This invention relates to apparatus and instruments for the extraction of teeth and more particularly to an hydraulic powered tooth extracting device. A primary object of the invention is to provide a novel and improved tooth extractor using hydraulic means for applying force and as such the invention will be hereinafter referred to as an hydraulic tooth extractor.

Another object of the invention is to provide a novel and improved hydraulic tooth extractor which may be mounted upon and against a patient's jaw at each side of a diseased tooth, grip the diseased tooth and by using a patient's jaw as a fulcrum, pull the tooth with a minimum of strain and discomfort to the patient.

Another object of the invention is to provide, in such improved tooth extractor, an arrangement which is especially adapted to grasp, lift and extract a diseased tooth and also to rock and tilt the tooth preliminary to and during the extraction movements thereof.

Yet another object of the invention is to provide a novel and improved hydraulic tooth extractor which is adapted to grip, rock and tilt a tooth preliminary to and during the extraction thereof according to a controlled sequence of movements which in the judgment of the dentist will most effectively bring the tooth out of its socket with a minimum of discomfort and injury to the patient.

Yet another object of the invention is to provide in a novel and improved hydraulic tooth extracting device, a construction which is simple in design, neat appearing, easy to install and use, versatile in its application, reliable, rugged and durable for the purpose at hand.

With the foregoing and other objects in view, all of which more fully hereinafter appear, my invention comprises certain novel and improved constructions, combinations and arrangements of parts and elements as hereinafter described, defined in the appended claims and illustrated in preferred embodiment in the accompanying drawing in which:

Figure 1 is a perspective view of a jaw section of a patient showing my improved hydraulic tooth extractor as being mounted over a tooth selected for extraction and showing further, in a somewhat diagrammatic manner, an operative control box for hydraulic valve controls adapted to regulate the movements of the extractor, and with broken lines indicating the connections of hydraulic control lines.

Figure 2 is a plan view of the extractor with dotted lines indicating the location of teeth thereunder, somewhat as in the arrangement illustrated at Fig. 1.

Figure 3 is a side-elevation, sectional view of the extractor as taken substantially from the indicated line 3—3 at Fig. 2, and with dotted lines indicating a portion of a patient's jaw and a tooth being gripped by the extractor.

Figure 4 is a fragmentary sectional detail of another portion of the extractor as taken from the indicated line 4—4 at Fig. 2, and with dotted lines indicating a portion of the patient's jaw and another tooth upon which the unit is anchored.

Figure 5 is a fragmentary sectional detail similar to Fig. 4, but illustrating a modified arrangement which is necessary to use when the unit must be set and anchored directly on the patient's jaw as where a tooth is missing.

Figure 6 is a fragmentary sectional detail of another portion of the extractor as taken from the indicated line 6—6 at Fig. 2, but on an enlarged scale.

Figure 7 is a side elevation view of a modified tooth gripping element which may be used in conjunction with my invention in lieu of the gripping elements shown at Fig. 3.

The art of tooth extraction involves several considerations related to the need and desire for minimizing the amount of pain a patient must suffer, avoiding permanent injury to the jawbone structure of the patient and minimizing the actual effort, time and strain incurred in extracting a tooth. The latter consideration is important, for while the front teeth, the incisors and cuspsids, are easy to remove with simple forceps, the removal of the bicuspids and molars is often another matter. These teeth may have long twisted roots embedded and interlocked in the patient's jawbone and the removal can be a difficult operation requiring several hours of painful effort.

Often the molar teeth will be embedded so tightly that the strength of the dentist is insufficient to loosen them and the jerking, twisting and hammering required causes considerable pain and even injury to the patient.

Mechanical tooth extractors have been proposed to meet this obvious need for a means for extracting a tightly embedded molar tooth. However, such devices are not satisfactory for they either pull a tooth in a given direction by pure force or attempt to shake the tooth loose by excessive vibration which is an exceedingly painful experience, even with nerve blocks. It is recognized that the ideal manner for extracting a tooth is by movements which involve a simple gripping, tilting and rocking of the tooth and then a pulling action simultaneously with the tilting and rocking movement. Such movements should be kept to a minimum and in all, there should be only a few powerful, but carefully controlled, movements to complete the extraction.

