

No. 745,828.

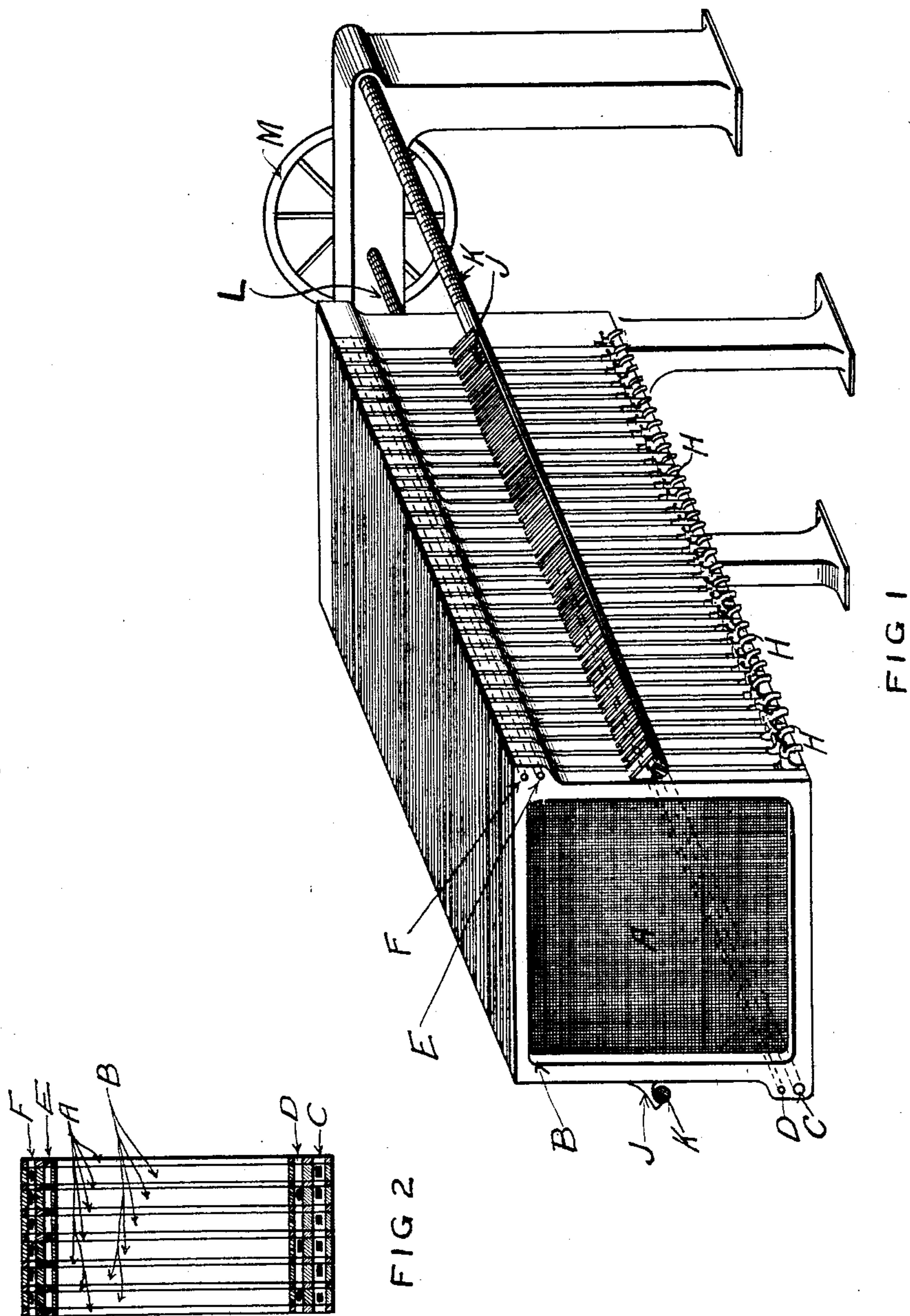
PATENTED DEC. 1, 1903.

