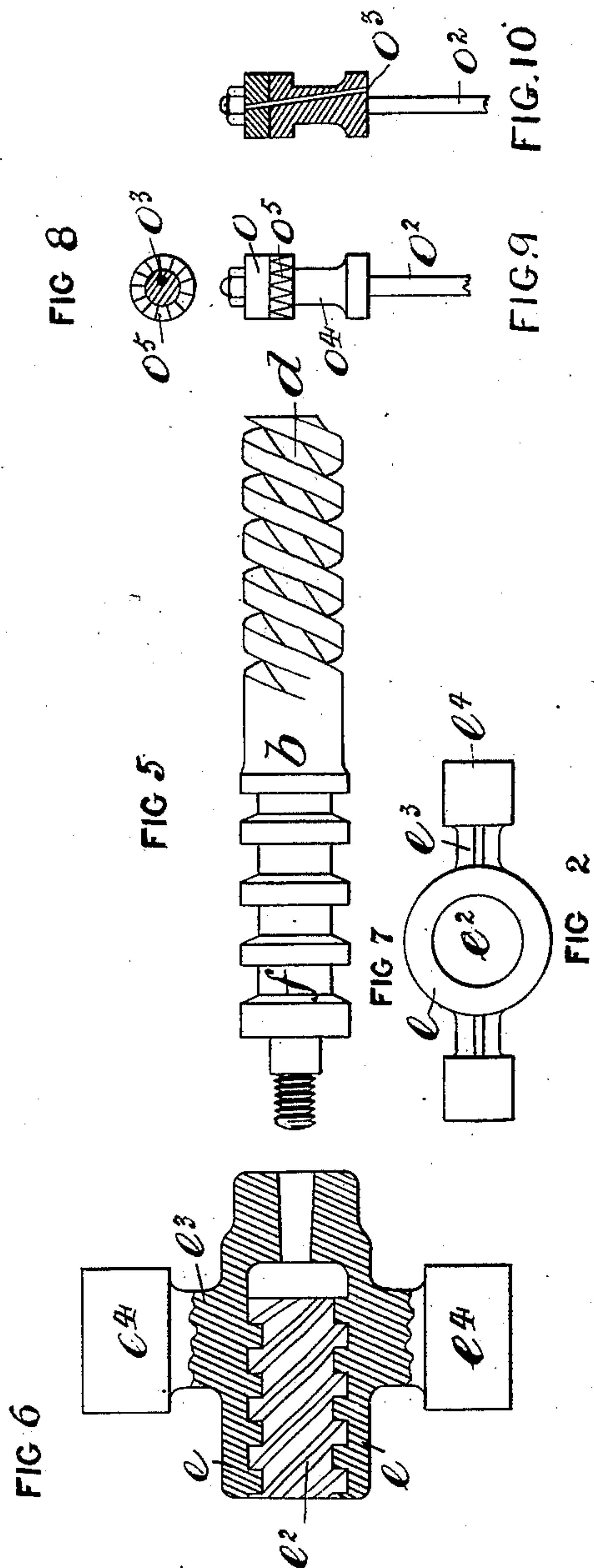
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UNITED STATES PATENT OFFICE.

ALFRED CHARLES HANDS AND FRANK PARKES, OF BIRMINGHAM, COUNTY OF WARWICK, ENGLAND.

DIRECT-ACTING ENGINE.

SPECIFICATION forming part of Letters Patent No. 353,134, dated November 23, 1886.

Application filed June 7, 1886. Serial No. 204,331. (No model.) Patented in England June 10, 1885, No. 7,058.

To all whom it may concern:

Be it known that we, ALFRED CHARLES HANDS and FRANK PARKES, subjects of the Queen of Great Britain, and residing at Birmingham, in the county of Warwick, England, manufacturers, have invented an Improvement in Direct-Acting Engines, (for which we have applied for Letters Patent in Great Britain, No. 7,058, dated June 10, 1885,) of which the following is a specification.

Our invention has for its object the raising of stamp-heads used in the shaping, punching, and the fabrication of metals, the raising of the stamp-head being effected in a simpler and more efficient manner than heretofore; and the essential features of our said invention consist in raising the stamp-head of a stamp through the medium or intervention of a screw-box situated on the end of a piston-rod, and taking into this screw-box is a screwed axis carrying the pulley, sheave, or drum, over or around the periphery of which the cord or band attached to the stamp-head passes or is wound. The piston which carries the reciprocating screw-box works within a steam-cylinder, and on the pressing upward of the piston rotary motion is imparted to the screwed axis carrying the pulley by which the stamp-head is raised. The return movement of the parts is effected by a coiled spring which has become compressed by the forward movement described.

