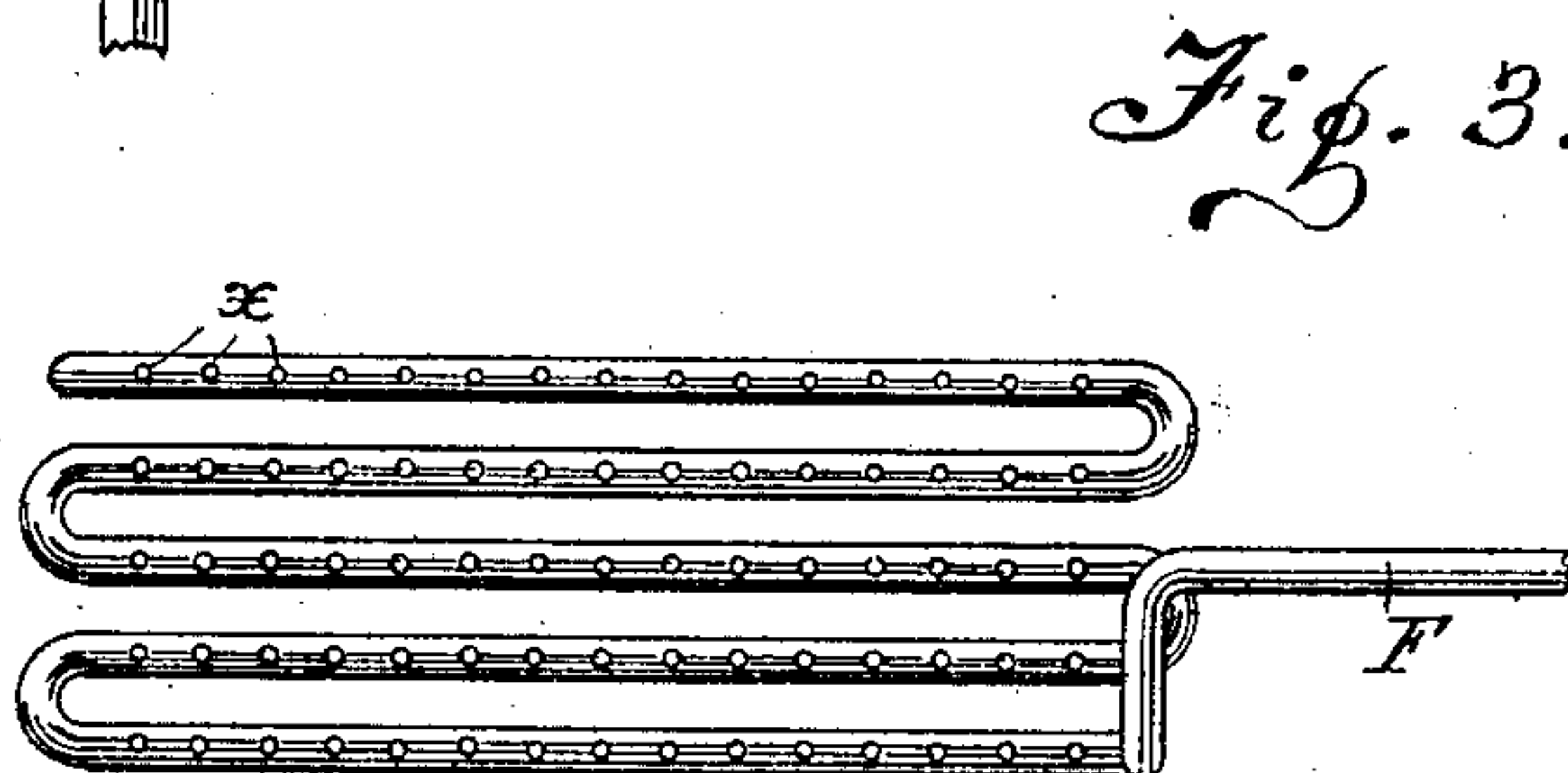
