H. KOPPERS.

COKE OVEN.

APPLICATION FILED AUG. 10, 1907.

925,815. Patented June 22, 1909.

3 SHEETS—SHEET 1.

Fig. 1

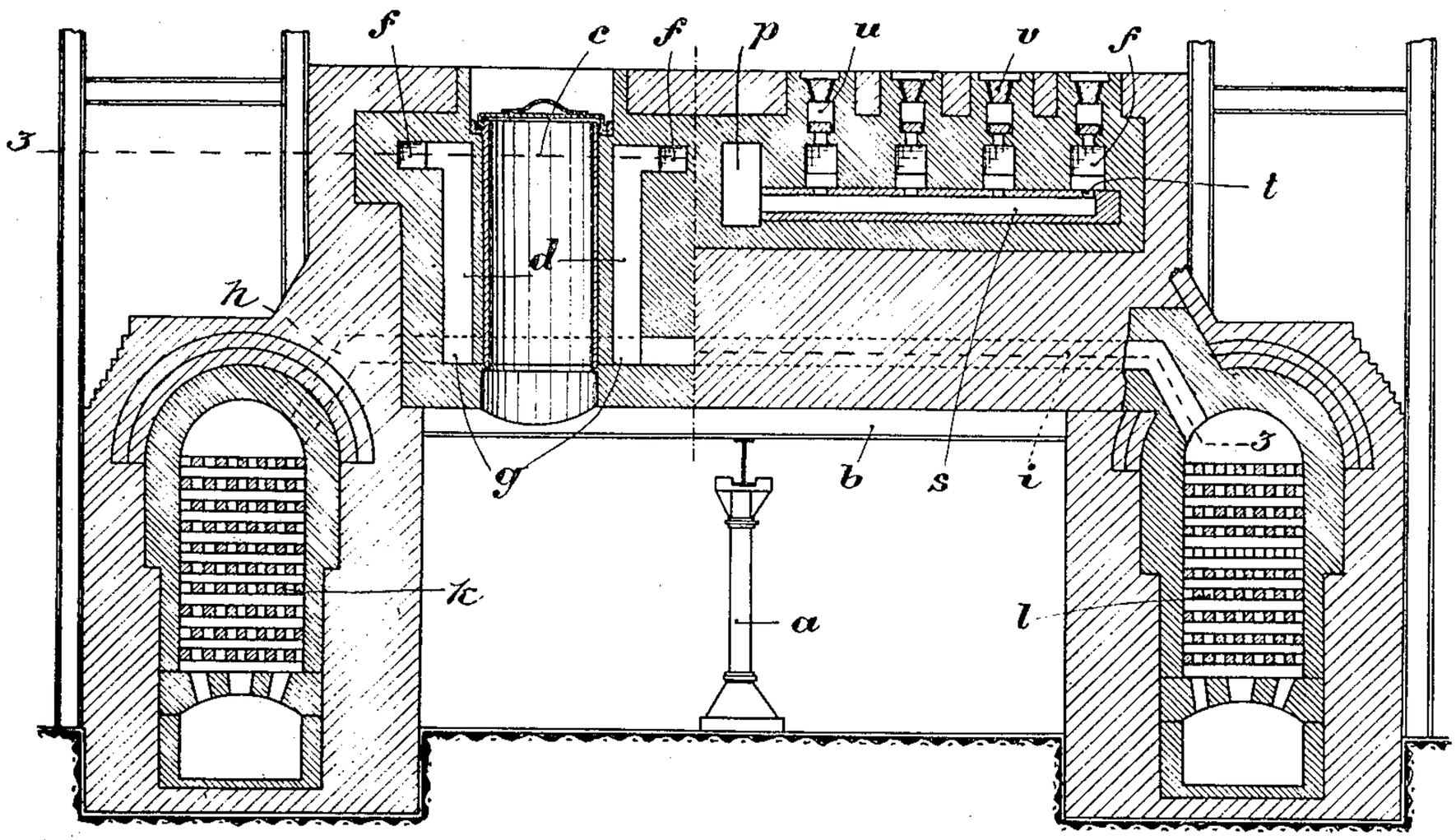
