

C. CHERRY.
Oil Still.

No. 15,643.

Patented Sept. 2, 1856.
2 SHEETS—SHEET 1.

Fig. 1.

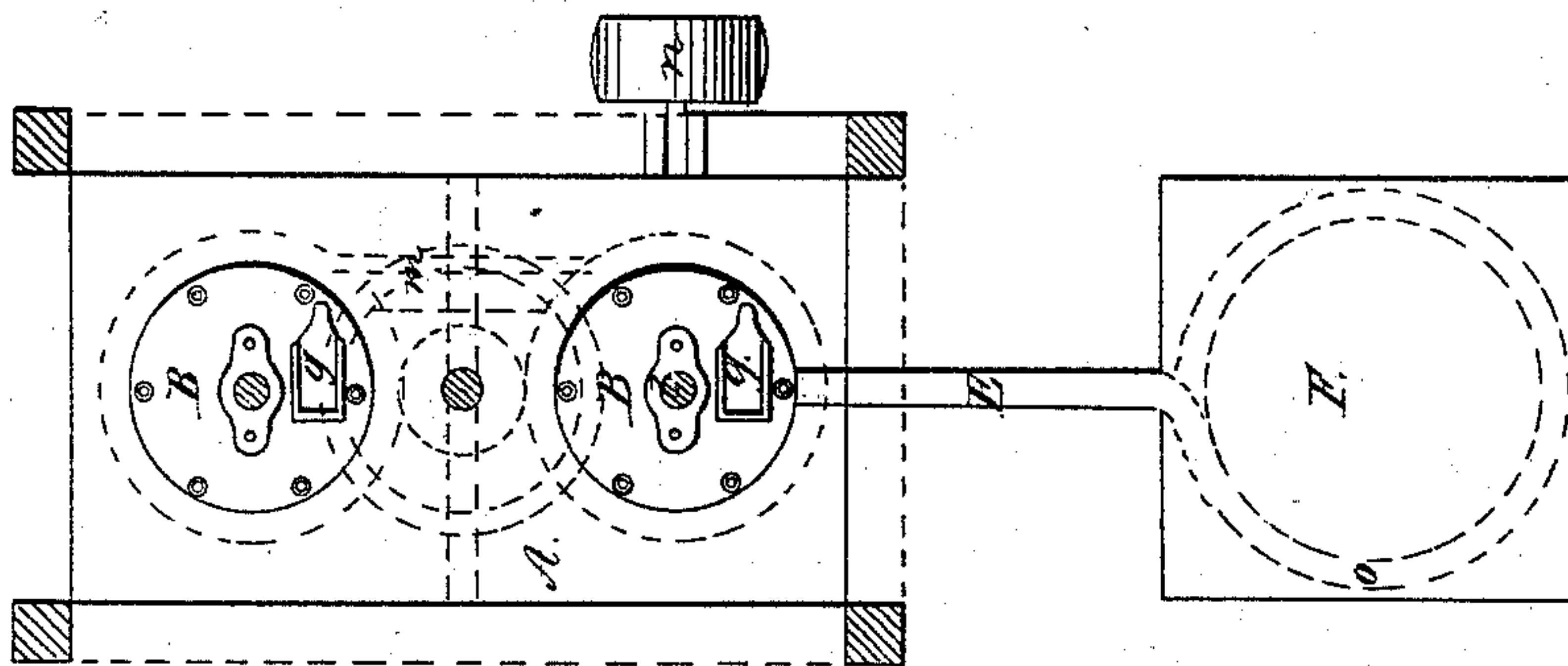
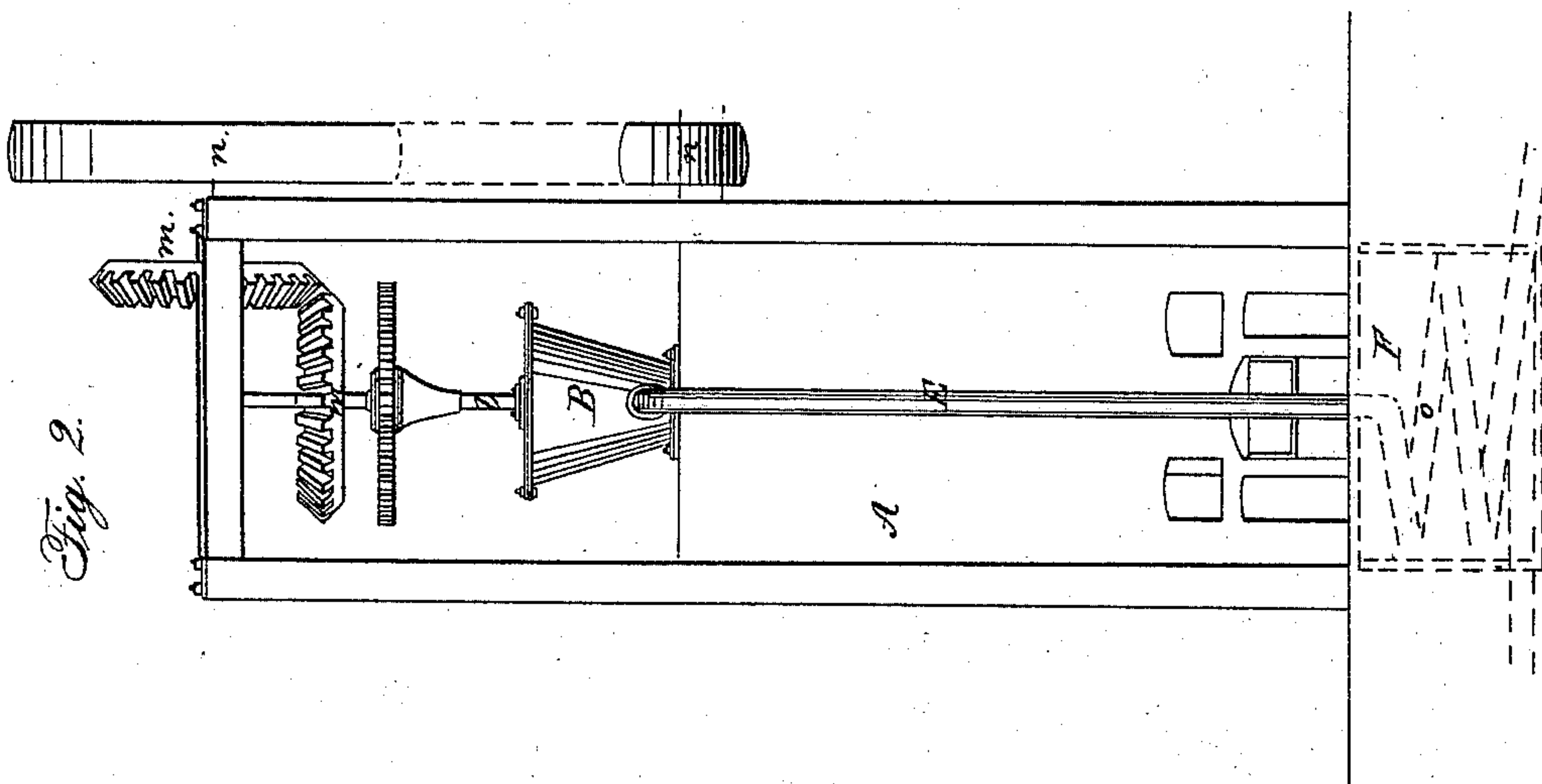


