

Dec. 12, 1961

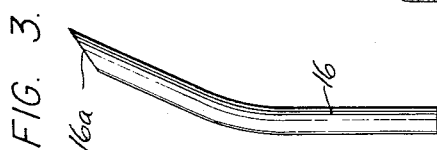
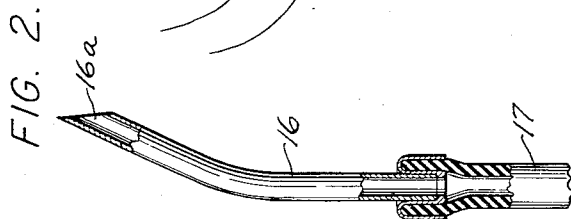
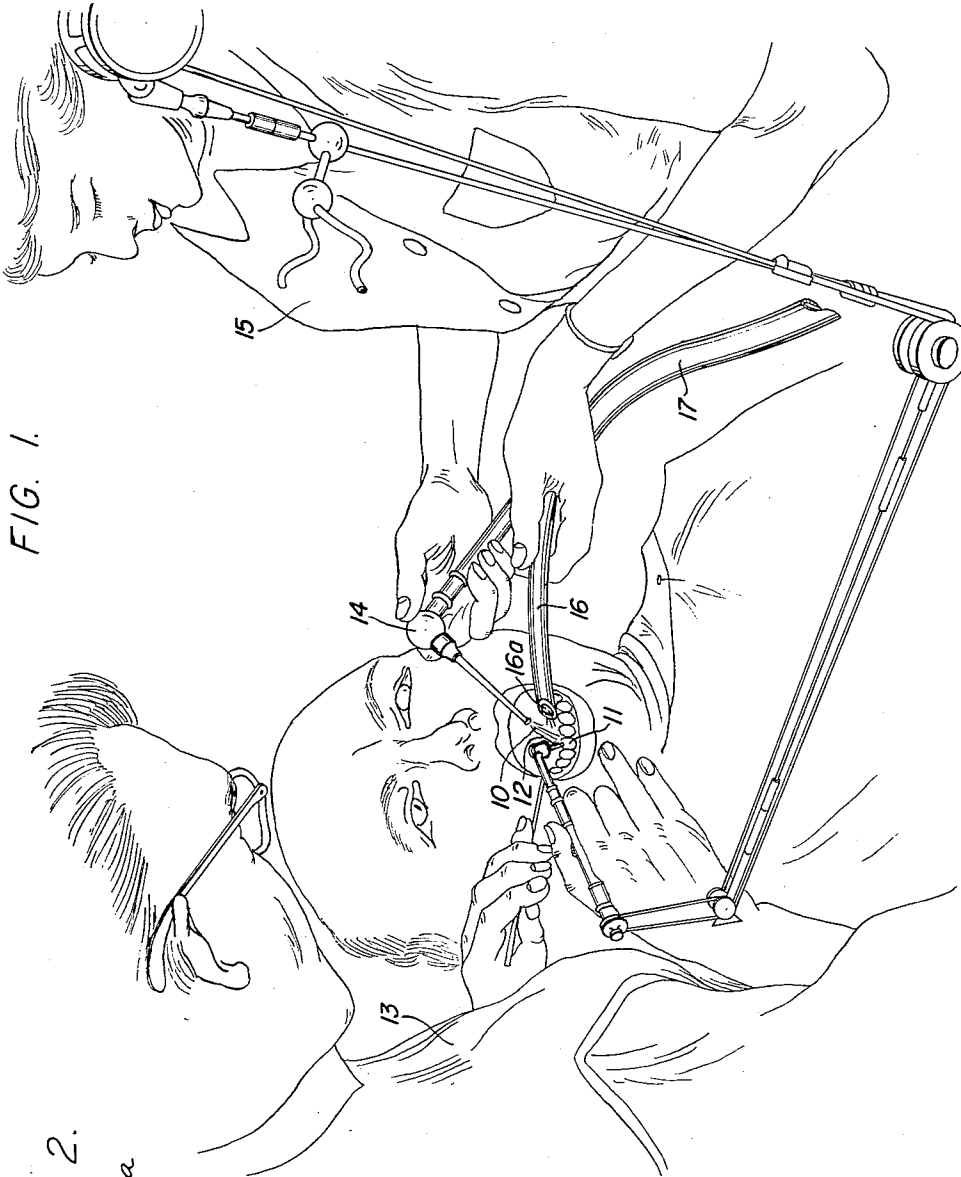
E. O. THOMPSON

3,012,323

METHOD OF DENTISTRY AND APPARATUS THEREFOR

Filed Feb. 19, 1954

3 Sheets-Sheet 1



Inventor
ELBERT O. THOMPSON

By *F. H. Mallinckrodt and*
Philip A. Mallinckrodt
Attorneys

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FIG. 4.

