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W. J. KIRK ET AL

1,729,044

DILATOR

Filed Nov. 14, 1927

Fig. 1.

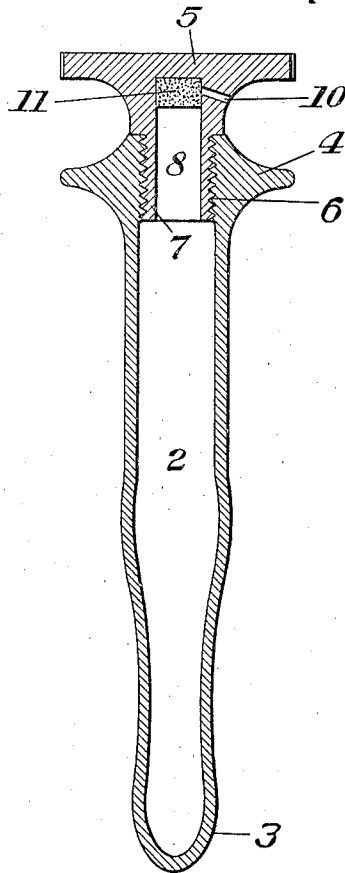
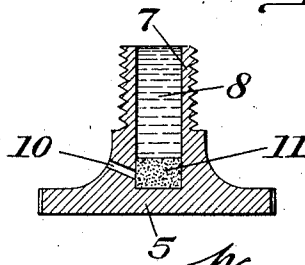


Fig. 3.



Fig. 2.



William J. Kirk Inventors
Roy H. Brownlee
William H. Coburn
By *Charles D. Dettle* Attorneys

UNITED STATES PATENT OFFICE

WILLIAM J. KIRK, OF WELLSBURG, WEST VIRGINIA, AND ROY H. BROWNLEE AND
WILLIAM H. COBURN, OF PITTSBURGH, PENNSYLVANIA, ASSIGNORS TO THE
ELECTRO THERMAL COMPANY, OF STEUBENVILLE, OHIO, A CORPORATION OF
OHIO

DILATOR

Application filed November 14, 1927. Serial No. 233,032.

Our invention refers to improvements in rectal applicators or dilators, and to the means for generating a sustained heat therefor. In devices of the same general kind, utilizing various heating mediums, they are apt to be more or less unsatisfactory due to either too little or too great heat or to a limited time of heat continuance, and other known objections.

Thus, when an applicator or dilator is filled with hot liquid, incapable of increase and therefore entirely safe against undue heating, the continued maintenance of heat is limited as to time, and with a tendency of the user to fill the applicator or dilator with liquid of too high temperature, with resulting risk.

There have also been used various heat generating mediums in the form of capsules, adapted for immersion in water or other liquid for chemical re-action and resulting heat generation. These have not entirely filled all of the requirements of such devices as to safety and adequate and sustained temperature for a sufficient period of time suitable for satisfactory and beneficial treatment. Such heat generation is disclosed in prior patent of Homan #1,551,499.

Our invention has in view to improve the construction of the dilator or applicator in its mechanical form and adaptation to use, and also to improve the means for generating heat within its body portion, together with various other features of utility and advantage, as shall be more fully hereinafter described.

Referring to the drawings showing one preferred embodiment of the invention:

Fig. 1 is a vertical sectional view through an applicator or dilator embodying our invention;

Fig. 2 is a similar view of the measuring closing cap therefor in inverted liquid-containing position;

Fig. 3 is a view in elevation of one of the

chemical-containing capsules or cartridges for use therewith.

Referring to the drawings, the body portion of the dilator comprises a hollow shell providing the interior chamber 2, the terminal 3 and the outer enlarged end or head 4.

The cavity or hollow interior of the dilator is normally closed by a removable plug or stopper 5 having threaded engagement, as indicated at 6. The head 5 is provided with an inner cup extension 7, capable of holding a predetermined amount of suitable fluid, as water, in its cavity 8, as clearly shown in Fig. 2.

The active chemical re-agent is prepared as a capsule or cartridge 9, in any suitable shape but preferably in the form of a bag or cartridge made of fabric or other suitable material, readily permeable by fluid and adapted to be freely inserted within the dilator and capable of easy removal after each operation.

The combined plug and cup is preferably provided with a small vent opening through its wall, for escape of any excess vapor pressure. The inner end of the cup is also provided with a packing 11 of felt or other suitable semi-porous material, sufficiently tight to prevent leakage. Vapor pressure in the interior may thus escape, if the internal pressure becomes excessive.

For the purpose of generating heat, upon admixture with a suitable liquid, as water, we utilize a combination of magnesium (Mg) in powdered form, approximately 15 parts, and cuprous oxide (Cu_2O), approximately 85 parts. These are thoroughly mixed together, and to such mixture is added a definite proportion of coarse sand, or the like.

The purpose of the sand addition is to provide a supporting and separating body for the chemicals, making them readily pervious or permeable to water, or other liquid, and

at the same time to give a greater bulk to the mixture.