Fig. 2.

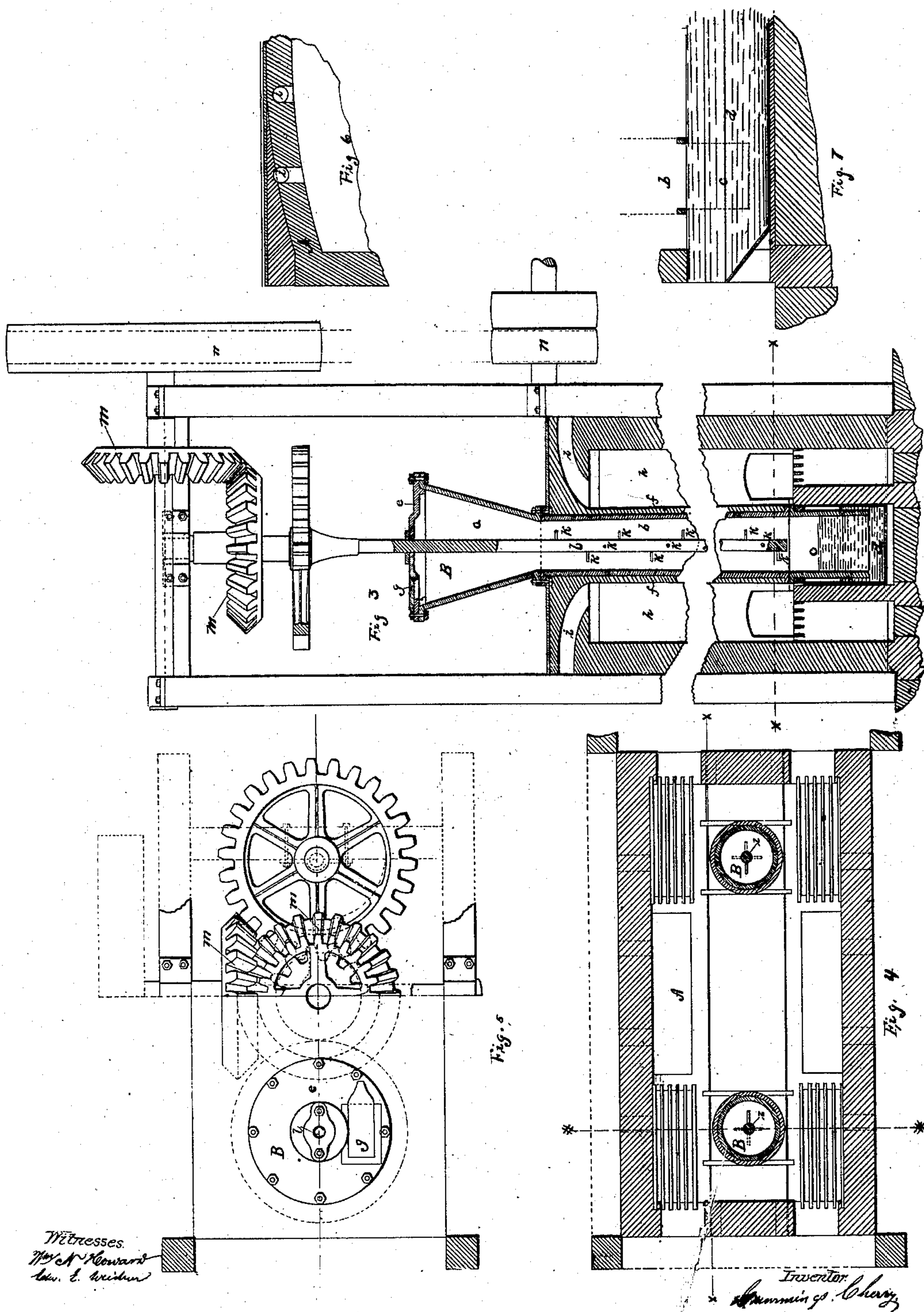


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UNITED STATES PATENT OFFICE.

CUMMINGS CHERRY, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN APPARATUS FOR DISTILLING CRUDE OIL FROM MINERAL COAL.