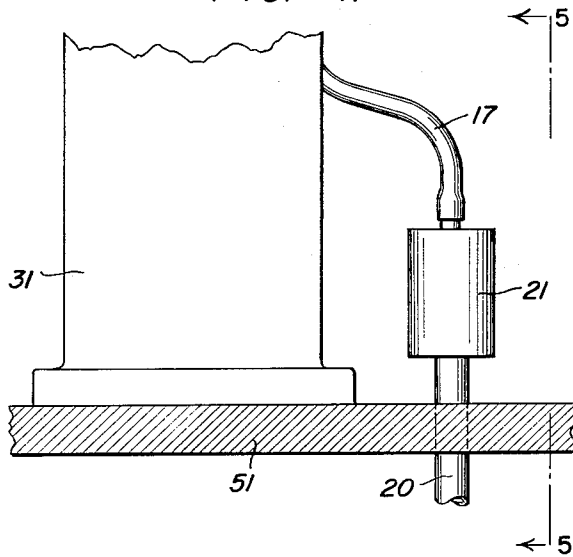
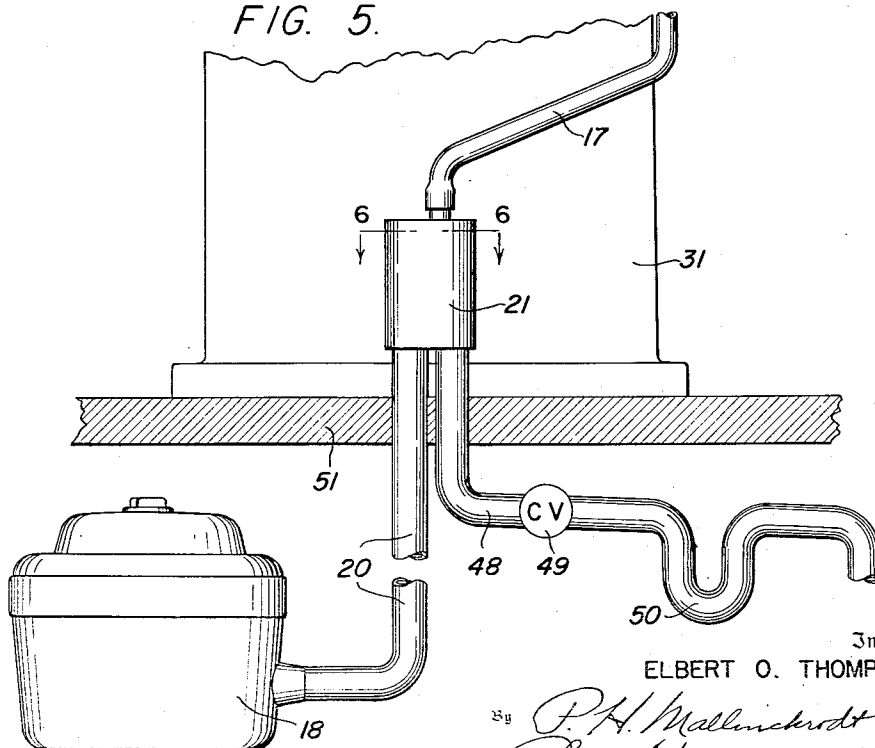


FIG. 5.



Inventor

ELBERT O. THOMPSON

By

*P. H. Mallinckrodt and
Philip A. Mallinckrodt*
Attorneys

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E. O. THOMPSON

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FIG. 6.

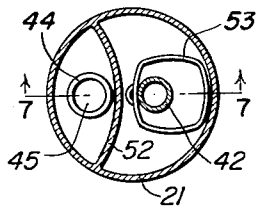


FIG. 7.

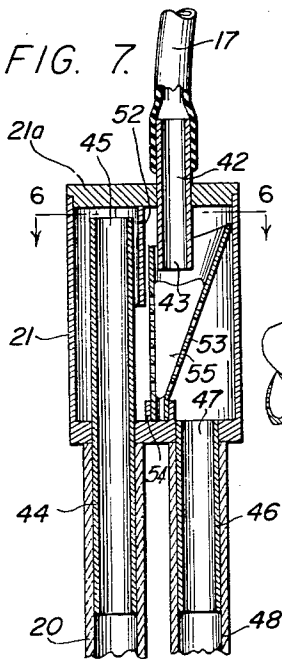


FIG. 8.