E. B. HACK.
PROCESS OF EXTRACTING METALS FROM ORES.

APPLICATION FILED JAN. 19, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



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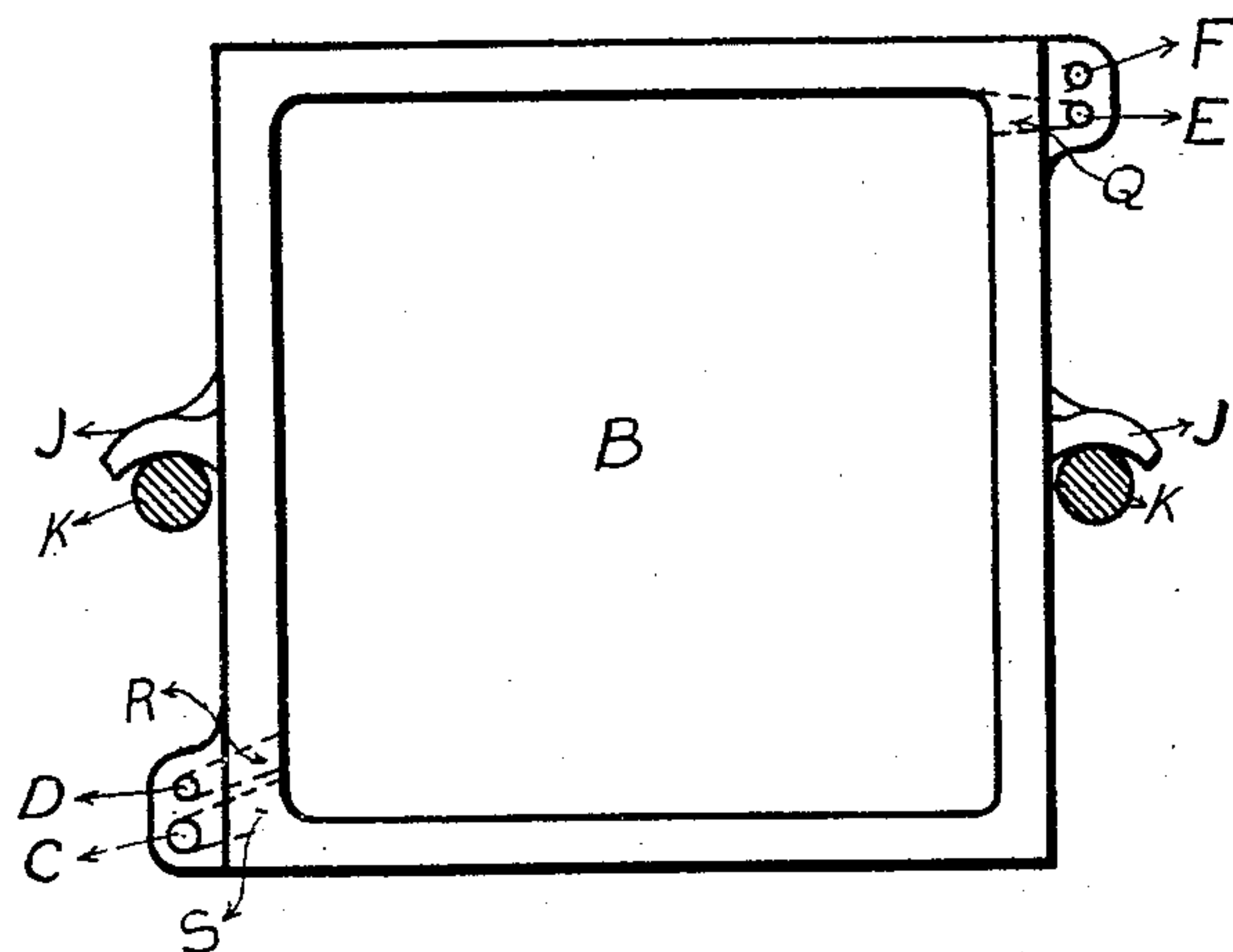


