

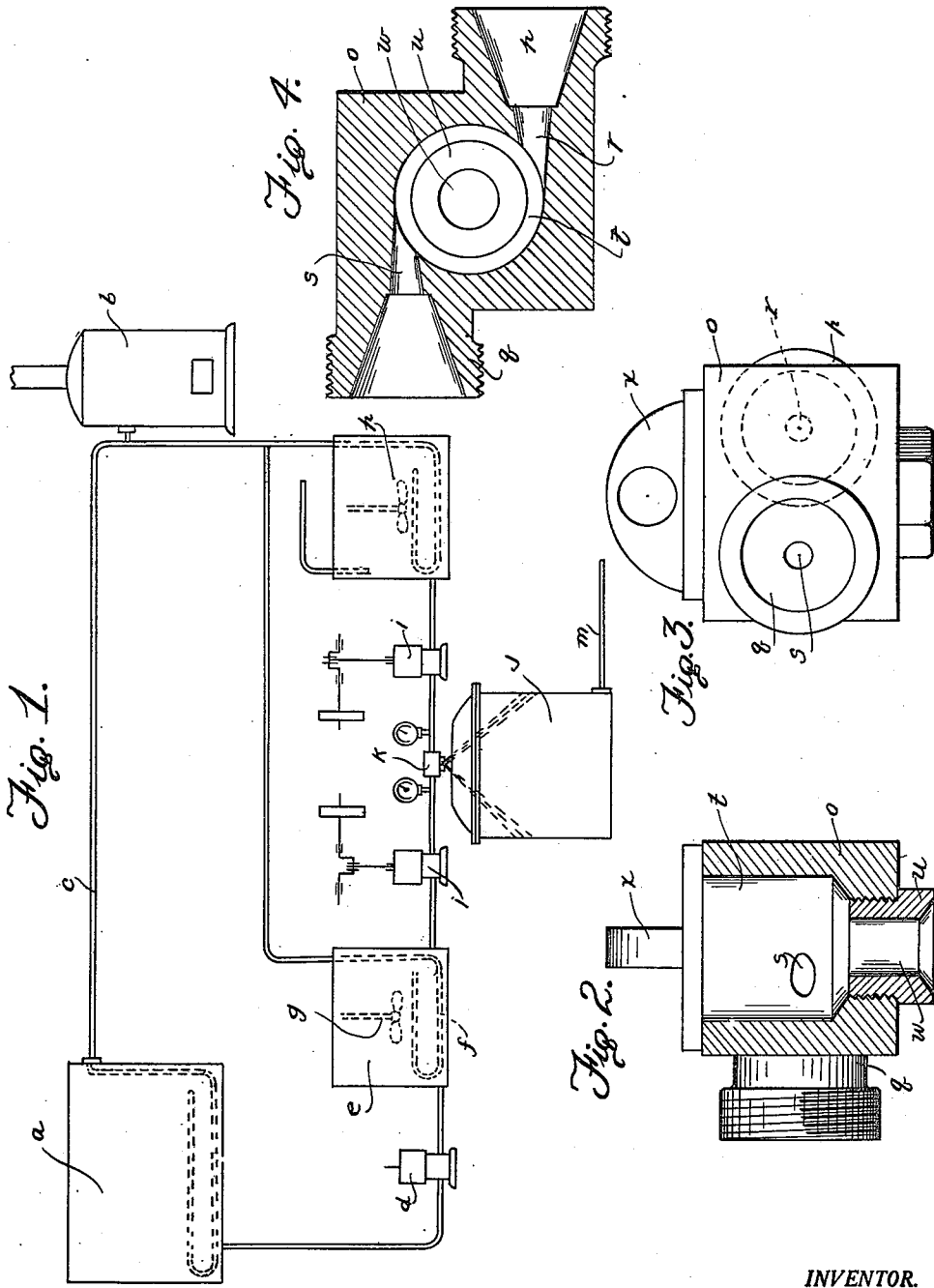
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APPARATUS FOR THE PREPARATION OF EMULSIONS

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# UNITED STATES PATENT OFFICE

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## APPARATUS FOR THE PREPARATION OF EMULSIONS

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The present invention relates to liquid mixing devices and has particular reference to a device for preparing a stable oil in water emulsion in which there are no moving parts, and hence the life of the machine is much greater than the known types of mills, agitators and the like which have moving parts.

