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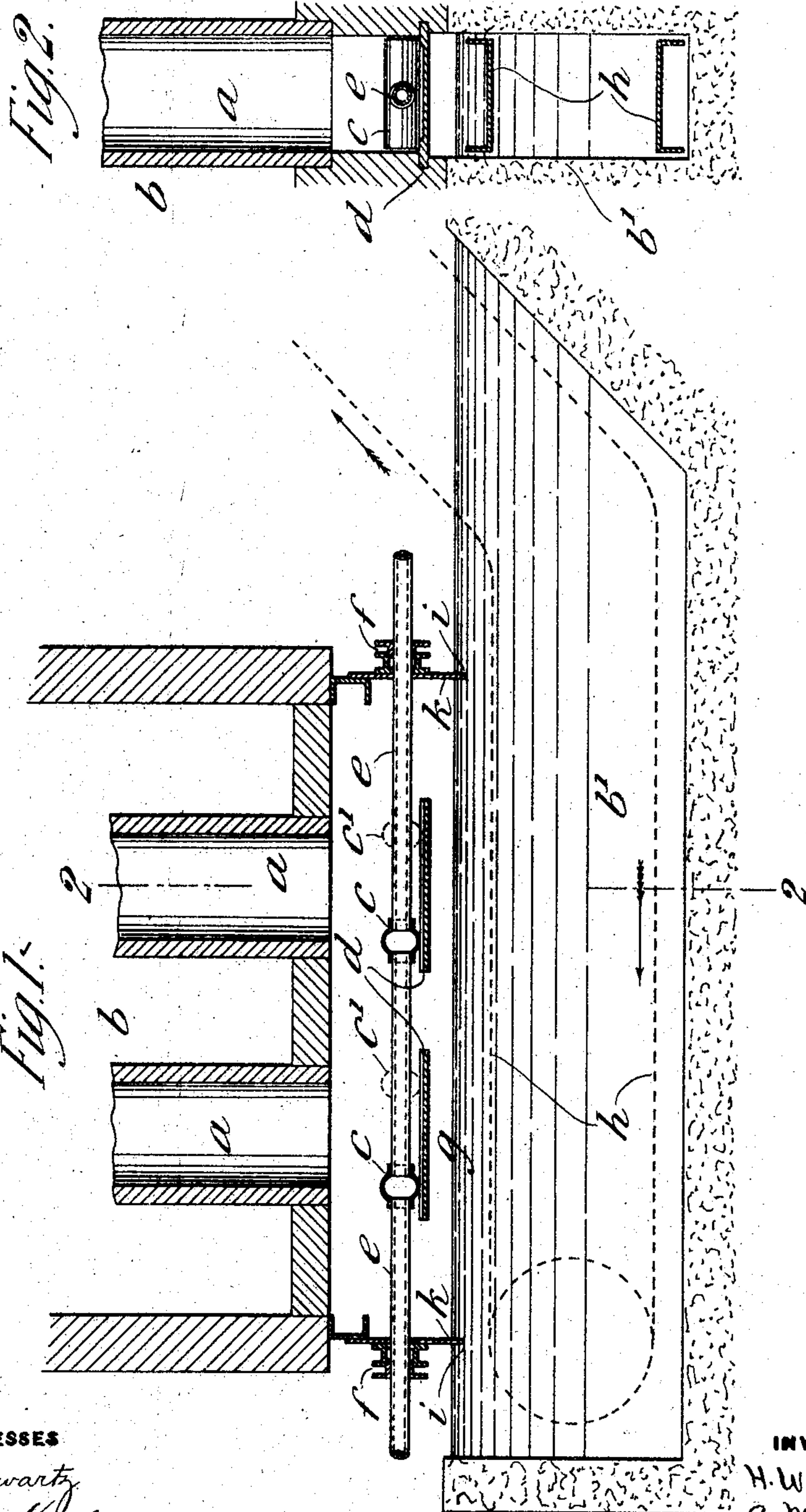
PATENTED OCT. 23, 1906

H. W. WOODALL & A. M. DUCKHAM.

VERTICAL RETORT FOR THE DESTRUCTIVE DISTILLATION OF COAL.