Specification forming part of Letters Patent No. 15,643, dated September 2, 1856.

To all whom it may concern:

Be it known that I, CUMMINGS CHERRY, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Procuring Crude Oil from Coal and other Bituminous Minerals; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the annexed drawings, forming part this specification, in which—

Figure 1 is a ground plan of my apparatus. Fig. 2 is an elevation of the apparatus shown in Fig. 1. Fig. 3 is a sectional elevation of the retorts and retort-furnace. Fig. 4 is a ground plan of the retorts and retort-furnace, being a section through *xx* of Fig. 3. Fig. 5 is a top view or plan of the retorts, showing the gearing of the shaft. Fig. 6 is a partial sectional view of the top of the retort-furnace on the line *xx*, Fig. 4. Fig. 7 is a partial sectional view of the bottom of the retort-furnace on the line *yy*, Fig. 4.

In the several figures like letters of reference denote similar parts of the apparatus.

My invention consists in certain improvements in apparatus for extracting oil from coal and other bituminous substances, whereby I am enabled to overcome a difficulty which has heretofore proved a serious obstacle to the manufacture, in large quantities, of oil from bituminous minerals—namely, the tendency of bituminous substances, when exposed to heat, to generate permanent gas instead of an oleaginous vapor readily condensable into crude oil.

The mineral which I propose chiefly to use in the production of oil is bituminous or gas coal. Any such coal, when properly treated, will produce oil; but the more bituminous the coal is the better will it answer the purpose, yielding a larger per centage of oil.

It is well known that bituminous coal, when exposed to heat in a retort, will evolve sulphureted hydrogen or olefiant gas, which is readily purified for the purposes of illumination. This is produced by exposing coal inclosed in close iron retorts, usually placed in a horizontal position, to the heat of a furnace. Such retorts will not, however, answer my purpose, because it is almost impossible to keep them at a uniformly low degree of heat, which is absolutely essential in the manufac-

ture of oil. If the heat rises above the requisite degree, the production of permanent gas is the immediate and necessary result, which defeats the object to be attained, and unless the retorts used can be so constructed as to insure the attainment and permanent maintenance of the exact degree of heat required, the oil would be produced in too small quantities to be of any practical benefit. It is also necessary to have retorts so constructed as that they can be charged with fresh coal from time to time without opening the retorts or altering the degree of heat, and to add the coal gradually, so as to keep the process of manufacture continually going on, and allow of the removal of the coke or residuum during the continuance of the process.

Having thus explained the object to be attained by my invention, I will proceed to describe in detail the construction and operation of my improved apparatus.

In the drawings, B represents a retort made of cast-iron of cylindrical or tubular shape, and placed in an upright position in the retort furnace A. A series of these retorts are placed side by side at a convenient distance apart, the number of such retorts set in one furnace being varied according to the extensiveness of the works. These retorts are made in three separate sections or pieces (marked *a*, *b*, and *c* in the drawings.) The head *a* is funnel-shaped, the widest part being uppermost. This head is covered with an iron cap, *e*, (see Figs. 3 and 5,) which is fastened on by screw-bolts to a flange around the circumference of the head *a*. A sliding door, *g*, in this cap serves for the admission of coal first broken up into small fragments into the head of the retort. This door fits closely, so as to prevent the escape of vapor, and yet is readily slid open to replenish the retorts, as occasion requires. The body *b* of the retort is tubular, about fourteen feet in length, and gradually increases in diameter from top to bottom, being about twenty-two inches in diameter at top, where it unites with the base of the head-piece *a*, and twenty-four inches in diameter at bottom. The foot *c* is also tubular, being merely a continuation of the body of the retort, and is about two feet in length. The dimensions just given are not imperative, but are merely given to furnish an idea of the size and relative proportion of the several

