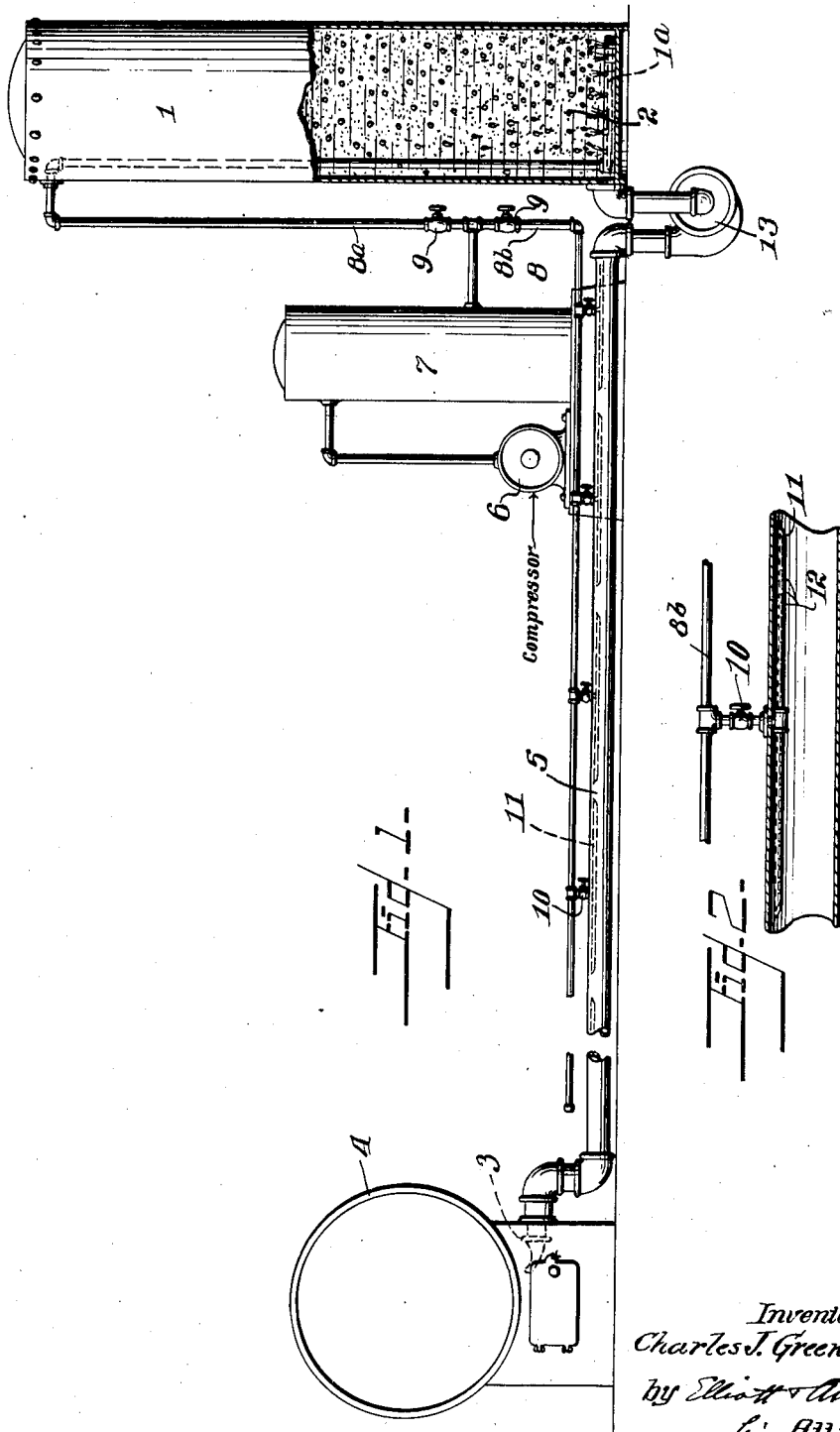


C. J. GREENSTREET.
METHOD OF CONVEYING LIQUIDS.
APPLICATION FILED JULY 23, 1919.

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Inventor
Charles J. Greenstreet
by Elliot & Luman
his Attys.

UNITED STATES PATENT OFFICE.

CHARLES J. GREENSTREET, OF ST. LOUIS, MISSOURI.

METHOD OF CONVEYING LIQUIDS.

1,329,967.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES J. GREENSTREET, a citizen of the United States, residing at St. Louis, and State of Missouri, have invented new and useful Improvements in Methods of Conveying Liquids, of which the following is a specification.

This invention relates to the conveying, or transporting of a liquid, and while the invention is capable of various uses it is particularly applicable when employed for conveying a liquid base carrying solid particles in suspension.

The general object of the invention is to produce a simple and efficient method of conveying such a liquid, and operating in such a way as to insure that the solid particles in suspension will be completely and effectively conveyed with the liquid.

The invention consists in the method described in the following specification and particularly set forth in the claims.

In the drawing which illustrates an apparatus which may be employed for practising my invention:

Figure 1 is a diagrammatic view illustrating a simple apparatus suitable to my purpose, certain parts being broken away; and

Fig. 2 is a vertical section and partial elevation showing details of the apparatus.