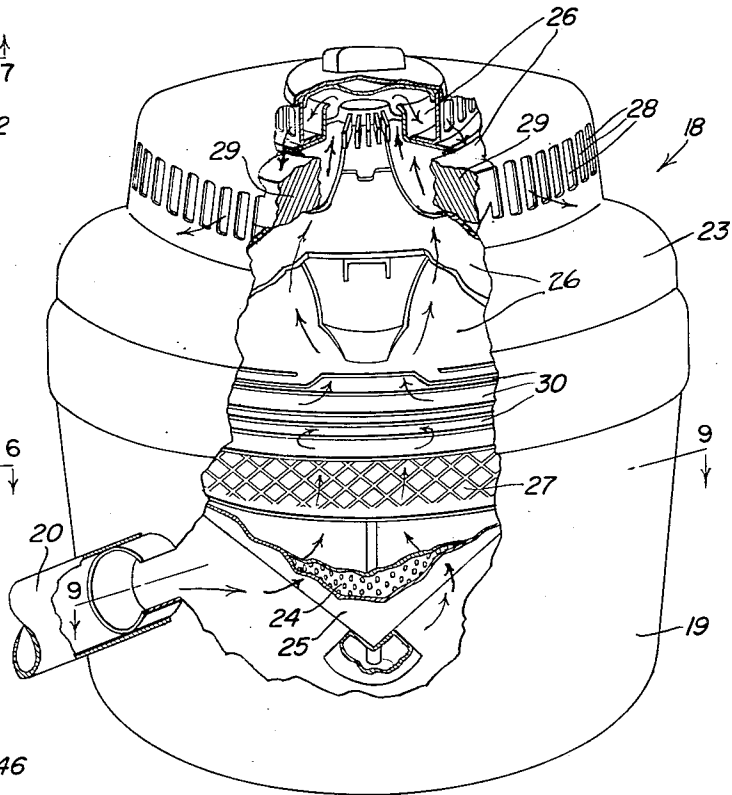
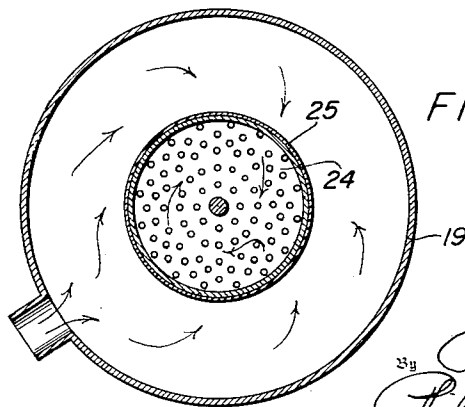


FIG. 9.



Inventor

ELBERT O. THOMPSON

By *P. H. Mallinckrodt and*
Philip A. Mallinckrodt
Attorneys

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3,012,323

METHOD OF DENTISTRY AND APPARATUS THEREFOR

Elbert O. Thompson, Salt Lake City, Utah, assignor to Vacudent Manufacturing Company, Salt Lake City, Utah, a corporation of Utah

Filed Feb. 19, 1954, Ser. No. 411,510

6 Claims. (Cl. 32—33)

This invention relates to methods employed in the practice of dentistry, and to dental apparatus. It is concerned particularly with procedures carried out in the mouth of a patient by a dentist during various aspects of dental treatment.

The preparation and filling of cavities in the teeth of patients affected by dental caries constitutes a major part of the practice of most dentists. As customarily carried out, this work is excessively time consuming, and is often extremely painful for the patient unless anesthetics are employed. This is so for several reasons, the principal one being heat generated by the dental drill in preparing the cavity for filling. Much of the pain experienced by the patient is due to this heat, and, under ordinary conditions, the dentist finds it necessary to divide the total drilling time up into short increments, separated by time intervals of sufficient length to permit both the drill and the tooth to cool. This not only relieves the pain, but also prevents damage to sensitive tooth tissues. Additional time is consumed by frequent rinsings of the tooth and spitting by the patient.

It has been heretofore proposed by many dentists to project a jet of water against the tooth during the drilling operation, for cooling purposes, and, in some instances, dental drilling equipment has heretofore been constructed with built-in hose and nozzle for carrying this out.

While this has achieved desirable cooling of both drill and tooth during the drilling operation, it has not been adopted generally, because of the excessive volume of liquid involved. Dentists have continued with old procedures in preference to the difficulties encountered in the use of such equipment.

Recently, there has come into use an attachment for the drill piece which directs an atomized spray of water against the tooth during the drilling procedure. This has eliminated the excessive volume of water involved in prior practices, but does not provide the same cooling advantages.

In accordance with the present invention, I have taken a different approach to the problem, even though utilizing the general concept of cooling by projecting a jet of water on the tooth being worked upon.

While the old concept mentioned above has been to limit the quantity of water employed, so far as possible while still obtaining the desired cooling effect, I purposely employ a relatively heavy and constant stream of water, and thereby achieve not only an optimum degree of cooling not possible heretofore, but also a highly advantageous washing action which effectively maintains the operative field clear of the debris constantly being produced by the drilling operation. Furthermore, in this way I am able to attain proper cooling by the use of warm water, which is much to be preferred from the standpoint of its effect on delicate tooth tissues.

The above is possible by reason of the application to the operative field, conjointly with such washing procedure, of a suction exhaust of suction cleaner character, the latter having considerably greater volumetric capacity per unit time than has heretofore been employed in the practice of dentistry, and being free of undesirable build up in exhaustive power when the intake orifice is closed.

