Sept. 6, 1932. F. B. GRANT ET AL 1,875,921

FEEDING FINELY DIVIDED SOLID MATERIAL INTO HIGH PRESSURE VESSELS

Filed March 13, 1930 2 Sheets-Sheet 1

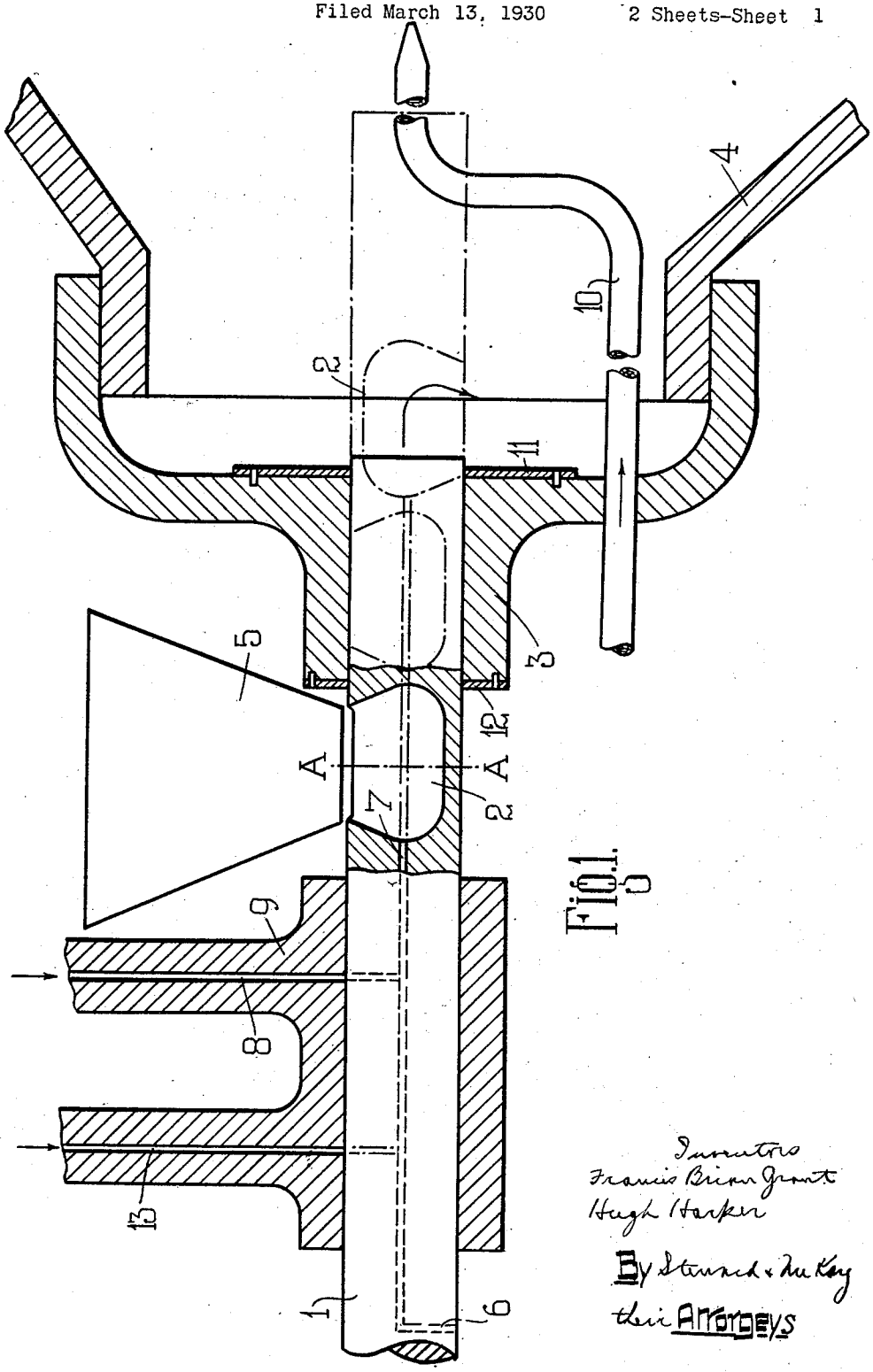


Fig. 1.