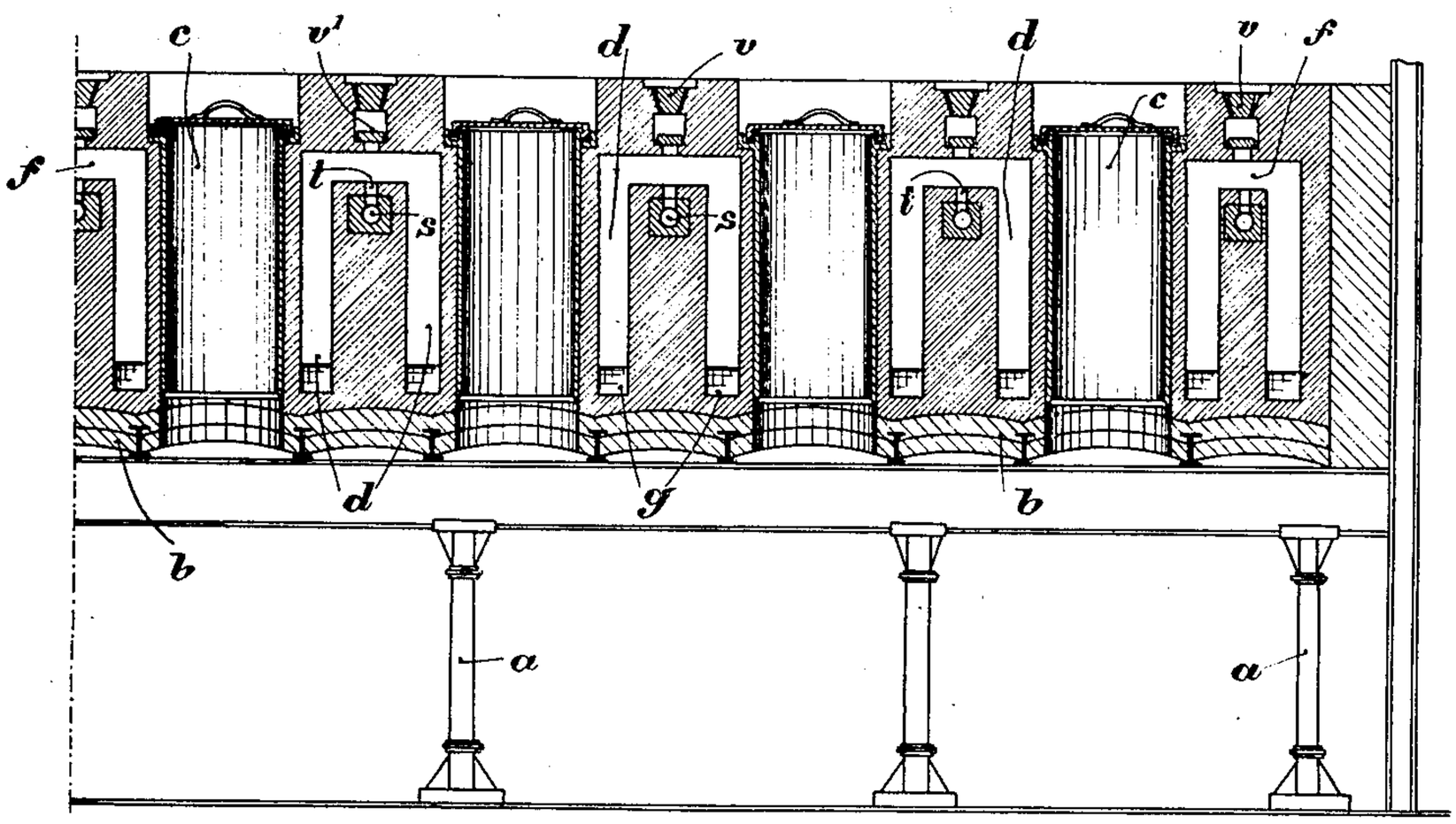


Fig. 2



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3 SHEETS—SHEET 2.