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In this connection, I well realize that saliva ejectors have long been employed by dentists for relieving the patient of saliva which accumulates in the lower jaw portion of the oral cavity during dental work on the tooth. Such ejectors, however, are purposely designed to have low volumetric capacity and such low suction effect as to become operative only upon the accumulation of a sufficient body of the saliva to cover the entry of the ejector mouthpiece.

On the other hand, aspirating equipment commonly utilized in connection with oral surgery, for withdrawing from the mouth blood which tends to accumulate during the course of the surgery, invariably provides an evacuation nozzle or mouthpiece having a small intake orifice (approximately $\frac{1}{8}$ of an inch), and utilizes a positive displacement vacuum pump capable of building up a high vacuum (in the vicinity of twenty inches of mercury) when the orifice is closed. Thus, unless great care is exercised in the use of this equipment, considerable pain and damage may result through inadvertently closing the intake orifice with living tissues of the mouth. Equipment of this kind is incapable of establishing and maintaining a liquid and debris entraining stream of air, this being true both by reason of the small cross-sectional character of any air stream established and by reason of the nature of the vacuum pump employed.

I have found that my novel procedure of projecting a relatively heavy, wash stream of water on the field of operation during dental drilling and related work and of conjointly applying, to the air proximate the field of operation, evacuative suction of considerably greater volumetric capacity and considerably lower vacuum-producing capacity than is customary in the ordinary practice of dentistry, brings about surprising results from the standpoints of patient comfort, tooth tissue protection, operative time involved, and nicety of work possible. Not only is the heat of drilling almost instantaneously removed, but the field of operation is constantly kept visually and operatively open. Use of the conventional saliva ejector is completely eliminated (except in special circumstances, such as when a rubber dam is being used), as are the normally necessary, intermittent tooth rinsings by the dentist, and the accompanying spitting by the patient.

The apparatus which I have developed for the purpose of carrying out my operative method to best advantage embodies a suction cleaner unit, which, by its very nature, has considerably greater volumetric capacity per unit time than is utilized either for a saliva ejector or for the customary surgical aspirator, together with evacuative tube and nozzle having flow passage and intake orifice considerably greater in cross-section than could be effectively handled by such saliva ejector or surgical aspirator equipment.

A filter trap for the elimination of liquids and solids entrained in the stream of air withdrawn from the mouth of the patient is also advantageously combined with such suction cleaner unit and evacuative tube and nozzle or mouthpiece to produce uniquely effective dental apparatus. In this way, it is possible to not only effect the purposes of the method as described above, but to also salvage any gold or other values which may be withdrawn from the mouth during the operating procedure. This aspect of the invention is claimed in my copending divisional application Serial No. 127,628 filed July 28, 1961 and entitled "Dental and Surgical Evacuative Suction Apparatus."

From the above, it can be seen that my method involves the initiation within the mouth of a dental patient, and the conducting therefrom during dental work, of a continuously flowing stream of air, and the entraining of debris from the dental operation into such air stream,

by means of a stream of liquid projected into the operative field adjacent the point of origin of the stream of air.

In this connection, it should be realized that the stream of air must have sufficient body and velocity to immediately pick up and carry along with it the liquid and solid particles which it is desired to evacuate from the mouth of the patient during the progress of the dental work, and that the critical factor here is not the extent to which a vacuum can be created by the suction action which establishes the stream of air, as is the case with all known instances where evacuative procedures have been employed heretofore in the mouth of the patient during dental work, but, rather, the constant character of a flowing stream of air having adequate volumetric and velocity characteristics for the purpose.

A suction cleaner unit, or, as it may be more appropriately termed "motor-fan air evacuation unit," which I have found to be ideal for my purposes is that utilized for the currently popular filter-receptacle type of vacuum cleaner e.g. the "Filter Queen," manufactured by Health-Mor, Inc., Chicago, Illinois, the "Lewyt," and others employing an especially powerful, suction-producing, motor-fan unit for displacing air. This is in contradistinction to the vacuum pumps of comparatively positive displacement character embodied in standard surgical aspirating equipment presently in common use by both physicians and dentists.

The carrying out of my method necessarily involves evacuative apparatus of the general character here described, though particular features of the apparatus are subject to considerable variation. For example, the apparatus here shown is arranged as a fixed and permanent installation in a dental office. It can, however, and often will, be made portable in accordance with the teachings of my copending application for U.S. Patent Serial No. 471,734, filed November 29, 1954, entitled "Evacuative Suction Apparatus," now Patent No. 2,784,717, granted March 12, 1957, or it may be made in the form disclosed in my copending application for Patent Serial No. 736,654 filed April 30, 1958, entitled "Evacuative Suction Apparatus," which is a continuation of my earlier and now abandoned, similarly entitled application Serial No. 522,590 filed July 18, 1955.