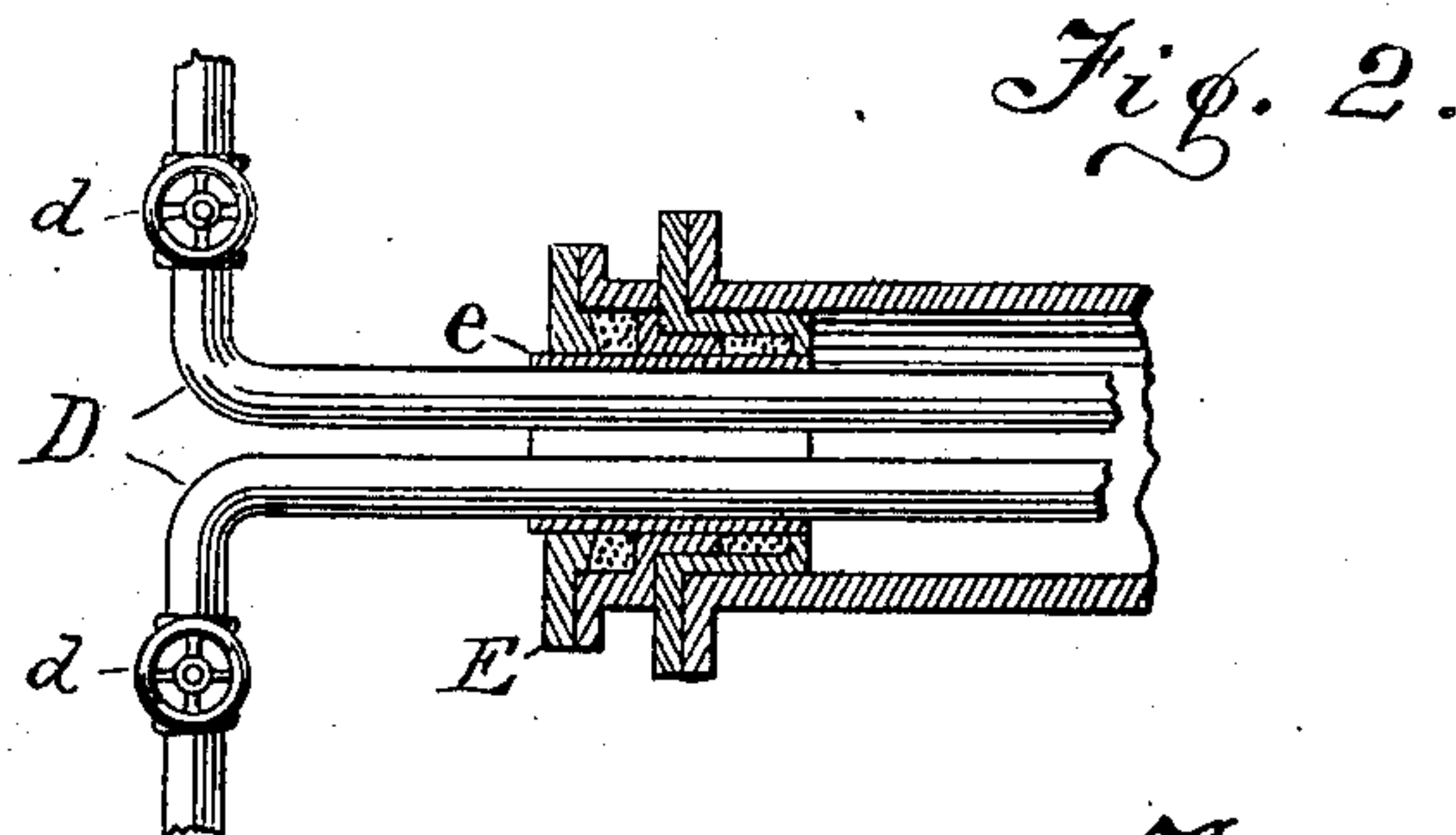
