

(No Model.)

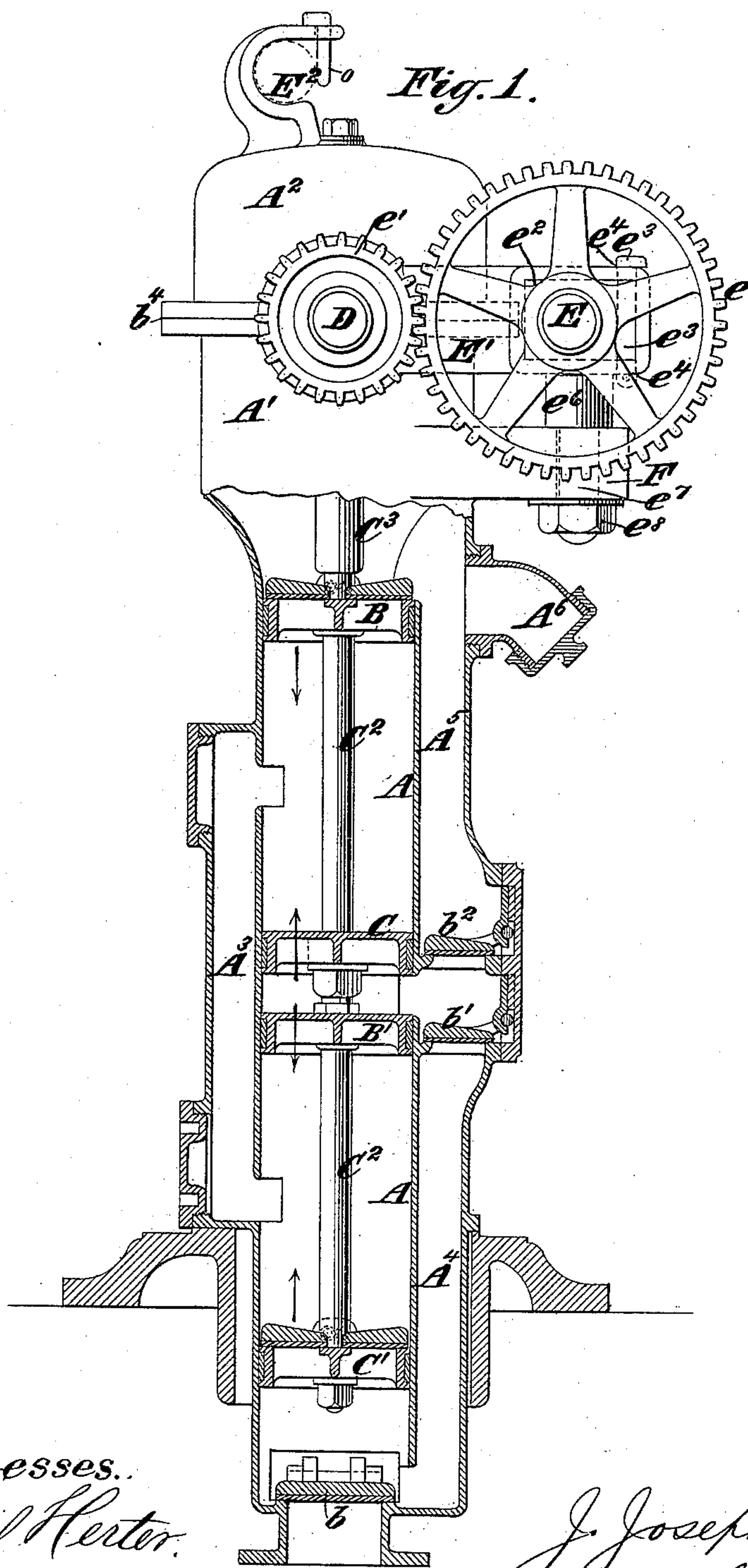
3 Sheets—Sheet 1.