Fig. 3

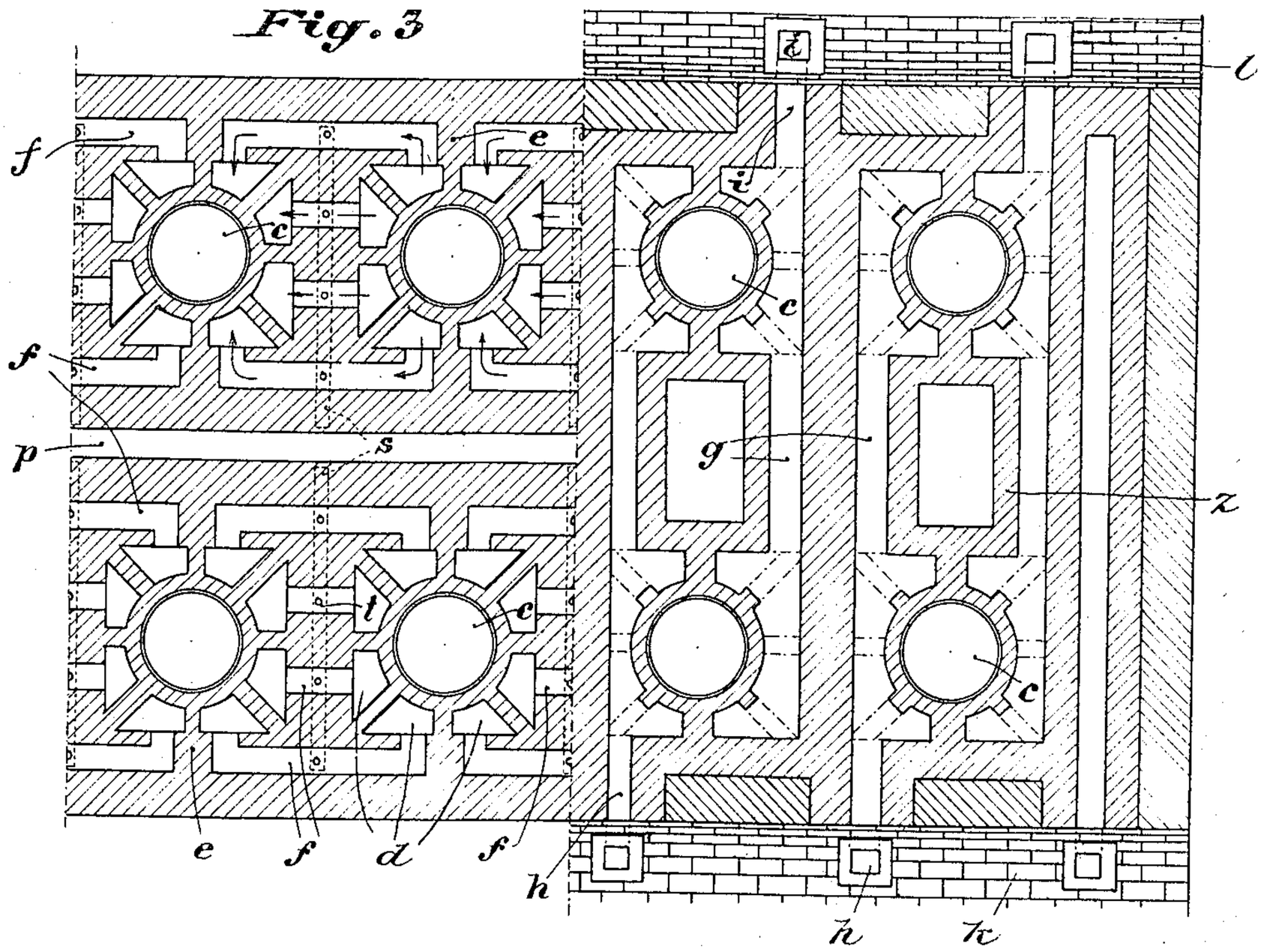