parts which I deem most suitable. The head *a* is united to the upper extremity of the body *b* by bolts passing through flanges at the extremities of those parts. So, also, are the body *b* and foot *c* connected together. The retorts are thus made in three separate pieces for convenience in construction, and because the body *b* alone being exposed to the heat of the furnace may need more often to be replaced. The retort is open at the bottom, (see Fig. 3,) but (as before stated) closed at top. The foot-piece *c*, being the lower extremity of the retort, is continually immersed to the depth of from six to twelve inches in cold water placed in a trough, *d*, which is placed under the retort below the fire-level of the furnace, (see Figs. 3 and 7,) the whole of the foot-piece *c* of the retort being inside of the trough *d*. Care must be taken to keep the water in the trough *d* so high as to rise above the lower extremity of the retort, which is raised about four inches above the bottom of the trough *d*, so as to permit of the removal of the coke and residuum of the coal after the oil is extracted from it.

In order to prevent any slight change in the heat of the furnace, occasioned by opening the furnace-doors or other causes, from effecting injuriously the heat of the retort, the body-piece *b* is surrounded with a casing of fire-tile *f*, (see Fig. 3,) which is built around the retort, supported by the horizontal flange around the lower extremity of the body-piece. The oven *A* is built of fire-brick. In Fig. 3, *h h* are the fire-chambers of the furnace, and *i i* (see also Fig. 6) are the flues for the escape of the smoke, placed in the arched roof of the furnace. The fire-chamber of the furnace extends from the lower extremity of the body of the retort to within a short distance of its upper extremity, thus exposing the whole body of the retort to a uniform degree of heat. This construction of furnace is more readily preserved at an even temperature, and that portion of the retort which is exposed to the fire being cased with fire-tile prevents its becoming so hot as to convert the coal into permanent gas if ordinary care is taken to regulate the furnace-fires.

Through the center of the retort *B* passes an iron rod or stirrer, *l*, which passes through the cap *e* down to the lower flange of the body-piece *b*. This rod should be about four inches in diameter, and is furnished with a number of spikes or iron points which ra-

diate from the rod at short intervals, through so much of its length as passes through the body of the retort. This rod or stirrer is caused to turn slowly on its axis by means of gearing *m m*, connected by pulleys *n n*, Fig. 3, with other machinery used in the works. The effect of this is to prevent the pieces of heated coal from uniting into a mass by keeping it constantly in motion, and thus to facilitate the evolution of oleaginous vapor and give it vent to rise to the head of the retort. The fresh coal to charge the retort and afterward keep it supplied is fed in through the valve or door *g*, the coal being kept up to the height of the bottom of the head-piece *a* by the addition of fresh coal as it sinks in the retort, and the coke and calcined coal left after the extraction of the oleaginous vapor sinks to the bottom of the retort, and is drawn out by an iron hook from the bottom of the trough *d*. The water in the trough serves to close the lower extremity of the retort and to condense any gas that may attempt to escape in that direction.

From the head *a* of the retort, which (not being filled with coal) serves as a receptacle for the oleaginous vapor, a pipe, *E*, (see Figs. 1, 2, and 8,) passes down to the prime condenser *F*, where it terminates in a worm, *o*. This worm is immersed in water in the condenser *F*, through which a stream of water passes, which is supplied in any convenient mode. The water should be at a temperature of about 40° or 65° Fahrenheit. In this prime condenser the oleaginous vapor of the coal is condensed into a crude oil, whence it is conducted into any suitable receptacle to undergo the process of purification.

Having thus described my improved apparatus for producing crude oil from coal or other bituminous minerals, what I claim as my invention, and desire to secure by Letters Patent, is—

Providing upright retorts for the manufacture of oil from bituminous coal with a closed top, and an opening at their bottom to be immersed in water, in the manner and for the purposes substantially as hereinbefore described.

In testimony whereof I have hereunto set my hand this 12th day of October, A. D. 1855.

C. CHERRY.

Witnesses:

WM. N. HOWARD,
N. BUCKMASTER.