Further objects and features of the invention will become apparent from the following detailed description of the application of the method and of a particular preferred form of apparatus illustrated in the accompanying drawings.

In the drawings:

FIG. 1 represents a perspective view of dental work in progress within the mouth of a patient, and application of the method of the invention to and during such dental work;

FIG. 2, a fragmentary elevational view, partly in longitudinal section, showing, in detail, a suction intake nozzle as attached to the evacuative hose of FIG. 1;

FIG. 3, a view in elevation showing a similar nozzle, per se, having a somewhat different form of intake opening;

FIG. 4, a fragmentary view in elevation showing an installation in a dental office of apparatus conforming to the invention, the view being in vertical section with respect to the floor of the office;

FIG. 5, a view similar to that of FIG. 4, but taken on the line 5—5 thereof, and illustrating components of the apparatus connected to the plumbing of the building;

FIG. 6, a horizontal section taken on the line 6—6 of FIG. 5, and drawn to a somewhat enlarged scale, this view showing the catch receptacle in detail;

FIG. 7, a vertical section taken on the line 7—7 of FIG. 6, and drawn to the same enlarged scale;

FIG. 8, a perspective view of a preferred form of suction cleaner unit component to the apparatus, as illustrated in FIG. 5, portions being broken away to reveal

internal parts in elevation and partially in vertical section; and

FIG. 9, a horizontal section taken on the line 9—9 of FIG. 8.

Referring now to the drawings:

The procedure depicted in FIG. 1 is typical of the manner in which my method is carried out in practice. There, the dental work in progress is the conventional drilling for the removal of decayed portions of a tooth in the preparation of a clean cavity for filling.

As illustrated, a jet of water 10 is projected against the tooth 11 being worked upon and against the usual drill 12 doing the work and held by the dentist 13. Such jet 10 may be provided from any suitable source, preferably a customary dental unit water syringe, indicated 14, and directed onto the work by an attendant 15. A suitable hose and nozzle arrangement may, however, be attached directly to the drill, for manipulation by the dentist coincidental with his manipulation of the drill, if desired in any instance.

In the procedure illustrated, the attendant also manipulates an intake nozzle or mouthpiece 16 connected to an evacuation hose 17 of the dental evacuation apparatus of this invention. The attendant places such intake nozzle relative to the work in progress such that the air stream passing therethrough entrains and carries with it the wash liquid, which, in turn, has entrained therein the debris resulting from the work in progress. It should be noted that the intake nozzle 16 is held somewhat away from the drill and the wash water, so as to suck in a stream of air, and that the air stream actually entrains the wash water and debris as it passes over the tooth being worked upon, thereby forcibly carrying such wash water and debris into the nozzle and through hose 17. It is not necessary nor desirable to submerge the intake orifice 16a of the nozzle in liquid to be evacuated, as is required by conventional saliva ejectors and surgical aspirators.

The stream of air utilized for entraining the wash water and debris is established and maintained by a motor-fan air evacuation unit, preferably of the filter-receptacle, vacuum cleaner type indicated 18 in FIG. 5, the internal arrangement of one advantageous forms of which is illustrated in FIGS. 8 and 9. Suitable vacuum cleaner units are available on the open market from a variety of manufacturers. For the purposes of this invention, they must embody an especially powerful motor-fan unit, as will appear more fully hereinafter.

Regardless of the particular type of motor-fan air evacuation unit utilized, it is necessary for the purposes of the invention that sufficient evacuative capacity, on both a volumetric and a velocity basis, be maintained with respect to the size of the nozzle intake orifice and evacuative passage to provide a continuously flowing stream of air within the mouth of the patient and across the area being worked upon to adequately entrain the washings and saliva incidental to the practice of the method. It is important that the volumetric flow of air be many times that of the wash liquid discharged from water syringe 14.

While the evacuative passage through the intake nozzle preferably is, or approximates, one-half inch in right cross-sectional diameter, with the passage through the evacuation hose and the size of the nozzle intake orifice being the same or somewhat larger, this is not a critical value in the sense that deviations cannot be made either way. Generally speaking, it is not desirable to appreciably reduce the size of this passage, since the carrying capacity of the stream depends largely upon the volume of air flow involved per unit time. It is normally unwise to utilize a diameter less than one-quarter of an inch. On the other hand, when the diameter of the intake nozzle passage is larger than five-eighths of an inch, manipulation of the nozzle within the mouth becomes something of a problem. The selection of an appropri-

ate size in any given instance will, thus, depend upon what is practical under the circumstances, given adequate carrying capacity of the air stream.

It should be noted that the size of the evacuative passage through the nozzle ordinarily determines the effective size of the nozzle inflow orifice. Nevertheless, it should be realized that this need not be, so long as the sizes are all selected in well known manner to insure a flow of air, from the mouth of the patient to the disposal unit, which has sufficient volume and velocity to effectively entrain and carry the washings and other matter desired to be removed from the mouth. These can be easily determined by calculation or by actual test for any special instance of use. The relative sizes indicated herein and by the accompanying drawings will give excellent results in most ordinary instances of use.