In practising the various arts, it may be necessary at times to convey a liquid from one point to another, and such a liquid may consist of a liquid base such as an oil fuel, carrying solid particles in suspension. If it is attempted to convey such a liquid, or mixture, from one point to another there is a tendency for the solid particles to settle either in the containers, or in the pipe line along which the liquid is conveyed.

According to my invention I prevent the settling of the solid particles and insure their delivery with the liquid at the desired point.

Any suitable apparatus may be employed for practising this process, or method, but the particular liquid upon which I prefer to practise my process, is a liquid fuel carrying finely divided solid fuel in suspension.

Any suitable apparatus may be employed for this purpose, the apparatus illustrated being shown merely by way of example. In this apparatus, 1 represents a storage tank, or reservoir, in which the liquid carrying the solid particles may be stored. This liquid may be a liquid fuel 2 of any kind, acting

as a carrier, and holding in suspension, a fuel such as powdered coal, peat, or any other finely divided material which has been added to it.

Let us suppose that it is necessary to convey this liquid 2, to a more or less distant point. For example, it may be desired to deliver it to a nozzle 3 at which the oil is consumed under a boiler 4. In accomplishing this, I provide means for confining the liquid and conducting the same in the desired direction, which means may include a reservoir or container 1, and an ordinary pipe line 5 which confines and conducts the liquid to the point of consumption, or to a burner 3.

In order to prevent the solid particles in suspension in the liquid from settling either in the container, or along the pipe-line in which the liquid is confined and conducted, I admit a gas under pressure to the liquid while it is being conducted, and in the same way I also maintain the solid particles within the container, also in suspension. I prefer to employ air under pressure, and for this purpose may use compressed air which may be supplied from an air bottle, but the air is preferably supplied by means of an air-compressor plant particularly suited to the peculiar conditions, for example, I may provide a small compressor 6, which compresses the atmospheric air into an air reservoir 7, and this reservoir 7 connects to a pipe system 8, having a branch 8^a and a branch 8^b, each branch being provided with its individual valve 9. The branch 8^a leads to a perforated annular nozzle, or air ring 1^a, in the bottom of the reservoir 1. The branch 8^b runs along parallel with the pipe-line 5, and at a plurality of points along the pipe-line is provided with connections including valves 10, which connect to air nozzles 11 disposed within the pipe 5. One of these valves and connections is clearly shown in Fig. 2. Each air nozzle 11 consists of an elongated pipe extending in both directions from the vicinity of the valve 10, and is provided on its underside with perforations 12. It is evident that with this apparatus, by opening the valves 9, the air will be admitted under pressure to the nozzles 1^a and 11. And the effect of this air is to keep the liquid in a state of agitation, thereby maintaining the solid particles in a state of suspension.

In many cases the situation of the reser-

voir 1, may be such that the liquid would gravitate or run freely to the point of consumption, but under some circumstances, it may be necessary to forcibly conduct the liquid to the point of consumption, or to a distant storage tank. For this reason, I prefer to provide the apparatus with a small pump such as a centrifugal pump 13 which is connected in the pipe-line 5. The construction of these pumps is such that no injury whatever will be done to a pump of this kind when employing it for pumping a liquid containing solid particles, such as small particles of coal.

It will be noted that the compressed air not only performs a useful function in maintaining the solid particles in suspension, but as the liquid is a fuel being delivered to a burner, the air also assists in supporting the combustion of the fuel.

If this process is used with a hydrocarbon containing light-fractions, there might be danger of creating an explosive mixture out of the light fractions and air which would form a gas accumulating over the liquid.

It is understood that the embodiment of the invention described herein is only one of the many embodiments my invention may take, and I do not wish to be limited in the practice of my invention nor in my claims; to the particular embodiment set forth.

What I claim and desire to secure by Letters Patent is:

1. The method of conveying a liquid carrying solid particles in suspension, which consists in confining the liquid, conducting the same in the desired direction, and admitting a gas under pressure to the liquid

while being conducted, thereby maintaining the solid particles in a state of suspension.

2. The method of conveying a liquid fuel composed of a liquid base acting as a carrier for a suspended finely divided solid fuel, which consists in confining the liquid fuel, conducting the same in the desired direction and agitating the liquid by admitting a gas under pressure to the liquid while being conducted, thereby maintaining the solid fuel in a state of suspension.

3. The method of conveying a liquid fuel composed of a liquid base acting as a carrier for a suspended finely divided solid fuel, which consists in confining the liquid fuel, forcibly conducting the same to the point of consumption of the fuel, and admitting air under pressure to the liquid fuel while being conducted, to prevent the solid fuel from settling.

4. The method of conveying to a burner, a liquid fuel composed of a liquid base acting as a carrier for a suspended finely divided solid fuel, which consists in confining the liquid fuel, conducting the same to the burner, and supplying oxygen for the combustion and simultaneously agitating the fuel by admitting air under pressure to the liquid fuel while being conducted.

5. The method of conveying a liquid fuel carrying a finely divided solid fuel, which consists in agitating the liquid by admitting air under pressure and conducting the liquid while the solid fuel is maintained in a state of suspension by the agitation.

In testimony whereof, I have hereunto set my hand.

CHARLES J. GREENSTREET.