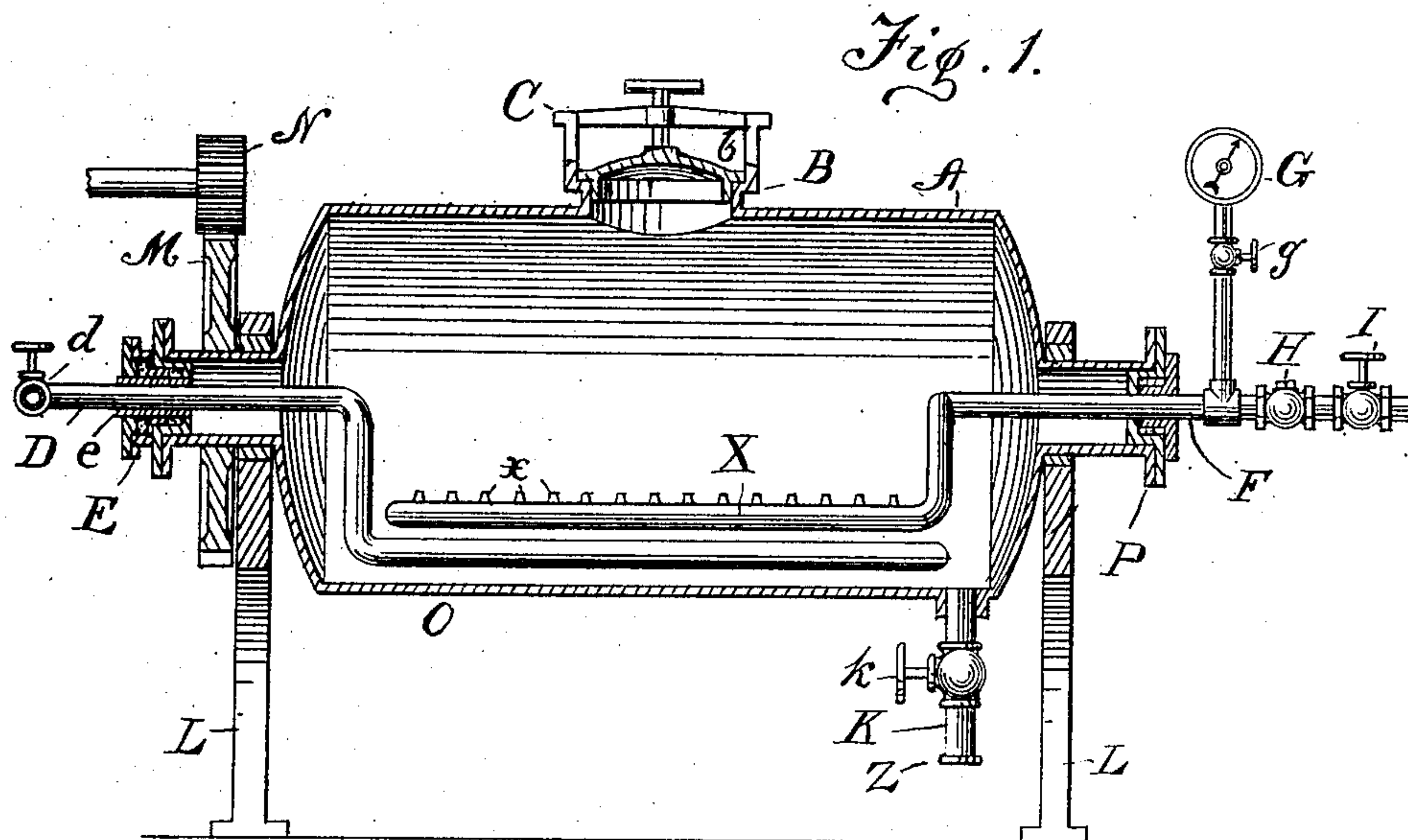