J. J. DE RYCKE.

CRANK PUMP.

No. 378,665.

Patented Feb. 28, 1888.



Witnesses..

Emil Hertter.

Olundgren.

Inventor:

Inventor:
J. Joseph De Rycke,
by his Atty.
Brown & Hall.

(No Model.)

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Fig. 2.

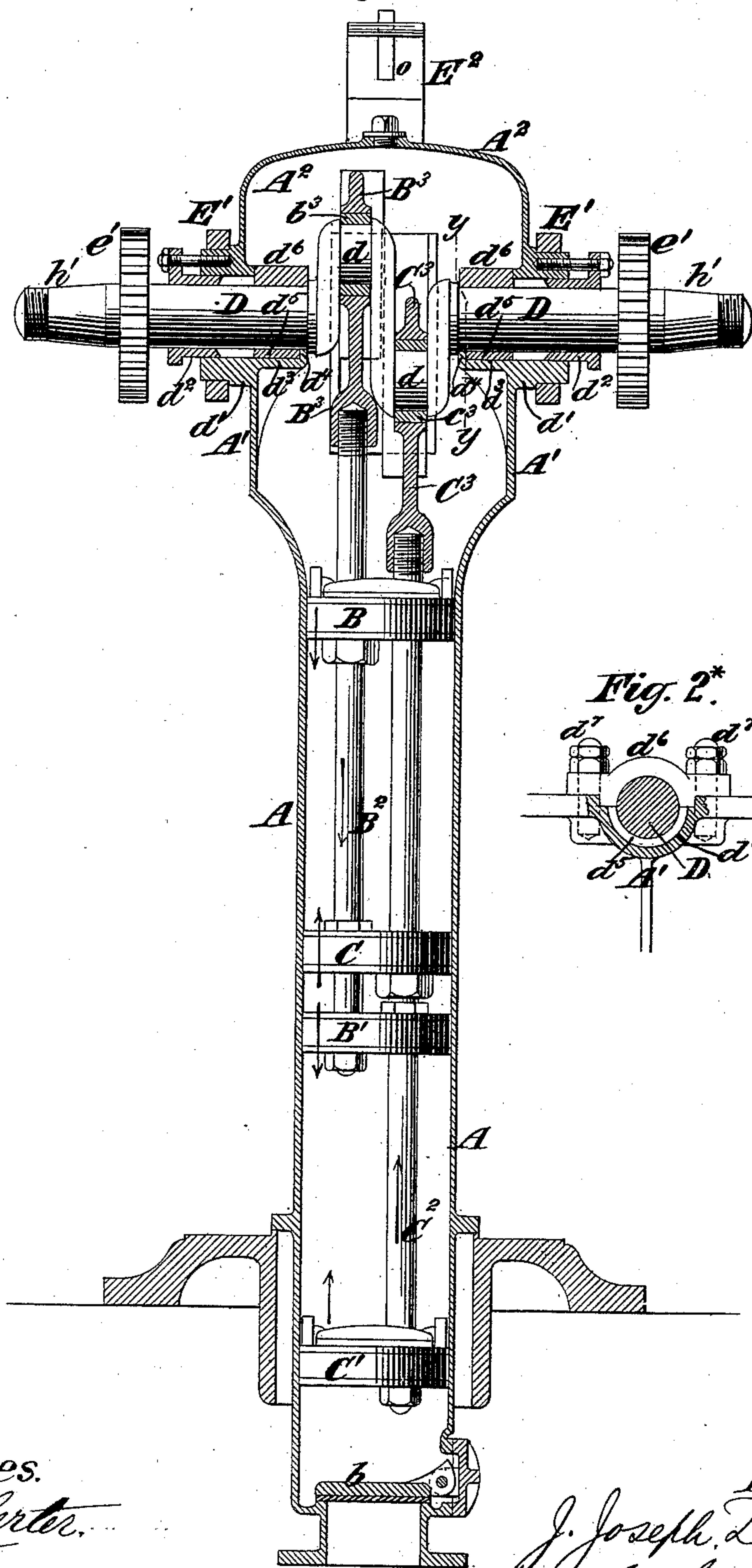


Fig. 2.*