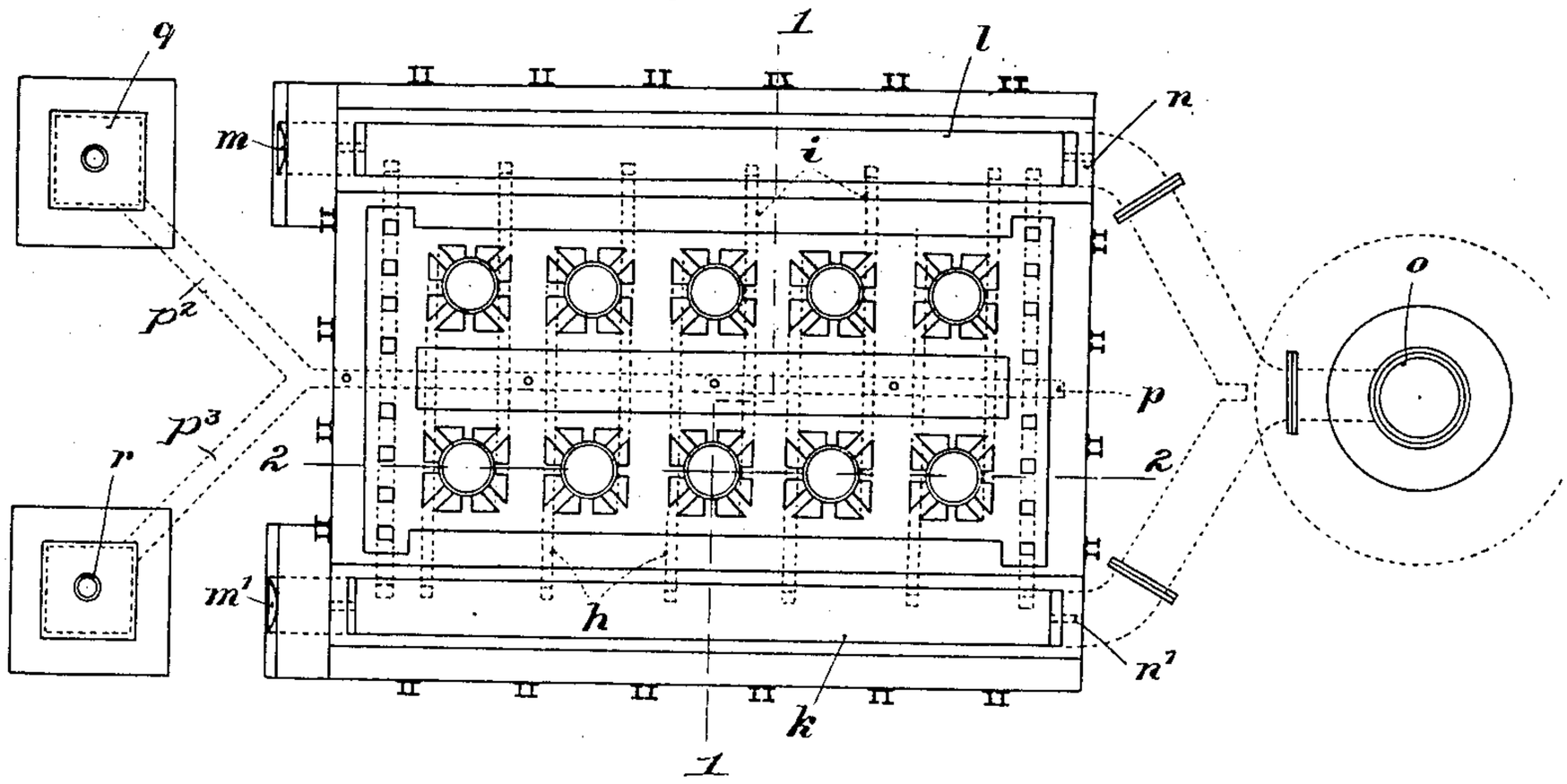