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 FORMIC ALDEHYDE CONTAINING COMPOSITION AND PROCESS OF MAKING THE SAME.
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 917,706. Patented Apr. 6, 1909.



WITNESSES:
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FORMIC-ALDEHYDE-CONTAINING COMPOSITION AND PROCESS OF MAKING THE SAME.

No. 917,706.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HENRY SPENCER BLACKMORE, a citizen of the United States, residing at Mount Vernon, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Formic-Aldehyde-Containing Compositions and Processes of Making the Same, of which the following is a specification, being a division of application Serial No. 168,673, filed August 7, 1903.

This invention relates to a new composition of matter for disinfecting, germicide, antiseptic and medicinal purposes and process of making the same, and it consists of a mixture, compound, or solution of formic aldehyde or its polymerides in a fixed water-repellent, such as fixed vegetable oils or fatty vehicles, which compounds, or compositions, may or may not be associated with other medicating agents, the object being to produce a fixed fatty composition of water-repellent nature containing formic aldehyde, which may be employed *per se* or as a vehicle for other medicating or medicinal agents.

As a specific illustration of my new composition and the manner in which the same is produced, I will take, for example, the production of a solution of formic aldehyde in maize oil (corn oil) which oil consists largely of glycerol-oleic ester. The manner in which I prefer to produce this fixed water-repellent or oily formic aldehyde solution or compound, is to place the desired fixed oil, such as maize oil, in a proper container and associate it with formic aldehyde under increased pressure, at the same time agitating it, whereby the formic aldehyde becomes absorbed, occluded, or retained therein. When the fixed oil has become saturated with formic aldehyde it is removed, the formic aldehyde content ascertained by test, and the composition diluted with more oil to obtain the percentage content of formic aldehyde desired. The polymerides of formic aldehyde, such as para-formaldehyde or trioxymethylene may be dissolved in the oil, preferably by the action of heat, producing compounds not departing from the spirit of my invention, as, upon heating in the formation of the composition, formic aldehyde is generated and the composition is found to have like disinfectant, germicide, antiseptic, and medicinal properties, and to all intents and purposes may be con-

sidered, and is herein included, as an equivalent composition in accordance with my invention.

The apparatus, in which the solution of formic aldehyde in inert and fixed water-repellent vehicles in accordance with my process is made, is illustrated in the accompanying drawing, in which,

Figure 1 is a longitudinal vertical section; Fig. 2 is a sectional view of an axial stuffing-box through which passes the inlet and outlet pipes for the purpose of heating the contents of the apparatus by means of steam; Fig. 3 is a view of a perforated pipe through which the formic aldehyde is introduced into the apparatus.

In carrying out my invention for making a solution of formic aldehyde in maize oil, I introduce into the revoluble drum A, maize or corn oil which consists largely of glycerol-oleic ester, through the opening B by removing the cover *b*, sufficient to fill the drum about two-thirds full. I then place the cover *b* over the opening B and maintain the same in a tight or closed position by means of the screw-clamp C. I then open the valves *d* in the pipes D and pass there-through and through the coil O a current of steam, whereby the maize or corn oil in the drum A becomes heated. As soon as the oil has become heated to about 100 degrees C., I introduce into the oil through the perforated pipe X formic aldehyde gas, under a pressure of about twenty pounds, by opening the valve I. This formic aldehyde gas passes first through the check-valve H which prevents the oil or other substances in the receptacle A from being forced back into the formic aldehyde reservoir or generating apparatus. Connected with pipe F, through which the formic aldehyde gas under pressure passes to the coil X from which the formic aldehyde gas is discharged through the perforations *x*, is a pressure gage G which becomes operative on opening the valve *g*. As soon as the formic aldehyde begins to pass into the oil in receptacle A through the small perforations *x*, the drum A is revolved by means of the cog-wheel M actuated by the movement of the revolving wheel N. In the axial ends of the drum A are the stuffing boxes E and P, the steam pipes D passing through the fixed section *e* of the stuffing-box E, while the pipe F through

