Jan. 13, 1925.

1,523,342

G. HART

PUMP

Filed Nov. 22, 1923

2 Sheets-Sheet 1

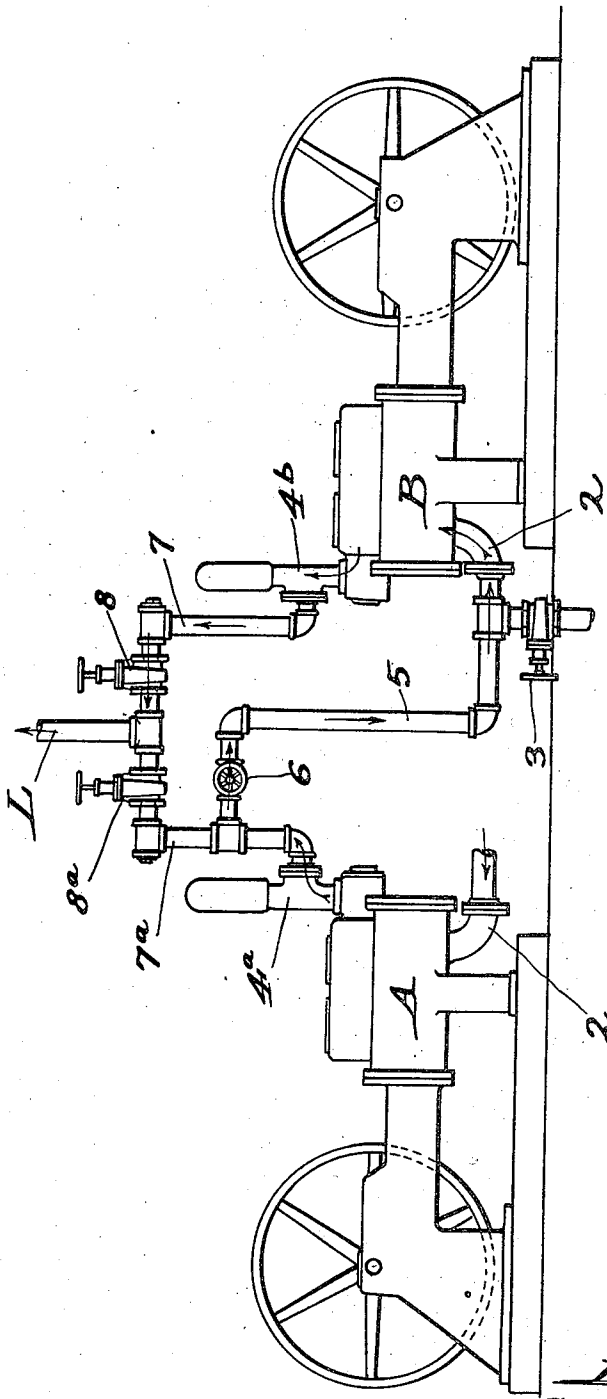


Fig. 1.

Witness.
W. Hall.

Inventor.
GEORGE HART.
BY Hazard and Miller
Attorneys

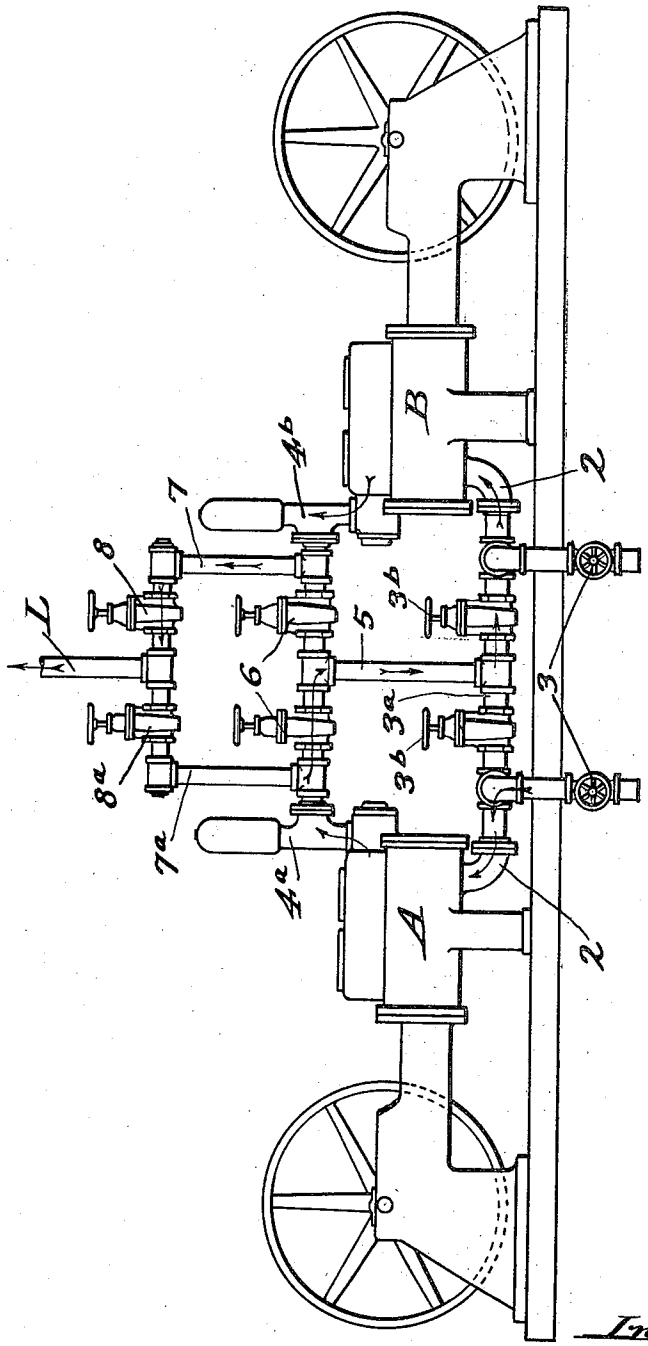
Jan. 13, 1925. 1,523,342

G. HART

PUMP

Filed Nov. 22, 1923 2 Sheets-Sheet 2

Fig. 2.