Fig. 4



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APPLICATION FILED AUG. 10, 1907.

925,815.

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3 SHEETS—SHEET 3.

Fig. 5

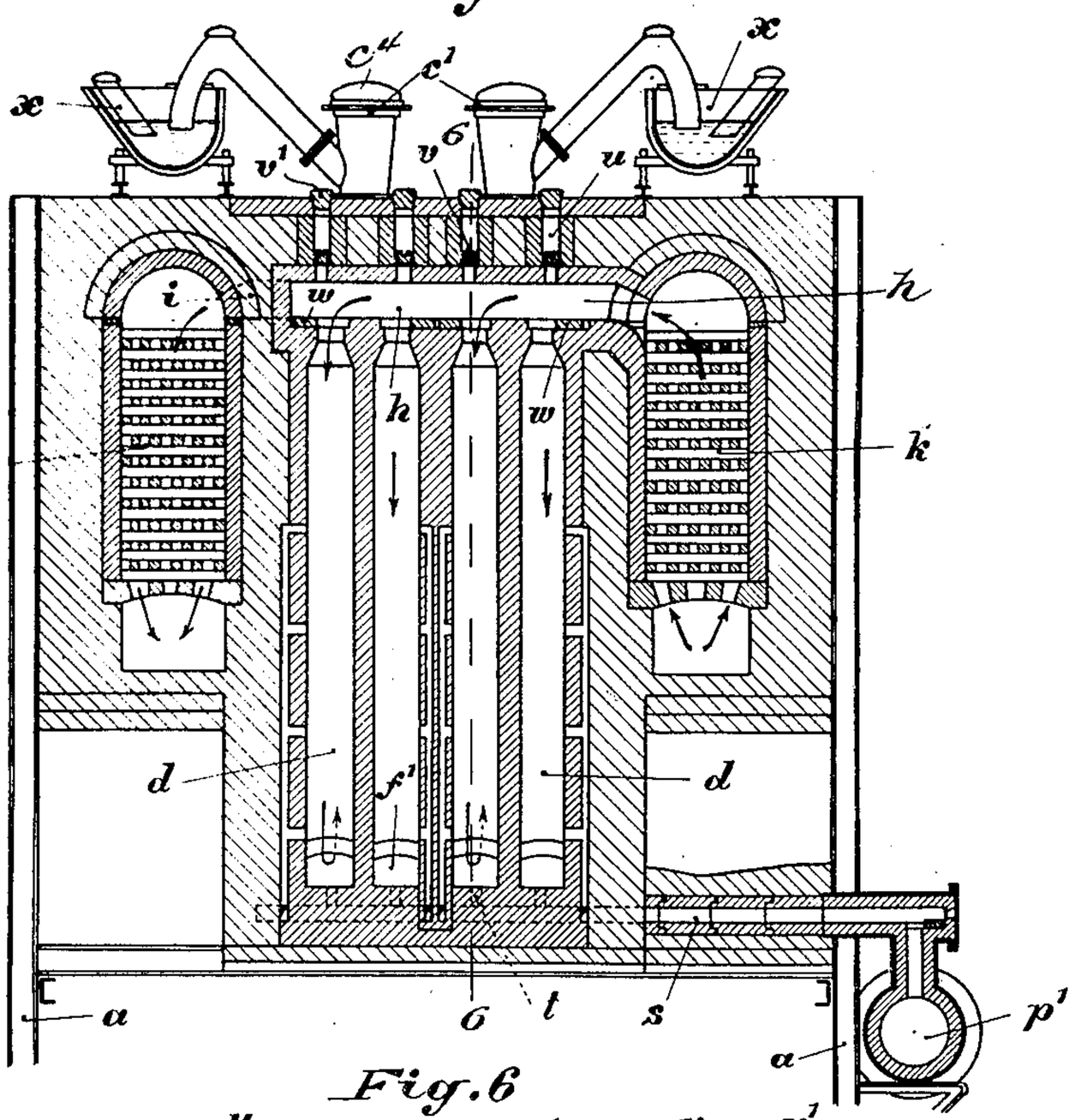
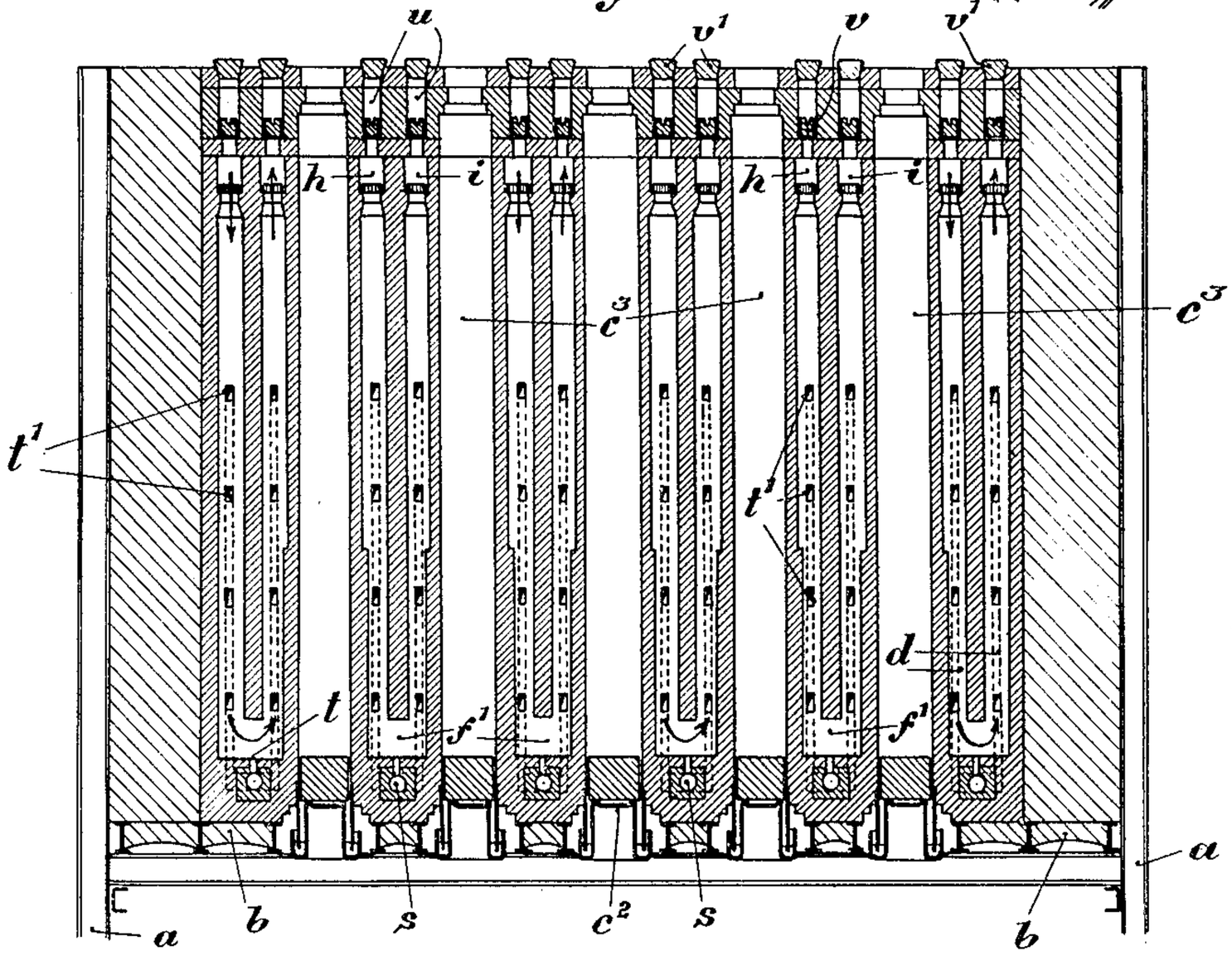