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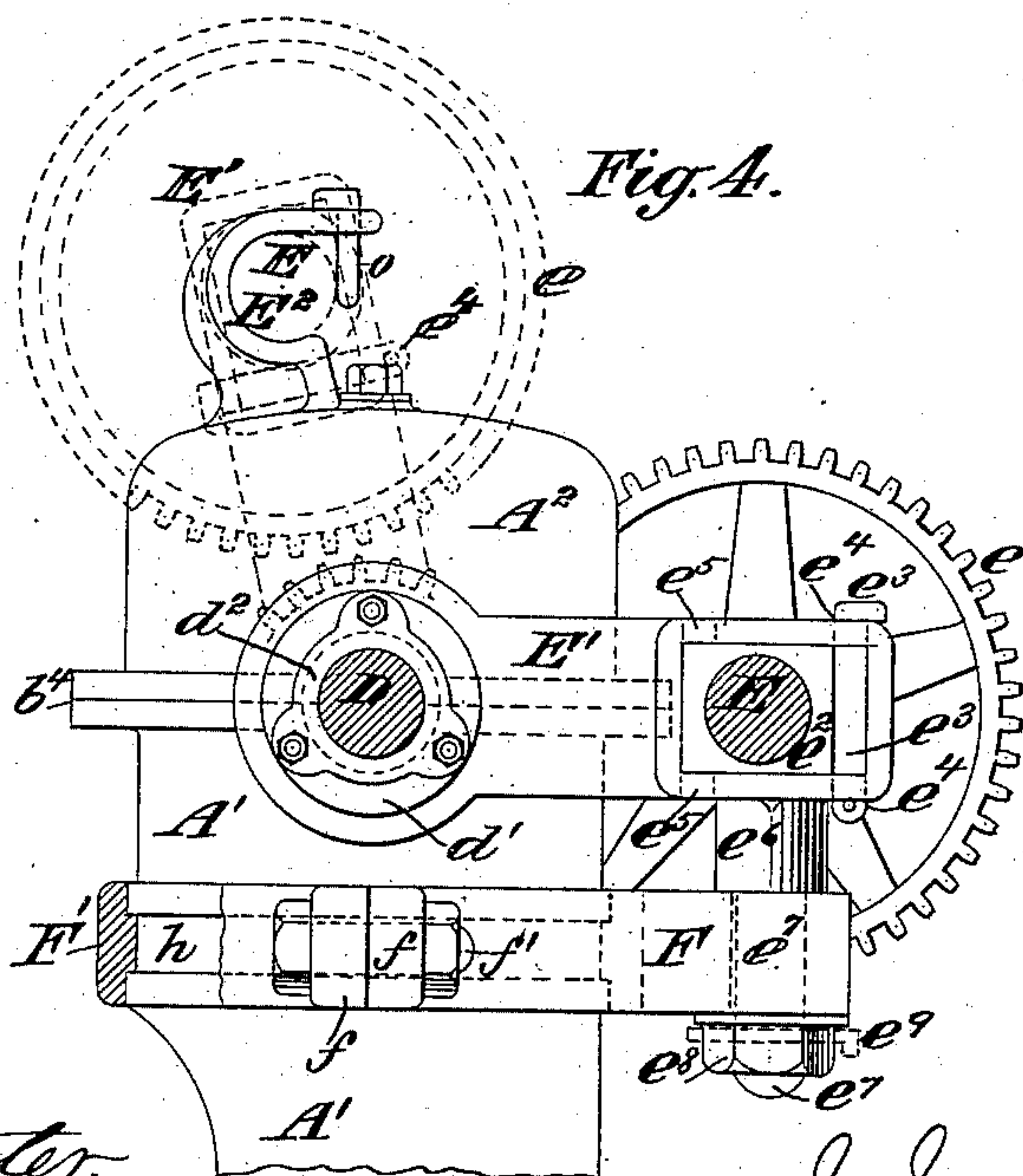
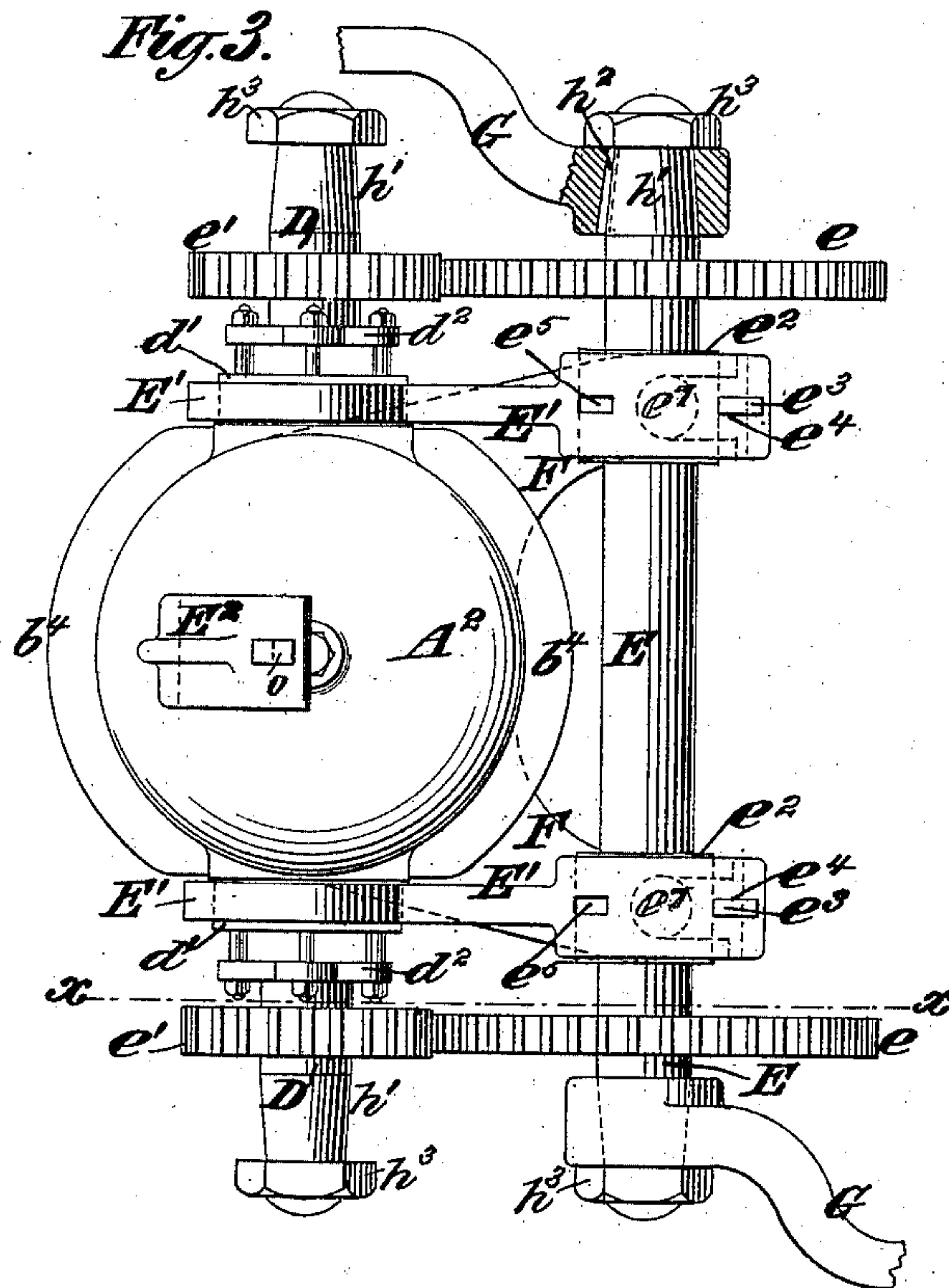
3 Sheets—Sheet 3.