APPLICATION FILED NOV. 15, 1905.

3 SHEETS—SHEET 1.



WITNESSES

W. W. Swartz
John Miller

INVENTORS

H. W. Woodall
A. M. Duckham
By Baker & Byrne
Attys.

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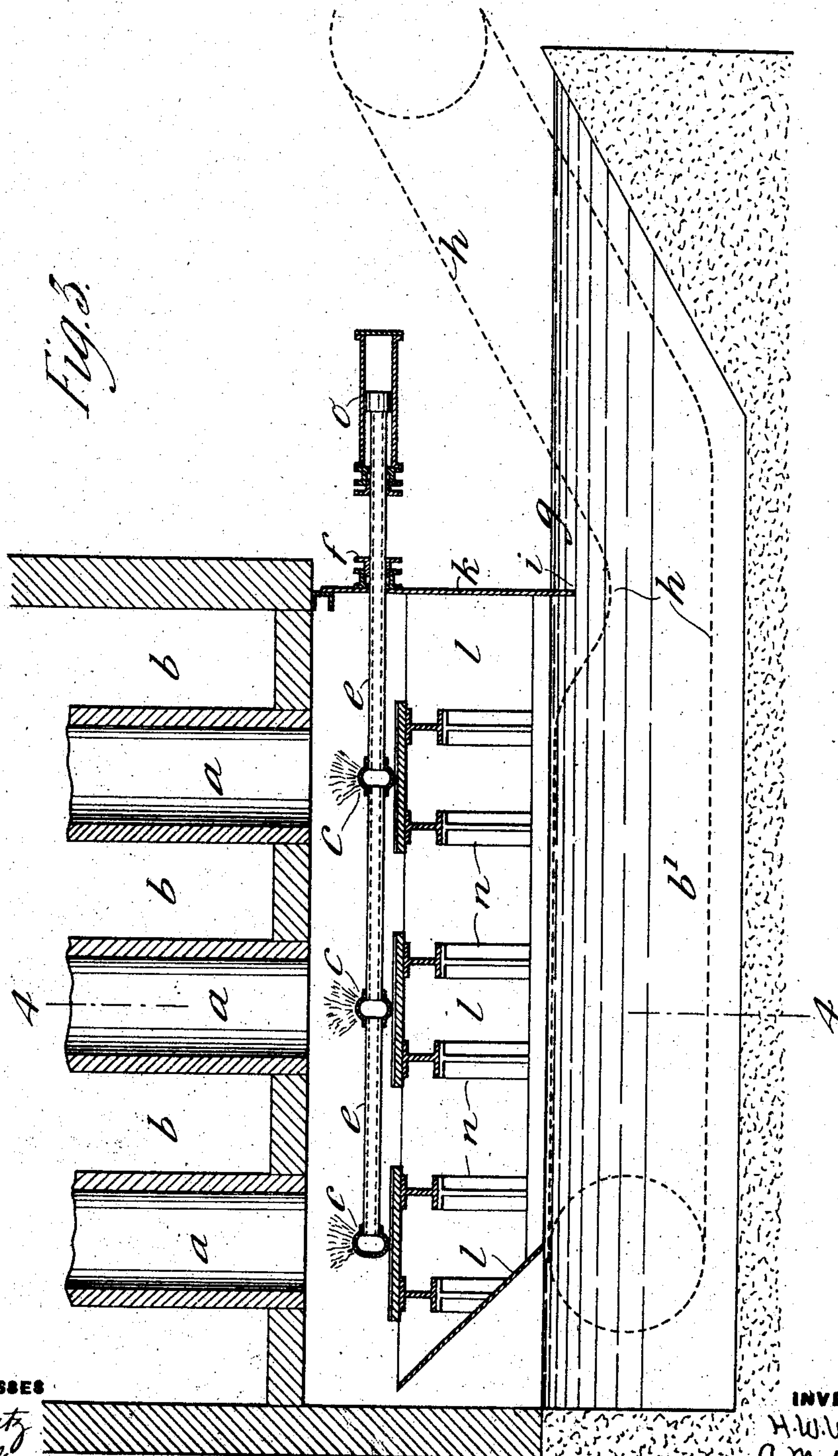
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W. W. Swartz
John Keller

INVENTORS
H. W. Woodall
A. M. Duckham
G. B. Bowers & Byrnes
Atty.