Fig. 6



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UNITED STATES PATENT OFFICE.

HEINRICH KOPPERS, OF ESSEN-ON-THE-RUHR, GERMANY.

COKE-OVEN.

No. 925,815. Specification of Letters Patent. Patented June 22, 1909.

Application filed August 10, 1907. Serial No. 387,969.

To all whom it may concern:

Be it known that I, HEINRICH KOPPERS, a citizen of Germany, residing at Essen-on-the-Ruhr, Germany, have invented new and useful Improvements in Coke-Ovens, of which the following is a specification.

This invention relates to coke ovens and similar devices of the class which directly use the hot gases generated in blast furnaces, etc. As draft reversing valves for these hot gases are very objectionable, my oven is so constructed that the direction of the air current only is changed, while the hot gases flow continuously into the combustion chamber.

In the accompanying drawings: Figure 1 is a cross section through an oven constructed according to my invention, on line 1—1, Fig. 4; Fig. 2 a longitudinal section on line 2—2, Fig. 4; Fig. 3 a horizontal section on line 3—3, Fig. 1; Fig. 4 a diagrammatic plan of my improved oven; Fig. 5 a cross section through a modification of the oven, and Fig. 6 a vertical section on line 6—6, Fig. 5.

My improved oven comprises a series of retorts *c*, carried by a suitable stone structure *b*, supported on columns *a*. Retorts *c*, are flanked by a suitable number of vertical heating flues *d*, separated from each other by partitions *e*, the flues *d*, of one retort being connected to those of the adjoining retort by upper horizontal connecting ducts *f*, each pair of flues and their connecting duct *f*, forming jointly a U-shaped heating channel. Retorts *c*, are preferably arranged in pairs, the retorts of each pair being separated from each other by hollow blocks of masonry *z*, which may be filled with sand or other material, if desired. Flues *d*, communicate at their bottom with transverse flues *g*, which are, by air channels *h*, and *i*, alternately connected to regenerators *k*, and *l*, respectively, which flank the rows of retorts *c*. Regenerators *k*, and *l*, are adapted to communicate with the atmosphere by means of dampers *m*, *m'*, and with chimney *o*, by means of dampers *n*, *n'*.

Gas is supplied to the heating flues *d*, from a common supply channel *p*, which extends throughout the entire length of the oven intermediate retorts *c*. Channel *p*, is connected by branches p^2, p^3, to gas generators *q*, and *r*, respectively. Channel *p*, communicates with branches *s*, extending at right angles thereto between each pair of adjoining retorts *c*, the branches being arranged slightly below transverse ducts *f*. These branches open through nozzles *t*, into ducts *f*, and are rendered readily accessible through openings *u*, adapted to be closed by plugs *v*, *v'*, and arranged in vertical alinement with nozzles *t*.