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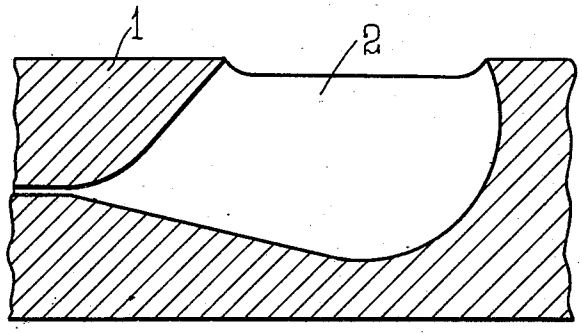


Fig. 3.

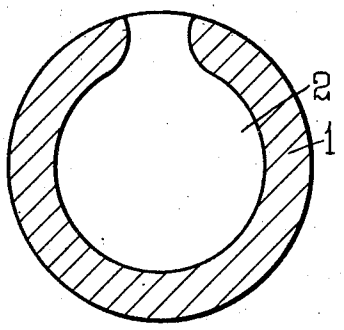


Fig. 2.

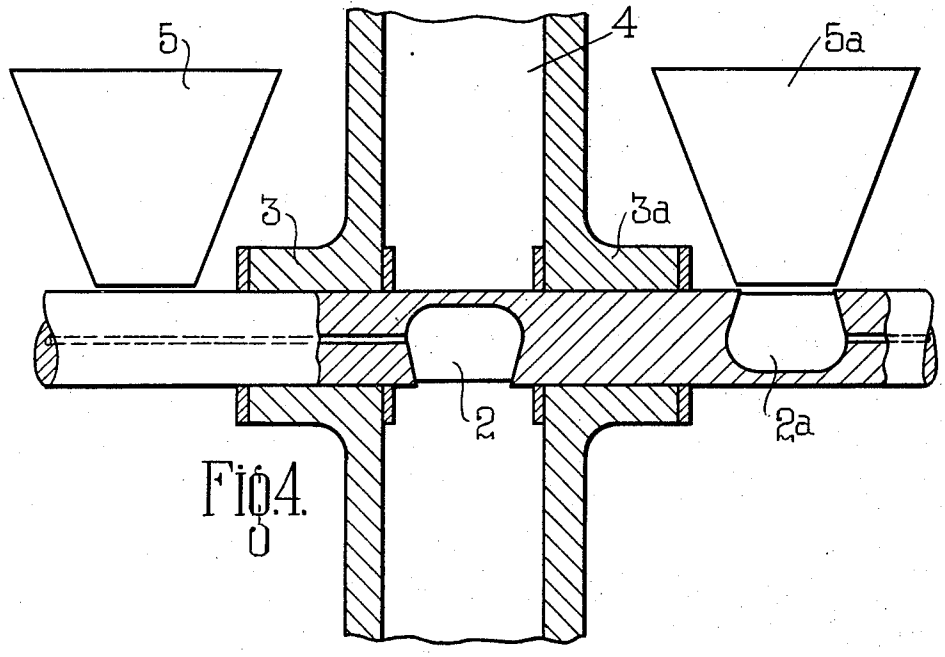


Fig. 4.

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UNITED STATES PATENT OFFICE

FRANCIS BRIAN GRANT AND HUGH HARPER, OF NORTON-ON-TEES, ENGLAND, ASSIGNORS TO IMPERIAL CHEMICAL INDUSTRIES LIMITED, OF LONDON, ENGLAND, A BRITISH COMPANY

FEEDING FINELY DIVIDED SOLID MATERIAL INTO HIGH PRESSURE VESSELS

Application filed March 13, 1930, Serial No. 435,671, and in Great Britain March 22, 1929.

The present invention relates to processes and apparatus for feeding finely divided solid material into high pressure vessels.

According to the invention a slidable ram is employed with a cavity therein for the material. The cavity is adapted to register with a hopper in the outermost position of the ram, and in the innermost position to lie past and on the high pressure side of the gland through which the ram projects.

The cavity may be emptied by rotation of the ram, e. g. through 180° C. while in its innermost position. A scouring blast of a gas at a higher pressure than that in the high pressure vessel may also be employed, but preferably we employ both methods in combination.