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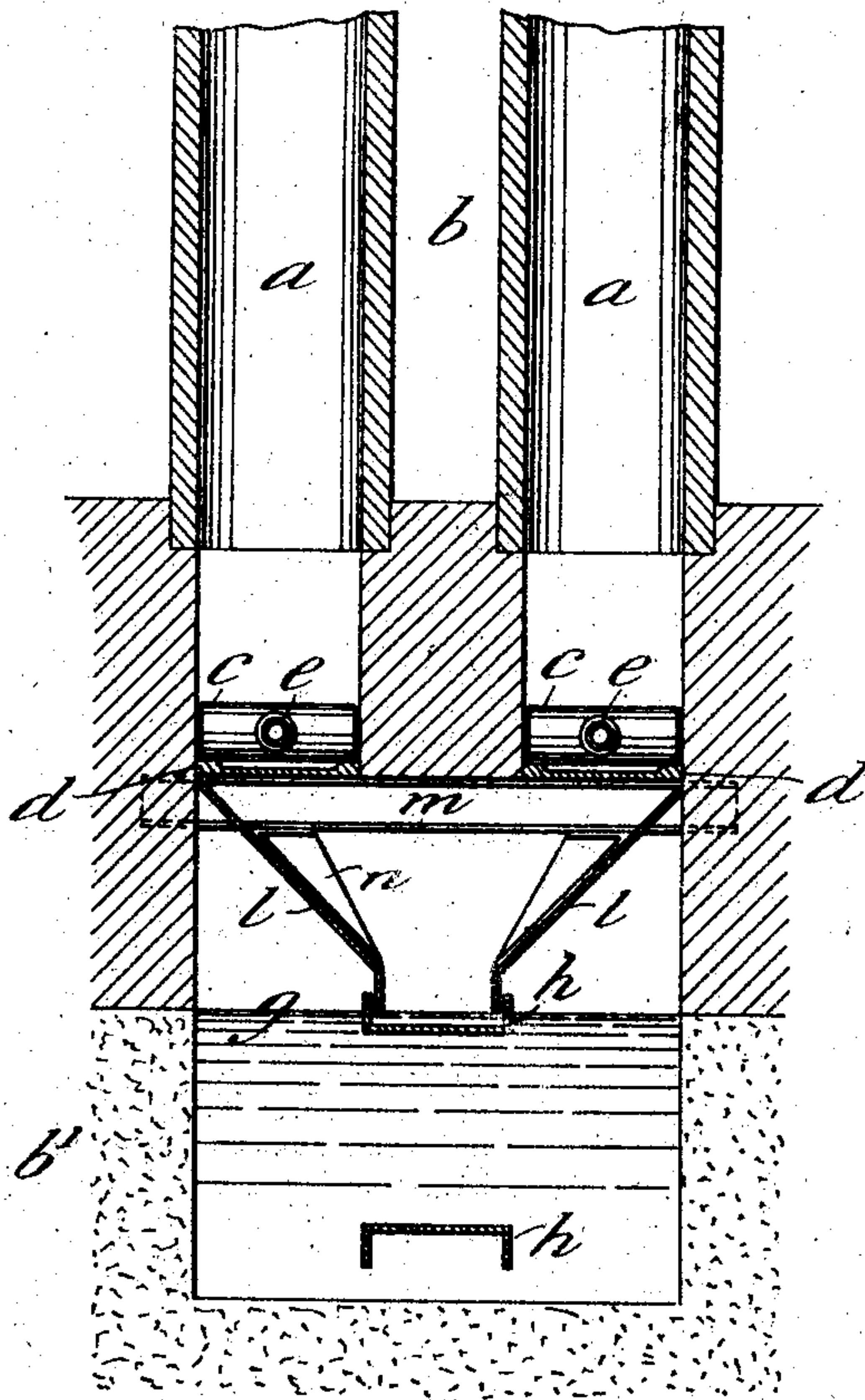
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Fig. 4.