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UNITED STATES PATENT OFFICE.

J. JOSEPH DE RYCKE, OF NEW YORK, N. Y.

CRANK-PUMP.

SPECIFICATION forming part of Letters Patent No. 378,665, dated February 28, 1888.

Application filed November 2, 1886. Serial No. 217,781. (No model.)

To all whom it may concern:

Be it known that I, J. JOSEPH DE RYCKE, of the city and county of New York, in the State of New York, have invented a new and useful
5 Improvement in Crank-Pumps, of which the following is a specification.

My invention relates more particularly to ships' pumps, which are employed for fire purposes, washing decks, and analogous forcing
10 purposes, and in which the pistons are operated by crank-shafts to which hand-cranks are applied.

My invention more particularly relates to pumps in which the barrel or cylinder is sur-
15 mounted by a closed water-tight casing containing the crank-shaft and connections for operating the piston or pistons, and from opposite sides of which the crank-shaft projects through suitable stuffing-boxes.

20 One object of my invention is to provide for the ready access to the crank-shaft and its boxes or bearings for renewal or for adjustment by simply removing the upper part of the casing, and to this end I divide the casing horizontally through the stuffing-boxes of the crank-shaft
25 and in a plane coincident with the axis of the crank-shaft, and I also provide a novel and simple construction of bearings for the crank-shaft, which are separate from and adjustably
30 secured to the lower portion of the casing below the line of division and inward of the stuffing-boxes, and which are readily accessible for adjustment or repair when the cap portion of the casing is removed.

35 In ship-pumps, particularly those designed for fast naval vessels or ships of war, it is desirable to have the pumps as light and compact as possible. To obtain a comparatively large supply of water under heavy pressure
40 from a pump of comparatively small size, it is necessary to turn the crank rapidly.

Another feature of my invention relates to pumps which comprise, in addition to the crank-shaft or main operating-shaft, a coun-
45 ter-shaft geared with the crank or main shaft and an operating-handle which may be applied to either of the two shafts. Where the hand-cranks are directly upon the crank-shaft, men cannot make much over twenty turns, or there-
50 about, of the crank-shaft per minute without

very soon becoming exhausted, while if they did not have to make over that number of turns per minute they could exert a power necessary to work a pump at a much higher speed. This feature of the invention consists
55 in the combination, with a pump-piston and a crank-shaft and cranks and connecting-rods for operating it, the shaft being constructed at the end for the attachment of a hand-crank, of a counter-shaft geared with the crank-shaft, and
60 also constructed at the end for the attachment of a hand-crank, and a novel construction of adjustable bearings and means of supporting the same for the counter-shaft, whereby it may be moved to engage or disengage the gears
65 which connect it with the crank-shaft.

Other features of the invention consist in novel combinations of parts, hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is
70 a side elevation, partly in section, of a pump embodying my invention, the hand-cranks being removed in order to show more fully the gearing whereby the counter-shaft and crank-shaft are connected. Fig. 2 is a vertical sec-
75 tion of the pump in a plane at right angles to Fig. 1. Fig. 2* is a sectional view on the plane of the dotted line *y y*, Fig. 2, showing the construction of the crank-shaft bearings. Fig. 3 is a plan of the pump, showing the counter-
80 shaft as in gear with the crank-shaft; and Fig. 4 is a sectional view upon about the plane of the dotted line *x x*, Fig. 3, showing how my invention may be applied to pumps which are
85 already in use.