Witness:

Inventor:
GEORGE HART.
By Hazard and Miller
Attorneys

Patented Jan. 13, 1925. 1,523,342

UNITED STATES PATENT OFFICE.

GEORGE HART, OF LONG BEACH, CALIFORNIA, ASSIGNOR OF ONE-HALF TO GEORGE F. FULLER, OF LONG BEACH, CALIFORNIA.

PUMP.

Application filed November 22, 1923. Serial No. 676,320.

To all whom it may concern:

Be it known that I, GEORGE HART, a citizen of the United States, residing at Long Beach, in the county of Los Angeles and State of California, have invented new and useful Improvements in Pumps, of which the following is a specification.

This invention relates to pumps and more particularly to multistage pumps.

It has been proposed to use reciprocating pumps in combination to increase a line pressure of discharge from the combined pumps, but an objection to an ordinary combination where each pump has a separate suction from any source is that the pumps discharge their contents in opposition to each other to the common discharge line. In other words, two pumps each having separate suctions operate against each other when discharging the substance into a common line.

An object of the present invention is to provide a reciprocating pump combination in which the suction side of one pump is connected to the discharge side of another pump so as to receive a discharged substance from the attached pump at the full discharge pressure and to increase the pressure in the line by the operation of the pump receiving the substance from the initial stage pump.

Other objects will be made manifest in the following specification of an embodiment of the invention illustrated in the accompanying drawings, in which,

Fig. 1 is an elevational view showing a combination of pumps acting in multiple stage leading to a discharge line.

Fig. 2 is an elevation showing a hook-up of pumps to enable either pump to be utilized as the initial stage and either pump to be utilized as the second stage.

Pumps of conventional reciprocating type are indicated at A and B, each having suction connections 2. The suction connections may be extended to any source of supply and these connections are adapted to be closed or opened at will as by a respective valve 3. To provide for multistage operation of the pumps, the valve 3, for instance, of the pump B will be closed and the suction 2 of the pump B is designed to receive the discharge from the pump A through suitable fittings including a connecting pipe 5 in which may be arranged a valve 6 connected to the discharge outlet 4^a of the pump A. The discharge outlet 4^b of the pump B is connected by a pipe 7 attached to a valve 8 on one side of a common discharge line L. On the other side of the line is provided a valve 8^a connected by a pipe 7^a to the outlet 4^a of the pump A. In the operation of this form of hook-up, the valves 3 and 8^a being closed and the valves 6 and 8 being open, the primary stage pump A discharges through the outlet 4^a into the pipe 5 at its full working pressure which is taken up by the pump B on its suction stroke and increased on its discharge stroke by discharge of the material through the pipe 7, past the valve 8 and thence into the line L. It will be seen that the secondary pump B receives the material operated upon from the pump A at full pressure from the latter and the energy of the pump B is expended in boosting up the pressure to a point which has been found in practice to be about double the initial stage pressure from the pump A.

In case of necessity either of the pumps A—B can be worked separately without a multistage action by the obvious closing of the suction valve of one pump and the opening of the other, and with the closing of the cross connection valve 6 and either valve 8 or valve 8^a.

A somewhat modified form of the hook-up is shown in Fig. 2 in which each pump is provided with suction valves 3 in a cross connecting line 3^a which is provided with gate valves 3^b on either side of the transfer pipe 5 which is double branched and provided with valves 6. The discharge of each pump A—B (Fig. 2) is connected to pipes 7^a—7, respectively, leading to valves 8^a—8 controlling flow to the line L. In this arrangement either of the pumps A—B can be used as initial or second stage pumps by the opening of their respective suction valves 3 and the closing of the contiguous gate 3^b and the opening of the discharge gate valve 6 to permit the initial stage pump to discharge to the transfer line 5 and thence to the second stage pump. The arrows on the several parts in Fig. 2 indicate the course of flow when the valves are set to use pump A as the initial pump and pump B as the second

stage pump; those valves marked by the arrows being open and the others closed. The reverse condition of the valves would obviously reverse the direction of flow through the pumps to the discharge line.

Further embodiments, modifications and variations may be resorted to within the spirit of the invention.

What is claimed is:

1. The combination of a set of plunger pumps and means connecting the discharge side of one pump to the intake of the other pump of the set, whereby full discharge pressure is delivered to the second stage pump and the latter operates to increase the pressure of material to be delivered to a line, said means including a pipe and valve system having an independent suction for each pump and an independent discharge for each pump, and valves arranged in said system and adapted to be set whereby either pump can be utilized as the initial stage pump and either can be utilized as the second stage pump.

2. The combination of a set of plunger pumps and means connecting the discharge side of one pump to the intake of the other pump of the set, whereby full discharge pressure is delivered to the second stage pump and the latter operates to increase the pressure of material to be delivered to a line, said means including a pipe and valve system having an independent suction for each pump and an independent discharge for each pump, and valves arranged in said system and adapted to be set whereby either pump can be utilized as the initial stage pump and either can be utilized as the second stage pump, and to provide for operation of either pump singly.

In testimony whereof I have signed my name to this specification.

GEORGE HART.