FIG 3

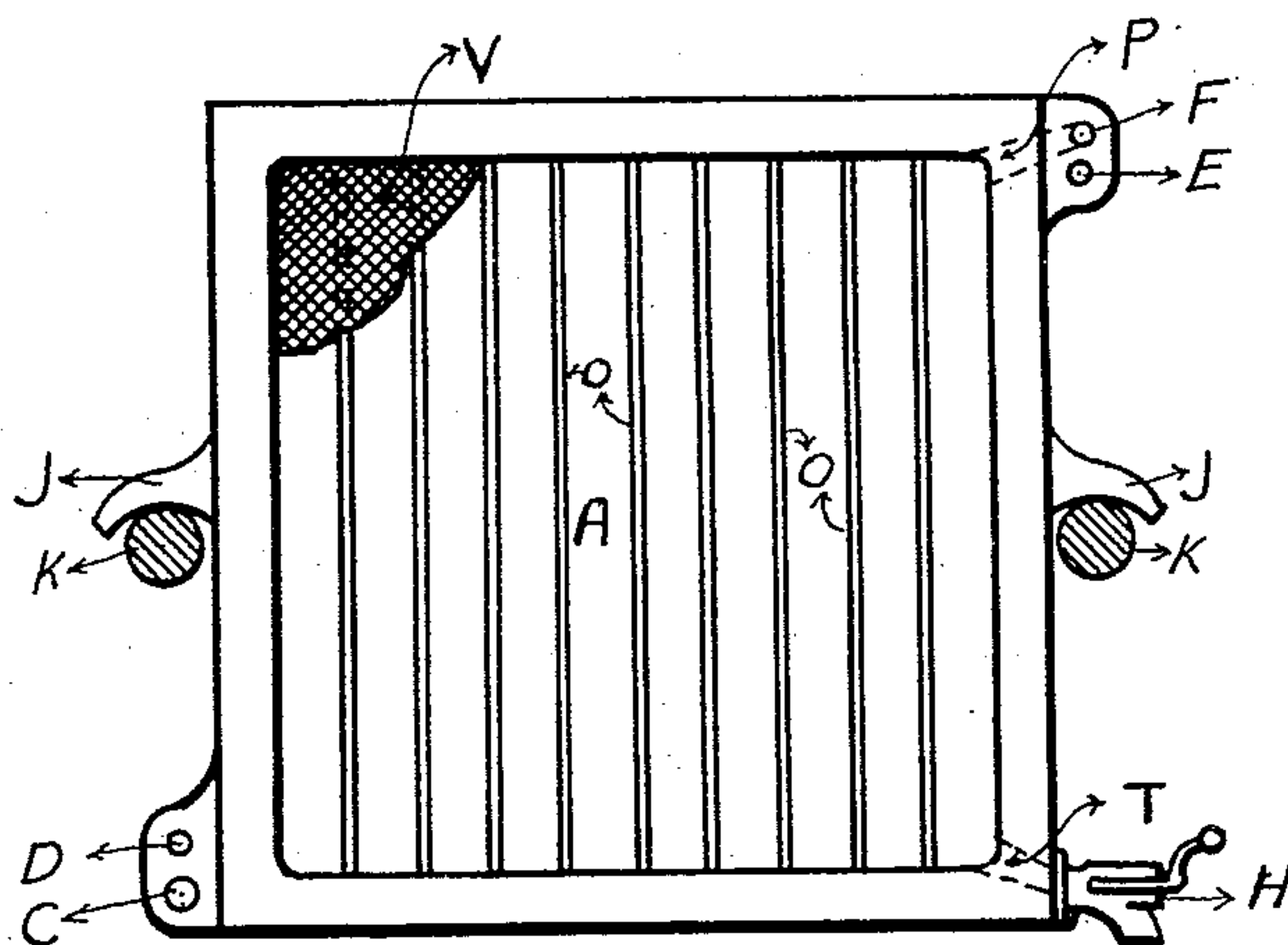


FIG 4

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UNITED STATES PATENT OFFICE.

ERNEST BARTON HACK, OF DENVER, COLORADO, ASSIGNOR TO THE
AMERICAN FILTER PRESS EXTRACTION COMPANY, OF DENVER,
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PROCESS OF EXTRACTING METALS FROM ORES.

SPECIFICATION forming part of Letters Patent No. 745,828, dated December 1, 1903.

Application filed January 19, 1903. Serial No. 139,715. (No specimens.)

To all whom it may concern:

Be it known that I, ERNEST BARTON HACK, a subject of the King of Great Britain, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Processes of Extracting Metals from Their Ores; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to a process of extracting metals from their ores (being especially adapted for the treatment of gold ores) by means of a solvent of cyanid of potassium or bromo cyanid or other bromin mixtures or other extracts of alkali or alkaline earths, my object being to increase the rapidity and cheapen the cost of extraction as compared with the existing methods.

The invention will be described in connection with its use on gold ores; but it must be understood that it is not limited thereto, as it will be found efficient in the extraction of other metals.

In extracting gold by means of solutions of cyanid of potassium, sodium, bromin, &c., I adopt the simultaneous application of the solution whereby it is made to thoroughly permeate every part of the pulp mass to be treated and the necessary oxidation by means of the action of air upon gold, which is thereby rendered oxidizable by the action of cyanid or other solution. Instead of depending solely upon the agency of the external atmosphere for the oxidizing action I employ compressed air acting on the pulp to be treated, the air being applied through the agency of channels or passages with which the machine or filter-press in which the pulp to be treated has been placed. The solutions pass into the pulp simultaneously with the air-current, and by so arranging the mechanism employed that the exit-channels for the solution and air are of greater pressure capacity than the inlet-channels I attain a thorough permeation of the pulp under treatment.