In carrying out our invention we proceed as follows: The sheave or pulley around which the rope or band attached to the stamp-head passes is situated upon the near or left-hand side of the machine, and is mounted upon the end of an axis or shaft wormed at one end with a quick-threaded right-hand screw, while near the pulley end the said axis is collared into annular rings, which work within a thrust-box affixed to or forming a part of the framing of the machine. At the other end of the framing of the machine, in the same axial line as the wormed axis, is a steam-cylinder with a piston working therein. The piston-rod of the said piston extends through a stuffing-box in the front cover of the cylinder, and at the front or forward end of the said piston-rod is

a screw-box or an internally-screwed cross-head.

The arms of the screw-box are provided at their extreme ends with slide-rests, which work or slide upon the fixed framing of the machine, and working within the cross-head screw-box is the wormed end of the screwed shaft carrying the stamp-head-raising pulley, so that by the to-and-fro movement of the piston within its cylinder the screw-box cross-head is reciprocated and rotary motion imparted to the pulley-axis in virtue of such reciprocation. The return movement of the parts for the falling of the stamp-head is effected by coiled springs arranged in front of the slides of the cross-head—that is, the springs are inclosed within boxes or cases situated in front of the slide-heads on the two opposite sides of the frame of the machine. The end covering of the cylinder is provided with an inlet-port leading to a transverse steam-chest, wherein the valve works. The axial direction of the valve and its valve-chest is at right angles to the axial line of the steam-cylinder. The valve-piston is somewhat of a plunger form, with a stem running through a gland or stuffing-box in the front cover. The steam-inlet port to the steam-chest is situated in the end casing, while the exhaust or outlet is disposed in the same axial line as the valve, so that when the valve is at the front end of its stroke the ports are perfectly clear and allow the exhaust to pass out without any interruption.

The plunger-valve is contracted or throttled about its middle, while the inside edges (off side) of the enlargements on either side of the valve are V'd or cut away, so as to admit steam gradually through the inlet-port, before which it passes in allowing steam to enter the cylinder for duty—that is to say, the valve is so formed that steam is not allowed to pass precipitously from the steam-chest to the side of the piston. This is effected by the peculiar formation of the inside collar next to the stalk or contracted part, which is V'd or made angular, so that the extreme points of the angles formed by the V or cut-away parts are presented to the port earlier than the contracted or stalk part of the valve, thus allowing steam

to enter the cylinder gradually, instead of with a rush or precipitously, as would occur if no means were devised as described. An air-hole passes longitudinally through the valve to allow the escape of air confined.

We will now proceed to describe, with reference to the accompanying drawings, the manner in which the same is to be performed.

Figure 1 is a side elevation, and Fig. 2 is a horizontal section, of a machine or engine for the raising of stamp-heads for the stamping and shaping of metals and other purposes. Fig. 3 is an end elevation of the same; and Fig. 4, a transverse vertical section taken through the dotted lines A B, Fig. 1. Fig. 5 is an elevation of the screw and collar axis, by the rotation of which a stamp-head is raised or elevated. Fig. 6 is a screw-box, which is connected to the end of the piston-rod, and wherein the quick-threaded screw on the end of the rod, Fig. 5, takes and works. Fig. 7 is an end view of the same. Figs. 8, 9, and 10 are respectively elevation, section, and end views of the plunger-valve for admitting and cutting off steam from the cylinder.

The same letters of reference indicate corresponding parts in the several figures of the drawings.

a is the bed of the machine, and *b* is a shaft or axis having mounted upon one end a sheave, drum, or pulley, *c*, around which a rope, band, or chain attached to a stamp-head passes and is fixed. The other end of the axis *c* is wormed with a quick-threaded screw, *d*, which works within a screw-box, *e*³, formed in the middle of a reciprocating cross-head, *e*. That part of the shaft or axis *b* nearest to the pulley is collared into annular rings *f*, which work within a thrust-box, *g*, made out of the solid part of the bed or frame *a*. The said thrust-box is of the counterpart of the thrust collared rings *f*.

h is a piston-rod with a piston, *i*, at one end, and attached at its other end to the cross-head *e*, so that the whole move together. The said piston *i* works within the cylinder *k* and the piston-rod through the gland or stuffing-box *j* in front of the cover of the cylinder.