The evacuative capacity of the source of suction applied to the evacuative passage is, of course, very important from the standpoint of the functional characteristics desired, though, structurally, such source of suction may vary considerably from one useful embodiment of the apparatus of this invention to another. Thus, the source of suction must be capable of inducing and disposing of the flow of a considerable volume of air in a continuous fashion and at a velocity adequate to accomplish the liquids and solids entraining function required by the method of this invention. In this connection, it should be realized that a motor-fan air evacuation unit has, inherently, a low vacuum-producing capacity in comparison to a vacuum pump as used in conventional aspirating equipment. A static suction of more than five inches of mercury at the intake orifice of the nozzle employed with my apparatus is ordinarily wholly unnecessary and undesirable, the preferred figure being approximately two inches. Except insofar as the suction source has the above characteristics, together with the ability to handle air of very high humidity, the nature and structure of same forms no part of the present invention.

As aforesaid, there are commercially available suction cleaner units which satisfy all the requisites of this invention. The one illustrated, and indicated 18, has been found to be particularly advantageous in its handling of the very humid air which ultimately passes through it, following the elimination therefrom of most of the liquid and solid content. As illustrated in detail in FIGS. 8 and 9, such vacuum cleaner unit 18 comprises a receptacle 19, into which a hose or other suitable type of conduit 20, FIGS. 4 and 5, leading from a catch receptacle 21, discharges. The motor-fan unit 23 is a self-contained assembly, which fits into and clamps over the open top of receptacle 19, and which is provided with a foraminous cone intake 24 adapted to dip deeply into the receptacle and to receive, in snugly fitting relationship to and over its outer face, a removable filter cone 25, preferably of disposable paper, fabric, or the like.

Any moisture or fine solids which may escape elimination from the air stream as it passes through the intermediate catch receptacle 21 will be deposited in suction cleaner receptacle 19 or caught by filter cone 25. Further protection against injury to the motor as the air stream passes thereover by way of exit passages 26 is provided by a secondary filter 27, and a final filtering prior to release of the air through exit openings 28 is advantageously accomplished by an additional filter 29 at the top of the unit.

As mentioned hereinbefore, the detailed construction described above has been found to be very satisfactory for use as a component part of the apparatus of the invention, but represents a standard receptacle-filter type of modern suction or vacuum cleaner available on the market, and not, in its details, forming any part of the present invention.

The manufacturer's specifications for the above suction cleaner unit lists a static suction at the standard hose inlet (one and five-eighths inches in diameter) of from 52

inches to 58 inches of water at a motor speed of approximately 19,000 r.p.m., the input rating of the electric motor being three-quarters horsepower. The air movement so produced, according to the Bureau of Standards' method of testing, is 40 cubic feet per minute.

The two fans 30 utilized by this unit are mounted in tandem on the armature shaft (not shown) of the motor, and are of centrifugal impeller type, approximately 5 inches in diameter.

Employing this particular construction of suction cleaner unit with an evacuative hose one-half inch inside diameter and an intake nozzle also one-half inch inside diameter and having a slanted intake orifice as illustrated, I have found the intake volume to be approximately 8 cubic feet per minute, as measured by a Fisher & Porter flow meter tube No. B5-27-6, and the static suction to be approximately two inches of mercury. Flow of water through the standard water syringe 14, it should be noted, is normally not over 150 cc. (0.005 cu. feet) per minute.

It should be realized that these detailed figures are given merely for the purpose of clearly identifying what I have found to be completely satisfactory in my practice of the invention. The permitted approximation affords some leeway in both directions.

While the apparatus of the invention may, in its specific aspects, take a variety of forms involving different installation procedures, it comprises essentially an evacuative hose and nozzle connected to a catch receptacle, and a suction cleaner unit of the nature above set forth connected to the catch receptacle by means of an appropriate conduit.

In the illustrated instance, the catch receptacle 21 is connected with the drain plumbing of the building in which the dental office is located, thereby providing for continuous disposal of the liquid washings evacuated from the mouths of patients.

In many instances, it is desirable to construct the apparatus in portable form, which involves the use of a catch receptacle having sufficient capacity in and of itself to retain the evacuated liquid washings as they accumulate between periodic emptyings of the receptacle. Preferred apparatus of this type forms the subject matter of my aforementioned copending application for patent, Serial Number 471,734.

The apparatus may also be constructed and arranged with the catch receptacle supported by the regular dental unit, in position affording gravity drainage directly to the dental cuspidor. Such an arrangement forms the subject matter of my aforementioned copending application for Patent Serial No. 736,654.