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

My invention may be embodied in piston-pumps of various kinds, and for the purpose of illustration I have here shown a pump of a
90 construction which forms no part of my invention, but which I will briefly describe, in order that the application of my invention may be fully understood.

A designates an upright pump barrel or
95 cylinder, which is surmounted by a casing, A', A', the part A' being formed in the same integral structure with the pump-barrel. The pump-barrel has at the bottom a suction-valve, *b*, and is provided with four pistons, B B' C
100

C'. The upper and lower pistons, B C', are constructed with suitable valves, while the intermediate pistons, C B', are valveless.

A³ designates a side passage whereby the portions of the pump-barrel above and below the intermediate pistons, C B', are in constant communication, and A⁴ A⁵ designate two other side passages, the former of which, A⁴, communicates with the pump-barrel A below the lower piston, C', and communicates through a valve, b', with the portion of the barrel between the pistons C B', while the latter of said passages, A⁵, is simply a discharge-passage communicating through a valve, b², with the spaces between the pistons C B'. The pistons B B' are attached to a rod, B², while the pistons C C' are attached to a rod, C². The piston-rods B² C² are secured in yokes B³ C³, which have horizontally-sliding boxes b³ c³, fitting crank-wrists d, which are arranged at points opposite each other upon the crank-shaft D.

As shown in the drawings, the pistons C B' are at a point at which they are nearest together, and as the crank-shaft D is turned the pistons B B' will be moved downward, while the pistons C C' will be moved upward. The intermediate pistons, C B', will therefore be moved in opposite directions away from each other. The upward movement of the piston C' will cause a suction through the valve b into the pump-barrel A below said piston, and the approach of the pistons B' C' toward each other will discharge the water which is between them through the passage A³.

The movement of the pistons C B' away from each other will produce a suction through the passage A⁴ and valve b' into the space in the pump-barrel A between the pistons C B'. The approach of the pistons B C toward each other will force the water contained between them through the valves of the piston B and into the upper part of the casing, which it will be understood is water-tight. The casing is provided with one or more nozzles, A⁶, with which hose may be connected, one nozzle only being here shown.

The casing A' A² has at opposite sides hubs or projections d', which are bored out to form stuffing-boxes and to which are fitted glands d². The casing A' A² is divided in a horizontal plane which is coincident with the axis of the crank-shaft D directly through the hubs d' and stuffing-boxes, and the two parts A' A² of the casing are connected by a flange joint, b⁴, any suitable packing being introduced between them to make the casing water-tight. The stuffing-box bores which are formed in the hubs d' extend inward entirely through the upper portion, A², of the casing, and the lower portion, A', is formed with segmental continuations d³ of said bores, which form seats for the bearings, and are provided at their inner ends with lips or flanges d⁴ for retaining the bearings in place. Each bearing consists of a segment or ring section, d⁵, which rests within a seat, d³, against the flange d⁴, and the

cap d⁶, secured by bolts d⁷ to the lower portion of the casing A'. A single ring of proper size bored out and turned upon its periphery will, when cut in two, form the lower sections, d⁵, of the bearings, and the caps d⁶ for the two bearings may be cast in one piece, and after boring out may be separated. These bearings are entirely separable from the casing, and hence may be renewed at small cost, and when the cap portion A² of the casing is removed access is afforded to the bearings for tightening their caps d⁶, or for removing them, if desired, and by simply taking out the bolts d⁷, which hold the caps in place, the entire crank-shaft, with the two piston-rods and their attached pistons, may be removed through the open top of the casing portion A'. The arrangement of the bearings d⁵ d⁶ and the manner of securing them to the lower casing portion, A', are best shown in Fig. 2*.

E designates a counter-shaft which is arranged parallel with the crank-shaft, and is geared therewith by spur-wheels e and pinions e' on opposite sides of the pump. As here represented, the wheels e are about twice the size of the pinions e', and hence a speed of about twenty revolutions per minute of the counter-shaft E will produce about forty revolutions per minute of the crank-shaft D.