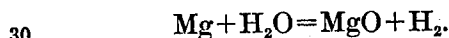
A further advantage in the sand admixture is that the temperature rise, when the chemicals are exposed to water, is effectively regulated. Suitable proportions and amounts of the chemicals and sand respectively for use with water are in about the following proportions:

Total weight of powdered magnesium and cuprous oxide..... 5 grams
Total weight of coarse sand..... 5 grams
Total water used..... 2 cubic centimeters

In utilizing the invention, the capsule or cartridge 9, containing the chemicals and sand thoroughly mixed together, is first inserted in the interior cavity 2. Thereafter, the measured amount of water in shell 7 is deposited within the interior and the plug 5 is tightly closed, as in Fig. 1.

The chemical re-action which almost immediately commences with resulting rise in temperature of the applicator or dilator up to approximately 115° F., more or less, is as follows:

As is well known, magnesium (Mg) re-acts with water in accordance with the equation:



If the water is in the form of steam the re-action takes place very rapidly; if in boiling water fairly rapidly, while with cold water the re-action is negligible.

If, however, a material capable of absorbing the nascent hydrogen as rapidly as it is formed is intimately mixed with the magnesium, the re-action even with cold water is so accelerated that the heat of the re-action raises the temperature of the mixture until in a proper mixture it rises to the boiling point, i. e. the point where water is 100° C. or higher with a smaller amount of water.

Such a material capable of absorbing the nascent hydrogen is cuprous oxide, Cu_2O . When nascent hydrogen comes in contact with cuprous oxide a re-action occurs represented by the following equation:



Lead oxide acts in a similar manner to cuprous oxide but not as efficiently as Cu_2O .

In place of the sand, we may use an equal amount of fuller's earth or other suitable material as a diluent or holding body for the chemicals, with the same supporting, separating, and absorbent effect.

Likewise, the proportions of the chemicals may be varied within reasonable limits, with a proportional change in the rate of absorption of nascent hydrogen, when the water is deposited within the dilator and the cartridge 9 is immersed.

Thus, the proportions of Mg may vary

from five to twenty parts and of Cu_2O from ninety-five to eighty parts, in a whole of one hundred parts, with corresponding variation in the rate of absorption, as desired. We have found that good results may be secured by maintaining the proportions between the chemicals as a whole and the supporting body of sand or fuller's earth, or their equivalent, at approximately equal parts for best results.

The heat generated within the dilator may thus be quite accurately regulated so as not to exceed a definite maximum.

The heat will also be maintained with very gradual diminution for a considerable time, amply long for one application, after which the exhausted cartridge may be emptied from the casing.

The dilator itself may be made of any suitable substance or material, as hard rubber, metal, etc., and in suitably convenient size, design or proportions within the usual limits of such articles, or permissible variations to suit requirements of use.

What we claim is:—

1. A dilator consisting of a suitably shaped hollow body provided with a removable closing end, and a hydrogen and oxygen absorbent unit containing magnesium and cuprous oxide.

2. A dilator consisting of a suitably shaped hollow body provided with a removable closing end, and a hydrogen and oxygen absorbent unit containing magnesium and cuprous oxide and a granular investing body.

3. A dilator consisting of a tubular hollow body provided with a removable closing end, and a water absorbent unit composed of magnesium and cuprous oxide and a granular investing body.

4. A dilator consisting of a tubular hollow body provided with a removable closing end, and a water absorbent unit composed of a minor portion of magnesium and a major portion of cuprous oxide, and a granular investing body.

5. A dilator consisting of a tubular hollow body provided with a removable closing end, and a liquid absorbent unit composed of a minor portion of magnesium and a major portion of cuprous oxide, and a granular investing body, with an associated liquid.

6. A dilator consisting of a tubular hollow body provided with a removable closing end, and a liquid absorbent cartridge composed of a minor portion of magnesium and a major portion of cuprous oxide, and a granular investing body, with a substantially less volume of associated liquid.

7. The combination with a hollow transversely round body member having an exterior form of gradually increasing diameter designed to effect orificial dilation, a substance within said hollow body having the

property of generating heat when moistened with fluid, and a removable plug at the larger end of said body having an inwardly extending fluid measuring cup.

- 5 8. The combination with a hollow transversely round body member having an exterior form of gradually increasing diameter designed to effect orificial dilation, a cartridge within the hollow body containing a
10 substance having the property of generating heat when moistened with water, and a removable plug at the larger end of said body having an inwardly extending water measuring cup of a capacity substantially
15 less than the volume of the capsule.

9. In combination with a hollow tubular body, a cartridge for re-action with water within said body consisting of a holding shell of permeable material filled with powdered magnesium and cuprous oxide and an
20 investing body of sand or the like.

10. In combination with a hollow tubular body, a cartridge for re-action with water within said body consisting of a holding
25 shell of permeable material filled with powdered magnesium and cuprous oxide and an investing body of sand or the like thoroughly mixed therewith and composing substantially one-half of the mixture.

- 30 11. In combination with a hollow tubular body, a cartridge for re-action with water within said body consisting of a holding shell of permeable material filled with powdered magnesium approximately fifteen
35 parts, cuprous oxide approximately eighty-five parts, and sand approximately one hundred parts by volume.

In testimony whereof we hereunto affix our signatures.

40 WILLIAM J. KIRK.
ROY H. BROWNLEE.
WILLIAM H. COBURN.

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