In carrying out my process I first pass the pulp by any desired means into a suitable receptable, preferably of the construction shown in the accompanying drawings, which consists of a filter-press composed of pulp-holding members B and filtering members A alternately arranged, the pulp being forced directly into the press by way of lateral channels leading from a continuous passage which is formed of registering openings bored in exterior projections with which the two sets of members are provided. The contents of each pulp-holding member when filled with pulp I term a "cake." I next pass a current of weak cyanid or other solvent solution through the cakes in the pulp-holding members or frames B. The solutions are then removed from the cakes by air-pressure. Next a strong solution or solvent is passed through the pulp until a complete extraction of the values is obtained, after which the pulp is again dried by compressed air. Then fresh water is passed through the pulp under strong pressure to remove the remaining solutions. After this step the pulp is again dried by compressed air and the residue or gangue finally discarded. The solutions containing the gold or other metals are then treated in the usual manner, whereby the values are precipitated.

Figure 1 of the accompanying drawings is a perspective view of a filter-press, being a suitable apparatus for carrying out my process. In this view a portion of the press is removed at one end to disclose the structure of the inside. Fig. 2 is a section showing the arrangement of the filter-press members A and B. Fig. 3 is a detail view of one of the pulp-holding frames, the supporting-shafts therefor being shown in cross-section. Fig. 4 is a similar view of one of the filter members, the filter-cloth being partly broken away on one side and the supporting-shafts on opposite sides being shown in section.

The pulp-holding members B and the filtering members A are alternately arranged and are provided with projections at opposite diagonal corners in which are formed registering openings forming longitudinal passages C, D, E, and F, communicating by lateral channels with the interior of the press. To

each filter-frame is applied two filter-cloths V, one being located on each side of the frame. Only one of these cloths is shown in the drawings. (See Fig. 4, where the cloth is partly broken away.) As the filter-cloth is an ordinary element of a filter-press, it is believed that further showing of this feature is not required. The pulp is introduced at C and enters all the pulp-holding chambers or compartments simultaneously. The solutions are introduced at D and drawn off at E or H, as desired.

H is a faucet-valve communicating with each filter member and through which the solutions may be drawn off from each filter member separately.

E is a common efflux or discharge passage communicating with all the filter members.

The necessary air for drying purposes is introduced at F and after passing through all the pulp cakes escapes at E.

The various filtering and pulp-holding members are provided with hooks or projections J, which engage supporting-shafts K, mounted at opposite sides of the machine.

A screw-shaft L, provided with a hand-wheel M, is employed in tightening the members A and B of the press, whereby the joints between the various members are made perfectly tight.

Having thus described my invention, what I claim is—

1. The herein-described process of treating ores, consisting in forming the pulp into cakes and subjecting the cakes to the leaching action of a suitable solution in the presence of compressed air which is introduced simultaneously with the solution and continued during the leaching operation.

2. The herein-described process of treating ores consisting in caking the pulp under pressure, allowing the moisture to escape, and in-

roducing a solvent solution simultaneously with the introduction of air under pressure.

3. The herein-described process of treating ores for the purpose of dissolving their metallic values, consisting in caking the pulp by applying pressure thereto under conditions allowing the moisture to escape, introducing a solvent solution simultaneously with a supply of air under pressure, passing air under pressure through the cake for removing the remaining solutions, again introducing the solvent simultaneously with the introduction of compressed air, and finally drying the cake by the use of air under pressure.

4. A cyanid process consisting of the following steps in the order named: caking the pulp by pressure under conditions allowing the moisture to escape; introducing a weak solution of the solvent simultaneously with the introduction of air under pressure; drying the pulp by passing air under pressure therethrough; introducing a stronger solution of the solvent simultaneously with the introduction of air under pressure, and finally drying the cake by air-pressure.

5. A process of treating ores whereby the values are dissolved, consisting first in caking the ore by pressure under conditions allowing the moisture to escape whereby the cake is left comparatively dry; second, introducing a solvent simultaneously with the introduction of air, the solvent being passed through the cake; and finally passing air under pressure through the cake whereby the remaining solution is removed.

In testimony whereof I affix my signature in presence of two witnesses.

ERNEST BARTON HACK.

Witnesses:

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