The counter-shaft E is journaled in boxes e², which are fitted to slide toward and from the crank-shaft D in links or bars E', which are journaled upon the hubs d', projecting from opposite sides of the casing, and in which the stuffing-boxes are formed. This arrangement and construction of the bearings e², with the links or bars E', provides for swinging the counter-shaft E upward, when desired, into the position shown by dotted lines in Fig. 4. As before stated, the boxes e² have a slight sliding movement in links or bars E' toward and from the crank-shaft, and are held in place by means of keys e³ or other suitable securing devices. When the keys e³ are inserted through the slots e⁴ in the bars or links E' upon the outer side of the boxes e², as shown in Fig. 4, they hold the counter-shaft in such position that its wheels e are in gear with the pinions e' of the crank-shaft D. If the keys or securing devices e³ were inserted through the slots e⁵ in the links or bars E' and upon the inner side of the boxes e², they would hold the counter-shaft E, with its wheels e, out of gear with the pinions e', and when the counter-shaft E is to be swung upward into the position of rest shown in Fig. 4 by dotted lines the boxes e² are first locked in the position described, to hold the wheels e out of gear with the pinions e'. When in this position of rest, the counter-shaft is supported by a hook or holder, E², which is at the top of the casing, and which forms a rest for the shaft, and may be provided with a key or keeper, o.

In order to steady and support the links or bars E' when they are swung downward into horizontal and operative position, as shown in Fig. 4, I provide the links or bars E' with

downward projections e^b , which engage lugs or ears F, projecting from the sides of the casing in the same horizontal plane. The lugs or ears F are slotted outward, so as to receive the cylindric studs or bolts e^c , which form continuations of the downward projections e^b , and which are provided with nuts e^d , whereby the bars E' may be securely held in rigid relation to the lugs or ears F. In lieu of a nut, e^d , the stud or bolt e^c may be provided with a transverse pin or key, e^e , as shown by dotted lines in Fig. 4. In making new pumps the lugs or ears F may be cast upon the casing A', and in order to apply my invention to pumps already in use I may form the lugs or ears F upon a band, F', which embraces the portion A' of the casing, as shown in Fig. 4, and is formed in semicircle sections, having their ends provided with ears or lugs f and secured together by bolts f' , whereby they are clamped upon the casing portion A'.

In many of the classes of pumps of the style shown which have been already manufactured and are in use the casing portion A' has a circumferential channel or groove, h , formed by fillets or beads, as shown in Fig. 4, and this construction furnishes a ready and secure seat wherein the band F' may be rigidly held in place.

Both the crank-shaft and counter-shaft are constructed at opposite ends to receive hand-cranks G, which in Fig. 3 are shown applied to the counter-shaft E. The ends of the shafts D E may have taper seats h' for the reception of the eye of the crank, and the crank may be locked by means of a key, h^2 , to either shaft and be secured thereon by a nut, h^3 .

When it is desired to operate the pump rapidly in order to give an increased discharge or velocity, as in case of fire, the hand-cranks G may be applied to the counter-shaft E almost instantaneously, and then by twenty revolutions of the counter-shaft, which may be performed by men without their exhausting themselves by the rapidity of their bodily movements, the crank-shaft D of the pump will be given forty revolutions and a comparatively large volume of water will be discharged. When there is no necessity for operating the pump to its greatest capacity, the keys or securing devices e^3 may be applied so as to hold the gear-wheels e out of engagement with the pinions e' , and the counter-shaft E may then be swung upward into the position shown by dotted lines in Fig. 4, and the hand-cranks G may be applied directly to the crank-shaft D.