It is preferably of plastic, having an inset cover 21a, through which extends a length of pipe 42, providing convenient connection for evacuation hose 17, externally of the receptacle, and an inflow port within the upper interior of the receptacle for the stream of evacuated air and entrained washings. As such, pipe 42 provides discharge means for the fluid-conducting tube or evacuation hose 17.

Through the closed bottom of the receptacle 21 extends a length of pipe 44, terminating adjacent the underside of the cover 21a and providing thereat an air exhaust port 45. Conduit 20 leading to suction cleaner unit 18 conveniently connects to the externally protruding lower end of pipe 44, thereby establishing a through flow evacuation system from nozzle orifice 16a to suction cleaner exhaust ports 28, catch receptacle 21 being interposed as a trap for liquids and solids entrained in the evacuated air stream.

In this fixed installation, the catch receptacle need not have storage capacity for accumulations of liquid, for it is provided with its own drain. Thus, as illustrated, a pipe 46 passes through the closed bottom of receptacle 21, terminating preferably flush with its inner surface, to provide a drainage port 47. Connected to such pipe 46 is drain piping 48, having interposed along its length a

check valve 49 and a trap 50, and ultimately connecting with the main waste piping of the building, leading to the sewer. In the particular installation illustrated, both the plumbing and the suction cleaner unit are positioned below the office floor 51.

A partition 52, depending deeply across the upper part of the catch receptacle 21, separates the inflow port 43 from the exhaust port 45 and functions as a baffle to enforce dropping of the entrained liquids and solids by the air stream prior to its flow into the conduit 20.

For the purpose of salvaging gold and other values from the solid matter entrained in the evacuated washings, I prefer to direct the stream of air entering catch receptacle 21 into a filter arrangement which is removable and replaceable. In the embodiment illustrated, such filter arrangement is provided by a foraminous, funnel-like receptacle 53, removable and replaceable with respect to a receiving and holding formation 54 rising from the bottom of the catch receptacle 21. A conical filter paper 55, or other filter medium, is inserted within the filter receptacle 53 to directly catch and retain solid matter entering the catch receptacle with the inflowing air. The liquid constituents pass through the filter and discharge through waste piping 48, while the thus cleansed air finds its way to exhaust port 45.

It will thus be seen that, in the practice of my method using the apparatus illustrated, a stream of air and entrained washings will be continuously evacuated from the mouth of the patient undergoing dental work, and will flow along the evacuation hose 17, through the liquids and solids entrapment device represented by catch receptacle 21 and its internal filter arrangement, and into and through suction cleaner unit 18, from which the completely cleansed air will return to the atmosphere by way of exhaust ports 28.

In the application of my method to the routine dental work for which it is particularly adapted, I have found that there is a saving of approximately one-third of the time normally taken for such work as carried out in conventional manner. This saving in time for both the dentist and the patient is accomplished coincidentally with considerably less pain for the patient and better working conditions for the dentist. Because the field of operation is continuously washed free of debris, more precise work is possible than heretofore, with less danger of damaging sensitive portions of any tooth being worked upon. Furthermore, rapid and effective evacuation of all foreign matter from the mouth is obtained in all types of dental work, without likelihood of injuring mouth tissues.

While I have developed my method and apparatus primarily from the standpoint of their application to dentistry, I have found that they may be also advantageously applied in general surgery. Thus, from the foregoing, it can be seen that my method is concerned essentially with what might be appropriately termed a "washed field" procedure, and the apparatus with means for accomplishing this procedure.

Heretofore, surgical aspirators have been used for removing accumulating blood and body fluids in various kinds of surgical operations, oral and otherwise, such aspirators being capable, however, only of removing pools of accumulated liquid, and having the functional disadvantages heretofore discussed.

In the application of my method and apparatus to general surgery, a wash stream of sterile water or other wash solution is directed onto the operative field in much the same manner as described above with respect to dental work on the teeth, thereby washing the operative field free of debris. The washings and accumulating blood and other body fluids are continuously withdrawn by entrainment in a stream of air in the manner heretofore described, it being noted that this procedure has been proven safe and highly effective in connection with major surgery internally of the human body. I have found that the suc-

tion employed in my method is gentle and non-traumatizing when applied to or near the most delicate tissues.

Whereas this invention is here illustrated and described with respect to preferred specific forms thereof, it should be understood that considerable variation is possible within the generic teachings hereof and the scope of the claims which here follow.

I claim:

1. In evacuation apparatus for dental and surgical work utilizing a stream of fluid projected on an area being worked upon, said apparatus including a fluid-conducting tube, at least the outer reach of which is flexible and of length adapted for manipulation relative to a patient and is provided at the outer, intake end thereof with inflow orifice means, air-suction means operatively connected with said tube, and a liquids and solids entrapment device interposed between said tube and said air-suction means, in fluid-flow communication therewith, the improvement, comprising a drain leading from the entrapment device; and check valve means normally closing said drain against backflow when the air-suction means is operating and normally opening said drain when the air-suction means is not operating.