which the formic aldehyde is introduced into the apparatus passes through the stuffing-box P. As the apparatus revolves, the contents are simultaneously heated by the steam passing through the pipes D and the formic aldehyde is introduced through the pipe F, the pressure being maintained preferably at about twenty pounds. After a sufficient amount of formic aldehyde has been introduced into the oil in the apparatus to produce the desired percentage content, the apparatus is maintained in a rotary condition for about two hours, whereby the formic aldehyde becomes thoroughly dissolved in or assimilated with the oil by the agitative action of the revolving drum and the fixed steam heating coil *o* and perforated coil *x* through which the formic aldehyde is introduced. The revolution of the apparatus is then stopped and the oil, charged with formic aldehyde, is withdrawn through the pipe K by opening the valve *k*. The pipe K is provided at its outer end with a flange *z* for the purpose of coupling up or clamping to conduits leading to a reservoir for the fixed oil charged with formic aldehyde.

The whole apparatus is axially supported by the stands L through which the ends of the hollow trunnions of the receptacle A are supported.

It can be seen that the oil and formic aldehyde are thus thoroughly mixed and assimilated by the action of heat and pressure, together with the agitation caused by the revolution of the drum, thus continually flowing the oil against the fixed coils X and O.

I have found it of advantage to employ this fixed water-repellent composition containing formic aldehyde or its described equivalent as a vehicle for other medicinal agents, such, for instance, as eucalyptol, in which case it is found to act with satisfaction as an antiseptic and healing agent for application to suppurating surfaces, bringing about the destruction and removal of the cause of the inflammatory or suppurating condition and at the same time apparently acting as a local anesthetic and thereby relieving the pain with which such inflammations are usually accompanied. It is preferable that the formic aldehyde content of the fixed oily vehicle, in cases of this kind, should not exceed one-tenth of one per cent., but it can be varied at the option of the prescriber to meet the exigencies and idiosyncrasies of the case.

Instead of eucalyptol I can employ any other medicinal agent, as desired, such as menthol, cocaine, morphine, etc., with the fixed oily formic aldehyde vehicle, or I can employ other vegetable fats, oils, or aliphatic esters as the base for the formic aldehyde vehicle without departing from the

spirit of my invention, and I intend to include the dense vegetable oils or other vegetable aliphatic or similar oxy-acid esters which may be of solid, semi-solid, or fluid consistency at ordinary atmospheric pressure and temperature, the said fatty water-repellent formic aldehyde compositions of which may be employed as a vehicle for other medicating or medicinal agents.

It is found that, aside from the advantages derived from the employment of the fixed oily formic aldehyde compositions as a vehicle for other medicating or medicinal agents, that, the formic aldehyde content prevents the oily base from becoming oxidized or rancid and the composition is found to be of itself of great advantage as a hemostatic and when applied to cuts or wounds is a rapid healing agent by reason of its antiseptic and coagulating action upon the albuminous content of the blood or exposed raw surfaces.

It may be noted that dry formic aldehyde, which is a gas, unites or combines very readily with the fixed oils or aliphatic esters and becomes more readily assimilated with or retained or occluded therein in a more permanent manner and to a larger percentage without danger of polymerization than is the case with aqueous solutions.

The term "inert" employed throughout this specification and claims has particular reference to the character of the solvent for the formic aldehyde and its character in relation to the formic aldehyde content; and the term "fixed vegetable oil" to the crude or commercial inert, fixed, water-repellent, vegetable fat or oil, as well as purified products or esters and is intended to include inert, fixed, water-repellent compositions of fixed oily nature which are derived from vegetable substances or artificially or synthetically prepared, it being understood that the term "fixed" implies that the substance is of non-volatile and permanent character under ordinary atmospheric pressure and temperature; and the term "water-repellent" designates a composition ordinarily insoluble or incompatible with, water.