I am aware that it is very old to construct force-pumps with the pistons, piston-rods, crank-shaft, and connections arranged within a casing having a closed top, the crank-shaft working through the stuffing-boxes in opposite sides of the casing and the casing being horizontally divided through the crank-shaft bearings and the stuffing-boxes. In such construction it has been usual to form the crank-shaft bearings integral with the parts of the

casing, and when the top of the casing is removed the caps or upper portions of the crank-shaft bearings are also removed, and the crank-shaft is no longer secured in its bearings. I therefore do not desire to include in my invention, broadly, the construction just described as old, but desire to limit the invention to a closed casing which is provided at the opposite sides with stuffing-boxes for the crank-shaft, and is divided horizontally through the stuffing-boxes and bearings inward of the stuffing-boxes, and comprising caps which are secured to the main lower portion of the casing independently of the removable upper portion of the casing. The construction of the casing with the seats d^3 , which are inward of the stuffing boxes and form continuations of the bores of the stuffing-boxes, and bearings which are concentric in these segmental seats, and which are independent of the parts of the casing, is very desirable, because of the accuracy and security with which they may be held in position and the ease with which they may be renewed when worn out.

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

1. The combination, with the pump-barrel and piston, of a crank-shaft for operating the piston, a closed casing directly surmounting the pump-barrel, provided at the opposite sides with stuffing-boxes for the crank-shaft and divided horizontally through the stuffing-boxes, and bearings inward of the stuffing-boxes, and comprising caps which are secured to the main lower portion of the casing independently of the removable upper portion of the casing, whereby the upper portion of the casing may be removed without releasing the crank-shaft from its bearings, substantially as herein described.

2. The combination, with a pump-barrel and piston and a crank-shaft for operating the piston, of a closed casing directly surmounting the pump-barrel and divided horizontally in a plane coincident with the axis of the shaft, and provided on opposite sides with stuffing-boxes and with segmental seats d^3 , which form continuations of the bores of the stuffing-boxes, and bearings for the crank-shaft, removably secured in the casing inward of the stuffing-boxes and centered by said seats, substantially as herein described.

3. The combination, with the horizontally-divided casing A' A², having the stuffing-box bores in its line of division, and having seats d^3 , which form continuations of such bores, of the bearings for the crank-shaft, consisting of ring-sections d^5 , externally fitting the seats, and caps d^6 , secured to the lower portion of the casing, said bearings forming the bottoms of the stuffing-boxes, and the stuffing-box glands d^2 , substantially as herein described.

4. The combination, with a pump-piston and the crank-shaft D for operating it, constructed at the end for the attachment of a hand-crank, of the counter-shaft E, connected by gear-

wheels e and pinions e' with opposite end portions of the crank-shaft, and also constructed at the end for the attachment of a hand-crank, the sliding boxes e^2 for the counter-shaft, supports having slots e^5 longer than the boxes, and in which the boxes are fitted, and keys or analogous devices whereby such boxes may be held positively in position with the said wheels and pinions engaged with or disengaged from each other, substantially as herein described.

5. The combination, with the pump-piston and crank-shaft D, of the counter-shaft and gears for connecting it with the crank-shaft, swinging links or bars pivoted concentrically with the crank-shaft, boxes for the counter-shaft, fitted to slide in said links or bars toward and from the crank-shaft, and securing devices for holding said boxes positively in position with the gears which connect the crank-shaft and counter-shaft either engaged

or disengaged, substantially as herein described.

6. The combination, with a pump-casing and ears or lugs F, projecting therefrom, of the crank-shaft D, the counter-shaft E, gear-wheels and pinions connecting said shafts, swinging links or bars E', pivoted concentric with the crank-shaft and having a detachable connection with said lugs or ears, boxes e^2 for said counter-shaft, fitted to slide in the links or bars toward and from the crank-shaft, securing devices for fixing the said sliding boxes positively in place, and a rest at the top of the pump-casing for supporting the counter-shaft when swung upward above the crank-shaft, substantially as herein described.

J. JOSEPH DE RYCKE.

Witnesses:

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