2. Operative field cleansing apparatus for dental and surgical work, comprising means for projecting a stream of cleansing fluid upon an operative field in a patient undergoing treatment; air-suction means having an inflow port and an exhaust to atmosphere and capable in normal operation of evacuating from said operative field at least approximately eight cubic feet of air and entrained matter per minute without developing an inflow static suction of more than approximately five inches of mercury; a flexible fluid-conducting tube of length adapted for manipulation relative to said operative field; inflow orifice means at one end of said tube; means connecting the other end of said tube in fluid-flow communication with said inflow port of the air-suction means; and a liquids and solids entrapment device interposed in the tube and inflow port connecting means, said tube, said inflow orifice means, said tube and inflow port connecting means, and said entrapment device having inflow and conducting capacities, respectively, of at least approximately eight cubic feet of air and entrained matter per minute.

3. A method of cleansing a dental or surgical operative field in a patient undergoing treatment, comprising substantially continually projecting a stream of cleansing liquid upon the operative field during the course of the treatment; and simultaneously entraining the applied cleansing liquid and accompanying waste material in a stream of air flowing at a rate of at least approximately eight cubic feet per minute but developing a static suction of no more than approximately five inches of mercury; and flowing said stream of air, with its entrained material, to waste.

4. In evacuation apparatus for dental and surgical work utilizing a stream of fluid projected on an area being worked upon, said apparatus including a fluid-conducting tube, at least the outer reach of which is flexible and of length adapted for manipulation relative to a patient and is provided at the outer, intake end thereof with inflow orifice means, air suction means operatively connected with said tube, and a liquids and solids entrapment device interposed between said tube and said air-suction means, in fluid-flow communication therewith, the improvement, comprising a fluid-conducting tube and inflow orifice means as specified which have inflow and conducting capacities, respectively, of at least approximately eight cubic feet of air and entrained matter per minute; and a motor-fan evacuation unit as the specified air-suction means, said unit having an exhaust to atmosphere and being capable in normal operation of evacuating from the patient said approximately eight cubic feet of air and entrained matter per minute through said tube and orifice means and developing a static suction of not more than approximately five inches of mercury at the said

inflow orifice means, said motor-fan evacuation unit embodying a receptacle, a motor-fan unit closing said receptacle, means defining air exhaust passages extending through said motor-fan unit from the interior of the receptacle to atmosphere, and air filter means disposed across said air exhaust passages, between the interior of the receptacle and the motor-fan unit, said fluid-conducting tube communicating with the interior of said receptacle.

5. In evacuation apparatus for dental and surgical work utilizing a stream of fluid projected on an area being worked upon, said apparatus including a fluid-conducting tube, at least the outer reach of which is flexible and of length adapted for manipulation relative to a patient and is provided at the outer, intake end thereof with inflow orifice means, air suction means operatively connected with said tube, and a liquids and solids entrapment device interposed between said tube and said air-suction means, in fluid-flow communication therewith, the improvement, comprising a fluid-conducting tube and inflow orifice means as specified which have inflow and conducting capacities, respectively, of at least approximately eight cubic feet of air and entrained matter per minute; and air suction means as specified which has an exhaust to atmosphere and is capable in normal operation of evacuating from the patient said approximately eight cubic feet of air and entrained matter per minute through said tube and orifice means and which does not develop a static suction of more than approximately five inches of mercury at the said inflow orifice means, said entrapment device being a catch receptacle having means defining an inflow port and means defining an outflow port adjacent the top thereof, the fluid-conducting tube communicating with said means defining an inflow port and the suction means communicating with said means defining an exhaust port; and a partition extending across the

upper part of the interior of said catch receptacle, between said inflow port and said exhaust port, providing a baffle relative to the air stream.

6. In evacuation apparatus for dental and surgical work utilizing a stream of fluid projected on an area being worked upon, said apparatus including a fluid-conducting tube, at least the outer reach of which is flexible and of length adapted for manipulation relative to a patient and is provided at the outer, intake end thereof with inflow orifice means, air suction means operatively connected with said tube, and a liquids and solids entrapment device interposed between said tube and said air-suction means, in fluid-flow communication therewith, the improvement, comprising a fluid-conducting tube and inflow orifice means as specified which have inflow and conducting capacities, respectively, of at least approximately eight cubic feet of air and entrained matter per minute; and air suction means as specified which has an exhaust to atmosphere and is capable in normal operation of evacuating from the patient said approximately eight cubic feet of air and entrained matter per minute through said tube and orifice means and which does not develop a static suction of more than approximately five inches of mercury at the said inflow orifice means, said entrapment device being a catch receptacle; drain piping connecting with said catch receptacle adjacent the bottom thereof; and a check valve interposed in said drain piping, permitting flow of liquid toward and into said drain piping when the suction means is not operating, but preventing backflow therefrom when the suction means is operating.

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