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John Miller

INVENTORS

H. W. Woodall
A. M. Duckham,
by Baker & Byrnes
Attys

UNITED STATES PATENT OFFICE.

HAROLD W. WOODALL, OF WIMBORNE, AND ARTHUR M. DUCKHAM, OF
UPPER PARKSTONE, ENGLAND.

VERTICAL RETORT FOR THE DESTRUCTIVE DISTILLATION OF COAL.

No. 833,861.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, HAROLD WHITEMAN WOODALL, residing at Royston, Wimborne, and ARTHUR McDUGALL DUCKHAM, residing at Walden, Alexandra Road, Upper Parkstone, in the county of Dorset, England, civil engineers, subjects of the King of Great Britain, have invented certain new and useful Improvements Relating to Vertical Retorts for the Destructive Distillation of Coal, of which the following is a specification.

In installations of vertical or substantially vertical retorts for the destructive distillation of coal, such as that described in British patent specification No. 16,497 of 1903, the bottom of the retort is closed by a water seal and the coke is removed from the retort by a conveyer which operates in the water. The rate at which the coal to be carbonized is fed into the top of the retort is governed by the rate at which the coke is thus conveyed away by the conveyer, and the latter rate must obviously not exceed a certain limit, dependent on the speed of carbonization of the coal in the retort. It thus happens that the coke is necessarily submerged in the water for a comparatively long time and absorbing more or less water becomes deteriorated for some purposes. This difficulty is obviously accentuated when a single water seal and a single conveyer serve several retorts. Moreover, it is difficult to work more than one retort properly with a single conveyer, because the coke is not removed to the same extent from each.

The present invention relates to improvements in installations of vertical retorts for the carbonization of coal, whereby the conveyer may be operated at any desired speed, so that the coke can be withdrawn from the water seal before it has absorbed any appreciable quantity of water, and one conveyer may be made to serve for the removal of coke from several retorts. For this purpose the charge in the retort is supported by a suitable support, such as a plate placed at a short distance below the open bottom of the retort, preferably above the water-line in the water seal. To facilitate this in the case of a single retort, the extension of the retort which dips beneath the surface of the water is made of greater cross-sectional area than that of the retort. In the case of a setting of several retorts there may be a water seal

common to all and constituted by an extension of the setting and within this seal a separate plate to support the charge of each retort. Across or along the plate or each plate is caused to move a rake or pusher at a speed proper to the rate at which the coke is to be removed from the retort or retorts.

The invention is not limited to any particular device for moving the rake or pusher; but it is obvious that the pusher may be conveniently mounted on a rod which passes through the extension of the retort or setting and receives a suitable reciprocating movement and that when several retorts in one setting are in line with each other, as is usually the case, one rod may carry the pusher for the plate belonging to each retort. The coke thus pushed off the plate falls onto the conveyer, which operates in the water below the plates at any desired speed.

The accompanying drawings illustrate the invention.

Figure 1 is a longitudinal vertical section through a setting of two vertical retorts and the water seal therefor. Fig. 2 is a cross-section on line 2 2 of Fig. 1. Fig. 3 is a longitudinal vertical section through a setting of six vertical retorts and the water seal therefor, and Fig. 4 is a cross-section on line 4 4 of Fig. 3.