The arms *e*³ of the cross-head *e* are provided with broadened-out slide-rests *e*⁴, which work and slide upon a fixed part of the framing of the machine, as represented in dotted lines in the plan, Fig. 2, and in front of the slide-rests *e*⁴, and between the shoulders or collars *m m*, and encircling the rods *n n*, coiled springs *l l* are disposed for assisting the bringing back of the stamp-head and the other parts of the machine to their normal positions, although these springs are not absolutely necessary from the fact that the gravitating force of the weight of the stamp-head is generally sufficient for all practical purposes.

Steam is admitted and cut off from the cylinder by the plunger-valve *o*, working within the steam chest or passage *p*, disposed at right angles to the axis of the cylinder, and leading to and from the said steam-chest are steam-ports

q, *r*, and *s*. The port *q* is the inlet-passage to the cylinder, the port *r* is the inlet-port to the steam-chest, while the port *s* is the exit-port, from which steam escapes from the steam chest and cylinder when the valve is in its backward stroke; and, further, the steam-inlet port of the steam-chest is situated in the end casing, while the exhaust or outlet is disposed in the same axial line as the valve, so that when the valve is at the front end of its stroke the exit-ports are perfectly clear and allow steam to pass out without interruption.

The plunger-valve *o* is reduced about its middle and marked *o*⁴, and the head of the plunger, a short distance back from its end, is formed with a series of V-shaped depressions extending entirely around the same, and marked *o*⁵, so as not to permit steam to enter the cylinder with a rush—that is, by V'ing or cutting away that part of the valve, steam is admitted into the cylinder gradually, as the extreme points of the V's are first presented to the cylinder-port earlier than the contracted part *o*⁴, thereby preventing the steam entering with a rush, as would occur if no such means were devised. The valve-plunger *o* has a stem, *o*², by which the valve is worked, and passing through the body of the valve *o* a hole, *o*³, is made. This hole is to allow the escape of air confined within the steam-chest on the reciprocation of the valve for admitting and cutting off steam to the steam-cylinder.

To rotate the sheave or pulley for the raising of a stamp-head, admit steam through the port *r* into the valve-chest *p*, and on the middle part of the valve *o* coming in front of the second inlet-port, *q*, steam is admitted into the cylinder. The pressure of the steam thus admitted exerts itself upon the back of the piston and presses it to the top of the cylinder. The piston-rod, carrying the screw-box cross-head *e e*³, compels the quick-threaded screw *d* to rotate to an extent equal to the reciprocations of the cross-head, thereby compelling the sheave or pulley secured to the end of the shaft to rotate, or partially rotate, and so raise the head of a stamp through the intervention of a rope, band, or chain to which it is connected. Thus by the reciprocation of a piston within its cylinder a to-and-fro movement is imparted to a cross-head having an internally-wormed screw-box, wherein a quick-threaded screw on the end of an axis or shaft carrying a stamp-raising pulley or arm works.

On the stamp being raised to the desired height, according to the amount of steam admitted to the cylinder, or according to the amount of forward movement having been given to the cross-head, steam is cut off and the valve returned by a spring or counterpoised weight attached thereto to a position that allows the ports *q* and *s* to be free to admit of the escape of steam without interruption. The springs *l l*, compressed by the forward movement of the cross-head, now react

and assist in carrying the parts back to their normal positions. The back movement thus created prevents any retardation to the stamp-head on its descent.

5 The stamp-head can be raised or elevated to any desired height, according to the requirements of the work, by admitting more or less steam into the cylinder.

10 The steam-valve may be moved automatically by links or connecting-rods attached to the movable parts of the stamp, or it may be moved by hand or foot levers.

15 Although we have described that steam is admitted to the back of the cylinder, yet steam may be admitted at the front as well as in the back. When so admitted, the pressure of steam takes the place of the springs *l l* for returning the parts to their normal positions without retarding the stamp in its descent; and
20 although we have described that the piston within the cylinder is moved by steam, yet compressed air, gas, or other elastic fluids may be employed with like effect for the working of the said piston.

Having thus described our invention, we 25 claim as new and desire to secure by Letters Patent—

In a direct-acting engine, the combination, with a steam-cylinder, a piston, and piston-rod, a cross-head having a screw-threaded 30 cavity and sliding in a suitable frame, and springs secured in said frame and bearing against said cross-head, of a shaft, *b*, having a screw, *d*, said shaft being journaled in the frame and provided with a pulley, *c*, all con- 35 structed and arranged substantially as described, whereby the said shaft and pulley will be rotated in one direction by the forward movement of the piston and in the opposite direction by the resiliency of the springs.

Signed this 8th day of April, 1886.

ALFRED CHARLES HANDS. [L. S.]
FRANK PARKES. [L. S.]

Witnesses:

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