With such in view, the present invention was conceived and developed and comprises, in essence, an hydraulic operated extractor having a base member adapted to pivot on the patient's jaw and rest against the patient's mouth to stabilize the base member, a compact arrangement of hydraulic pistons mounted in the base member at each side of the tooth to be extracted and a gripper tongs carried upon the pistons over the tooth. Remote hydraulic control means, outside the patient's mouth, operate the pistons to shift and rock the tongs, all as further described in detail.

Referring more particularly to the drawing, the base member of the extractor is formed generally as a curved channel section 10 with a side wall 11 and a lid 12. This channel 10 is adapted to be seated upon and over several teeth of a patient's mouth as upon the lower jaw teeth, as illustrated at Fig. 1, or upon the upper teeth in the same manner illustrated by simply reversing the apparatus. The base channel 10 is formed with a central open portion 13 where a section of the lid is removed.
and when placed in the patient's mouth the unit is located so that the tooth to be extracted is at this open portion 13. Each side of the channel 10 is thus seated upon and anchored against the teeth or jaw portions adjacent to the to-be-extracted tooth. This anchoring provides an effective fulcrum to resist the forces imposed against the instrument during the extraction as hereinafter described. The teeth are seated upon the adjacent teeth and permit these teeth to serve as fulcrum abutments with a minimum of discomfort, the closed end portions of the channel 10 are preferably lined with a rubber-like plastic pad 14 of a material which will yield sufficiently to conform to the shape of each tooth, as to prevent and still be of sufficient hardness and resiliency as to resist a substantial pressure force. A number of pliable rubber and plastic rubber-like materials are suitable for this purpose and are easily available to the technician and dentist. Also, materials which will set up or harden after they are placed and shaped about a tooth are available to hold the tooth in place. Where there is no tooth adjacent to the to-be-extracted tooth the channel must seat against the gums and a filler pad 14 will be required to substantially fill the channel portion 10 and even extend therefrom where it is necessary to reach a receded gum, as in the manner illustrated at Fig. 5.

It is essential that the base channel 10 remain solidly upon the abutting teeth and resist rocking action of the gripper tongs, as hereinafter described. To obtain this stability, a flat arm 15 extends from the inner side-wall 11 of the channel to extend across the patient's mouth with the end of the arm being adapted to rest upon the teeth at the opposite side of his mouth. This arm includes a suitable offset 16 to align the end with the top of the teeth and a protective pad 17 is placed at the underside of the end portion which sets against the teeth. A comparatively thick biting pad 18 upstands from the topside of the end of this arm and the thickness of this pad is such as to force the patient to keep his mouth open sufficiently to provide clearance for the tooth-pulling elements at the other side of his mouth. At the same time the patient will bite against this pad 18 during the extraction operation to release other tensions and also to bear the arm 15 and base channel 10 securely in position especially against undesirable rocking actions.

The gripping tongs 19 may be a self-locking type as illustrated at Figs. 1, 2 and 3 or may be a manually lockable type 19', as illustrated at Fig. 7. Referring to the self-locking type 19, these tongs adapted at Fig. 4 and 5 for gripping the teeth 25, which are suitably curved and shaped to fit the sides of a tooth. These ends extend upwardly and over the tooth to cross each other and form a hinged pivotal connection 21. Thence each portion extends generally outwardly as an arm 22 in opposition with the other arm 22. Upward pressure against these arms as in the pulling of a tooth will bring the gripping heads together against the tooth, with the harder the pull, the tighter the grip.

Where a self-locking type of tongs is not desirable, a form similar to the manually-lockable tongs 19' may be used. In this arrangement one gripping head 20a is affixed to an extended arm 22', which extends completely across the tong portion from both sides of the head 20a. A threaded slide section 23 is formed on this arm and a shiftable gripping head 20c is slidably mounted upon this portion. A locking arm 24 is turned upon the threaded portion of the slide section to shift the gripping head 20b as against the side of a tooth for gripping it tightly.