In the preparation of emulsions, for example asphalt emulsions, the dispersed phase is obtained in the form of particles so very finely divided that the individual particles have the largest possible surface area in proportion to the total volume, and consequently remain suspended in water. The particles must be so dispersed in the emulsifying liquid that the individual particles cannot coalesce.

This condition is obtained by finely dividing the body to be emulsified by means of a rapidly moving mill, a rapidly rotating stirring device or the like. The number of revolutions of such a machine are, if they should be worked out rationally, dependent upon a law of nature; for a high velocity is necessary to give the friction required and this can only be obtained by apparatus which has a prohibitive cost; also the power consumption of such a machine is very considerable.

It has now been found that by using the so called spray nozzle, that the preparation of emulsions of desired degrees of dispersion can be obtained if the liquid is ejected from a spray nozzle in the form of a rapidly rotating spray, which cannot be obtained with other apparatuses. The liquid is obtained in a finely divided state by introducing it tangentially to the axis of a drum, cone or the like, in such a manner that the latter device ejects it from the nozzle by means of centrifugal force in a very finely divided condition. The nozzle is subject to very little wear, while all moving parts of known emulsifying machines wear rapidly.

Figure 1 is an elevation of the invention; Figure 2 is a vertical section of the nozzle; Figure 3 is an elevation of the nozzle; and Figure 4 is a horizontal section of the nozzle.

Apparatus for the preparation of an emulsion by means of a spray nozzle is shown in the drawings. The reservoir *a* containing

bitumen has a hot coil through which steam flows through the pipe line *c* from the steam vessel *b*, so that the bitumen is maintained in a liquid condition. To the receiver *e* a bituminous material is forced by the pump *d*. The receiver *e* is heated by the hot coil *f* and is provided with a stirrer *g*. To the bitumen is added an emulsifying agent such as for example wool fat, tallow, rosin or the like. In the second reservoir *h* a solution of alkali and water is prepared. By means of the two pumps *i* and *i'* the bitumen which is mixed with a fat or similar substance is introduced at one side of the nozzle *k*, while at the opposite side the alkali solution is led to the nozzle, both materials being introduced in regulated amounts. In this spray nozzle there results through the described rapid rotation, a fine division and intimate mixture of both liquids, so that out of the nozzle there proceeds a liquid as described above, which comprises a stable emulsion in which the dispersed phase is in the form of fine drops. The emulsion is cooled in the receiver *j* which is supplied by the conduit *l*.

In Figures 2 to 4 there is shown a mixing nozzle in vertical and cross section. The member *o* of the mixing nozzle possesses at each side thereof a feed channel for each of the liquids to be mixed; the channels being designated by the reference characters *p* and *q*, from each of which there are nozzle entrances *s* and *r* leading to the cylindrical mixing chamber *t*, in a direction which is substantially tangential.

The mixing chamber *t* possesses a discharge *w*, concentric with the mixing chamber proper, into which a mouthpiece *u* is screwed, the latter being removable if desired.

The entering liquid which is under pressure and in a rotating state is conducted through the conduits *r* and *s* into the mixing chamber *t*, in which mixing chamber it is rotated at a correspondingly high velocity so that intimate mixture and division of the liquid takes place and the mixture in the desired condition, without further treatment, can be led out into the collecting receiver *j*.

It is to be distinctly understood that we

do not limit ourselves to the specific apparatus herein disclosed, but claim as part of our invention all modifications which may reasonably fall within the scope of the appended claim.

We claim:

An emulsifying apparatus comprising a mixing chamber in the form of a closed cylinder, conduits leading to the said mixing chamber at opposite sides thereof and tangentially thereto, a discharge nozzle concentric with the said mixing chamber through which the emulsion may be discharged, pumps adapted to force liquids under pressure through the said conduits against the curved walls of the mixing chamber, whereby a rapid rotary movement of the liquids is attained, and means communicating with reservoirs of untreated material and the said conduits.

In testimony whereof we affix our signatures.

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