A preferred form of the invention is illustrated in the accompanying drawings.

In the drawings Fig. 1 shows a general view of the improved plant, Fig. 2 is a section along the line A—A of Fig. 1, Fig. 3 shows an alternative form of cavity and Fig. 4 shows a double acting apparatus.

Figure 1 shows a general illustration of a suitable plant, in which a ram 1 is provided with a cavity 2 and slides in a high-pressure gland 3 of a high-pressure vessel 4. As shown, gland 3 is of sufficient length to completely cover or shroud cavity 2 in its passage therethrough.

A hopper 5 feeds into the cavity 2 by gravity. The ram is then pushed into the high pressure vessel and at the end of the stroke is turned through 180°, thus reversing the cavity (this position is shown by chain dotted lines on the drawings).

In doing so a port 6 leading by a passage 7 to the cavity is momentarily brought into register with the passage 8 in the high pressure gland 9, which is supplied with gas at a higher pressure than that reigning in the high-pressure vessel, say 300 atmospheres if the high pressure vessel is at 250 atmospheres. This allows a puff of gas to blow out all the finely divided material from the cavity in the ram.

The ram then is withdrawn and turned through 180° to the position with the cavity under the hopper.

10 is the supply pipe for the high pressure gases to the vessel 4. Leather scraper washers 11 and 12 are provided to clear any powdered material off the ram and so prevent any entrance of dust into any bearing surface.

Figure 2 is a section on the line A—A of Figure 1.

Figure 3 shows an alternative form of cavity, adapted to be more easily secured by the gases.

To avoid loss of gas an exhaust port 13 connected to a gas holder, may be provided in the high pressure gland 9 which should then be considerably increased in width adapted to be brought into register with the passage 7 while the cavity full of high pressure gas is passing through the gland 3.

The process and apparatus described above are particularly useful in feeding pulverized coal into a hydrogenation plant.

The vessel 4 may be a stationary reaction vessel, or it may be a rotating drum from which the powdered material is transferred to a reaction vessel in an analogous manner to that described in the application of Harper & Scott, Serial No. 435,584, filed March 13, 1930.

The ram may also be made double-acting by arranging that it passes right through the high pressure vessel. This saves power and avoids the considerable end-thrust to which the single acting ram is exposed. By providing two cavities in the ram and duplicate charging apparatus, the one cavity may be charged while the other is being discharged in the interior of the vessel.

This arrangement is shown in Fig. 4.

Here 1 is the ram, 2 and 2*a* the cavities, 3 and 3*a* high pressure glands, 4 the high pressure vessel and 5 and 5*a* the hoppers.

We declare that what we claim is:—

1. An apparatus for feeding finely divided solid material into a high pressure vessel, comprising a gland in said vessel, a slidable ram passing through said gland, said ram being adapted to rotate through 180° at the inner end of its stroke, a cavity in said ram, and a hopper adapted to register with said cavity in the outermost positions of said ram.

2. An apparatus for feeding finely divided

solid material into a high pressure vessel, comprising a gland in said vessel, a slidable ram passing through said gland, said ram having a cavity and being adapted to rotate through 180° at the inner end of its stroke, means for scouring out said cavity when said cavity is in its innermost position by a puff of high pressure gas, and a hopper adapted to register with said cavity in the outermost position of said ram.

3. An apparatus for feeding finely divided solid material into a high pressure vessel, comprising a gland in said vessel, a slidable ram passing through said gland, a cavity in said ram, an auxiliary gland, means whereby said cavity communicates with a port in said auxiliary gland when at the innermost end of its stroke, and with a second port when passing outwards through the said high pressure gland respectively, a means for supplying high pressure gas to the first port, means for drawing off the high pressure gas contained in the cavity through the second port, and a hopper adapted to register with said cavity in the outermost position of said ram.

4. An apparatus for charging finely divided solid material into a high pressure vessel, comprising high pressure glands in said vessel, a double-acting slidable ram having cavities therein, said ram being adapted to rotate through 180° at the ends of its stroke, and hoppers adapted to register alternately with said cavities at opposite ends of the stroke.

In witness whereof, we have hereunto signed our names this 21st day of February, 1930.

FRANCIS BRIAN GRANT.
HUGH HARPER.