In operation, dampers *m'*, *n*, are opened, while dampers *m*, *n'*, are closed, so that the air necessary for combustion will enter regenerator *k*, through open damper *m'*, to be heated, whence it will be conveyed through channels *h*, and *g*, to the foot of those vertical flues *d*, which are situated to the left of partitions *e*. The air will then rise in said flues and pass through transverse ducts *f*, where it will be mixed with the hot gases produced in generators *q*, and *r*, and passing through channel *p*, branches *s*, and nozzles *t*, into said ducts *f*. At nozzles *t*, the mixture of gas and air is ignited and will burn downwardly in the ducts *d*, situated to the right of partitions *e*. The exhaust gases are conveyed through channels *g*, and *i*, to regenerator *l*, to give off their heat. The gases finally leave regenerator *l*, through open damper *n*, and chimney *o*. After the elapse of a certain time, say thirty minutes, dampers *m'*, *n*, are closed, while dampers *m*, *n'*, are opened to obtain the desired draft reversal. The hot air coming from the previously heated regenerator *l*, will now ascend in those flues *d*, in which combustion took place before the draft reversal, so that the hot gases entering through nozzles *t*, will be deflected to the opposite side, so that combustion is now effected in those flues which were formerly passed by the hot air.

The perfectly symmetrical arrangement of the heating flues with regard to the retorts insures a uniform heating of the same, irrespective of the direction of the draft. As further, all means for reversing the draft of the hot gases are dispensed with, an economic and reliable operation of the oven is obtained.

In the modification illustrated in Figs. 5 and 6, retorts c^3, closed at their bottoms as at c^2, are adapted to be charged through suitable hoppers *c'*, having lids c^4. After the heated retorts c^3, have been charged and lids c^4, have been placed upon hoppers *c'*, the gases generated will pass into receivers *x*. Intermediate adjoining retorts are arranged U-shaped heating flues, the vertical legs *d*, of each flue being connected by a transverse duct *f'*. Flues *d*, are connected at their upper ends through channels *h*, and *i*, with

regenerators *k*, and *l*, respectively. Regenerators *k*, and *l*, are preferably arranged at such an elevation that their upper section may communicate directly with channels *h*, and *i*. The hot gases pass from supply pipe *p'*, through branches *s*, and nozzles *t*, to the transverse duct *f'*, of the heating flues, while additional gas nozzles *t'*, also communicating with branches *s*, are provided in the lower section of flues *d*. In this way the length of the heating zone is considerably increased, the combustion beginning already in the lower part of that flue *d*, which is supplied with the air, instead of beginning at nozzle *t*. Dampers *w*, control flues *d*, and are accessible through openings *u*, closable by plugs *v*, *v'*. The operation corresponds in all respects to that of the oven above described.

It will be seen that my improved oven requires only a reversal of the air supply in order to obtain the necessary intermittent change of draft, while the gas supply remains unchanged, so that all objectionable means for reversing the gas supply are dispensed with.

I claim:

1. In a retort furnace, a series of retorts, U-shaped heating channels intermediate said retorts, each channel consisting of two vertical flues and a connecting transverse duct, means for alternately supplying air to the free end of one or the other flue of each heating channel, and means for permanently connecting the transverse duct to a single gas supply, whereby the gas is introduced at the draft reversal point of the heating channel.

2. In a retort furnace, a series of retorts, U-shaped heating channels intermediate said retorts, each channel consisting of two vertical flues and a connecting transverse duct, means for alternately supplying preheated air to the free end of one or the other flue of each heating channel, a gas channel, and branches for connecting said gas channel with the center of the transverse duct, whereby the gas is introduced at the draft reversal point of the heating channel.

3. A retort furnace, comprising a first regenerator, a second regenerator, a chimney, a series of retorts, a series of U-shaped heating channels intermediate the retorts, each heating channel consisting of two vertical flues and a connecting transverse duct, means for permanently connecting the ducts to a hot gas supply, branches connecting alternating flues with the first and second regenerator, respectively, and means for connecting said regenerators either with the atmosphere or with the chimney.

Signed by me at New York city, New York this 7th day of August 1907.

HEINRICH KOPPERS.

Witnesses:

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ARTHUR E. ZUMPE.