The fixed vegetable oils or fats are more stable than animal oils or fats, such as lard, and are not so prone to be decomposed by hydrolysis into fatty acids and glycerin, because they are associated in nature largely with water-repellent vegetable substances which protect the esters present, and, furthermore, they are free from such decomposition products as acrolein and other disintegrating aldehydes which are present in animal fats, by reason of the method by which they are obtained such as heat; while vegetable oils are largely obtained by cold compression or through the medium or solvent action of some volatile vehicle or menstruum.

The decomposition products, or products

of destructive distillation, present in animal oils or fats, act to enhance the decomposition or hydrolytic disruption of the fixed esters into fatty acids and glycerin. Maize oil presents an admirable vehicle for formic aldehyde, in that it is practically a waste product, being a by-product in the manufacture of corn products. It is hardly saponifiable enough to be employed for making soap, and does not possess drying qualities enough to be used as a vehicle for paints, but contains more or less vegetable albuminoids which prevent or retard hydrolytic action on the fixed ester contents, and will absorb, occlude, or retain, large quantities of formic aldehyde gas and allow it to gradually be discharged in the presence of the atmosphere and moisture, while its non-drying and unsaponifiable properties tend to prevent decomposition and the drying of the oil.

One of the particular applications of the maize oil formic aldehyde composition, for hygienic purposes, is to apply it to, or employ it in, telephone transmitters, where, by the action of the moisture of the breath, formic aldehyde is discharged gradually, thus rendering the device perfectly antiseptic in an automatic manner.

Another valuable application of the composition is for oiling floors of schools, halls, public buildings, etc. for the purpose of retaining dust, thereby preventing its circulation in the air and thus producing a sanitary and germicidal condition, and also in conjunction with absorbent substances, such as saw-dust, etc., for collecting dust during the process of sweeping.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A new composition of matter comprising a fixed vegetable oil and formic aldehyde.
2. A new composition of matter comprising a fixed vegetable oil, formic aldehyde, and a medicating agent.
3. A new composition of matter comprising a fixed vegetable oil, formic aldehyde, and eucalyptol.
4. A new composition of matter comprising maize oil and formic aldehyde.
5. A new composition of matter comprising maize oil, formic aldehyde, and a medicating agent.
6. A new composition of matter comprising maize oil, formic aldehyde, and eucalyptol.
7. A new composition of matter comprising

ing a fixed vegetable ester and formic aldehyde.

8. A new composition of matter comprising a fixed vegetable ester, formic aldehyde, and a medicating agent.

9. A new composition of matter comprising a fixed vegetable ester, formic aldehyde and eucalyptol.

10. The process of making the new composition of matter herein set forth, which consists in mixing a fixed vegetable oil with formic aldehyde and exposing the same to intimate association until the formic aldehyde had become associated therewith or occluded therein.

11. The process of making the new composition of matter herein set forth, which consists in mixing a fixed vegetable oil with gaseous formic aldehyde and exposing the same to intimate association until the formic aldehyde has become associated therewith or occluded therein.

12. The process of making the new composition of matter herein set forth, which consists of mixing a fixed vegetable oil with formic aldehyde under super-atmospheric pressure and exposing the same to intimate association until the formic aldehyde has become associated therewith or occluded therein.

13. The process of making the new composition of matter herein set forth, which consists of mixing maize oil with formic aldehyde and exposing the same to intimate association, until the formic aldehyde has become associated therewith or occluded therein.

14. The process of making the new composition of matter herein set forth, which consists of mixing maize oil with gaseous formic aldehyde and exposing the same to intimate association until the formic aldehyde has become associated therewith or occluded therein.

15. The process of making the new composition of matter herein set forth, which consists in mixing maize oil with formic aldehyde under super-atmospheric pressure and exposing the same to intimate association until the formic aldehyde has become associated therewith or occluded therein.

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

HENRY SPENCER BLACKMORE.

Witnesses:

E. M. HOLMES,
J. R. NOTTINGHAM.