Referring to Figs. 1 and 2, the retorts *a* are set in the setting *b*, the foundations *b'* of which form the sides of the water seal, the ends of the latter being formed of plates *k*, depending from the setting and dipping at *i* into the water in the sump *g*. Beneath each retort there is supported by the foundations *b'* a plate *d*, whose length preferably exceeds the diameter of the retort *a*. Through stuffing-boxes *f* on the end plates *k* of the water seal extends a hollow rod *e*, made up of three lengths joined together by hollow cylindrical pushers *c*. Water is circulated through this rod and the pushers, and the rod is given a reciprocating movement by any suitable mechanism to cause the pushers to travel to and fro on the surface of the plates *d*, respectively, represented by the distance between *c* and *c'* in Fig. 1 at a speed corresponding with the desired rate of carbonization of the coal in the retort. The coke thus pushed from each plate falls into the conveyer *h*, which operates beneath the surface of the water in the sump *g* at any desired rate.

In Figs. 3 and 4 letters of reference which are the same as those used in Figs. 1 and 2 represent similar parts. The six retorts *a* are in two rows of three each, and for each row there is a rod *e*, operated by a ram *o* and carrying three pushers *c*, one for each plate *d*. These plates are supported by girders *m*, which also support webs *n* of plates *l*, that form a hopper for directing the coke onto the conveyer *h*. In this case the upper stretch of the conveyer is not immersed in the water except where it dips beneath the plate *k*, so that the coke is immersed in the water only for a very short time. As the conveyer moves the coke much faster than it is dislodged from the plates *d* by the pushers, the hopper made up of the plates *l* never becomes full and the coke never becomes jammed therein. In Figs. 3 and 4 the pushers *c* are perforated to permit the water passed into the hollow rod *e* to issue in sprays for cooling the plates *d*.

Having thus described the nature of our said invention and the best means we know of carrying the same into practical effect, we claim—

1. In combination, a vertical distillation-retort, a water seal sealing the lower end of the said retort, a substantially horizontal stationary support beneath the lower end of the said retort extending across the water seal and supported by the walls thereof adapted for the contents of the retort to rest upon, a pusher adapted to travel to and fro along the said support, and means for causing the said pusher to move to and fro; substantially as described.

2. In combination, a vertical distillation-retort, a water seal sealing the lower end of the said retort, a substantially horizontal stationary support beneath the lower end of the said retort adapted for the contents of the retort to rest upon, a pusher adapted to travel to and fro along the said support, means for causing the said pusher to move to and fro and a conveyer operating within the said water seal beneath the said support; substantially as described.

3. In combination a vertical distillation-retort, a water seal sealing the lower end of the said retort, a substantially horizontal stationary support beneath the lower end of the said retort above the water-line of the said water seal, said support being adapted for the contents of the retort to rest upon, a

pusher adapted to travel to and fro along the said support and means for causing the said pusher to move to and fro; substantially as described.

4. In combination, a vertical distillation-retort, a water seal sealing the lower end of the said retort, a substantially horizontal stationary support beneath the lower end of the said retort above the water-line of the said water seal, said support being adapted for the contents of the retort to rest upon, a pusher adapted to travel to and fro along the said support, means for causing the said pusher to move to and fro, and a conveyer operating beneath the said support and at the surface of the water in the water seal; substantially as described.

5. In combination a vertical distillation-retort, a water seal sealing the lower end of the said retort, a substantially horizontal stationary support beneath the lower end of the said retort adapted for the contents of the retort to rest upon, a pusher adapted to travel to and fro along the said support, means for cooling the said pusher, and means for causing the said pusher to move to and fro; substantially as described.

6. A series of vertical distillation-retorts, a water seal common to the series and sealing the lower ends of the retorts, a separate horizontal stationary supporting-plate below each retort, said plates having free spaces at their ends, a pusher-rod, and a series of pushers carried by said rod, one for each of the plates, and arranged to be moved thereover; substantially as described.

7. A vertical distillation-retort having a free discharge-opening at its lower end of the full diameter of the retort, a water seal sealing the lower end of said retort, a substantially horizontal supporting-plate below the discharge-opening and supported by the walls of the water seal above the water-level therein, and pushing means arranged to be reciprocated upon the said plate, said plate having free discharge-spaces at its ends; substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

H. W. WOODALL.
A. M. DUCKHAM.

Witnesses:

E. T. GAZE,
ARTHUR W. JOY.