The gripping tongs 19, or 19', are mounted upon the extractor over the open portion 13 with the heads extending into this open portion to grasp the tooth to be extracted. The arms 22 extend from each side of this portion with one tong arm being over the stabilizer arm 15 and the other arm being over a ledge 25 outstanding from the outer sidewall 11 in spaced opposition to the stabilizer arm 15. Hydraulic cylinders 26 are mounted upon the support arm 15 and the ledge 25 adjacent to each sidewall 11 and in line with the position of the arms 22. An actuating piston 27 extends upwardly from each cylinder 26 to contact the underside of each arm 22. The head of each piston is hemispherical and the head contacts a longitudinally grooved portion 28 of the arm 22 to allow for play and shifting as during tilting of the tongs. To further secure the arms 22 onto the piston head, a slot 29 may be formed in each arm, and a loosely fitting pin 30 may upstand from the head to extend therethrough, as in the manner clearly illustrated at Fig. 6.

To provide that the arms of the pistons in the limited space available and for a compact arrangement when the pistons are retracted, it is contemplated that each piston may be a telescoping type with one or more intermediate sleeves 31 between the piston and cylinder, as in the manner illustrated at Fig. 6. Such a piston will require interlocking flanges 32 at each end of the sleeve and at the ends of the cylinder and piston to prevent disconnection of the apparatus while in operation. However, these flanges need not be described in detail for several types are well known.

Each piston is actuated through a pressure line 33 connected to the base of the cylinder, each line is sufficiently long to extend from a patient's mouth and to a control box 34, as illustrated at Fig. 1. A pressurized supply line 35 and a drain line 36 are also connected with this control box to provide an hydraulic pressure source and release. The valve elements within the control box to regulate pressure to the line 33 are not shown because they are a common conventional construction and may be arranged in any well known manner. For example, a pressure control valve is connected with the pressure line and pressure intensity may be regulated by depressing the lever 37 of that valve. A three-way valve is connected with each line 33 and with the pressure supply line 35 and drain line 36. Operation of the lever 38 of one three-way valve extends or retracts one piston 27 and operation of the lever 39 of the other three-way valve extends or retracts the other piston 27.

With this arrangement, the extraction of a tooth is a simple operation. The dentist secures the channel base member 10 upon the teeth of the patient's jaw at each side of the portion of the tooth to be extracted and has the patient bite against the pads 17 and 18 on the arm 15 to hold the apparatus in place. The next step is to set the gripping tongs 19 with the handles opposed and the tooth within the arms 22 upon the pistons. The operation begins by applying some pressure to each piston by manipulation of the levers 38 and 39, and by applying such pressure on each side consecutively and alternatively in a manner designed to rock the tooth and loosen its roots from the tooth socket. As this phase of the operation continues, the pressure is increased as by depressing lever 37 to the point where the loosening actions are completed and the tooth may be withdrawn. Where crooked root formations are encountered, the tooth may be tilted considerably to turn it to a position for effective extraction.

While I have now described my invention in considerable detail, it is obvious that others skilled in the art can devise and build alternate and equivalent constructions which are within the spirit and scope of my invention; hence I desire that my protection be limited, not by the constructions hereinafter illustrated and described, but only by the proper scope of the appended claims.

I claim:

1. A mechanical tooth extractor comprising, a base having side wall portions adapted to be set at each side of a to-be-extracted tooth of a patient and adapted to be anchored against tooth and jaw portions of the patient in front of and behind the to-be-extracted tooth, a tooth-gripping tongs having an arm extending over each side wall portion of the base, an arm lifting means affixed to each side wall portion of the base with each means having
5. In the extractor defined in claim 1, a stabilizer arm affixed to the base to outstand therefrom and to extend across a patient's mouth, thickened biting pads at the extended end thereof adapted to permit the patient to bite against the extended end during a tooth extraction operation whereby to stabilize the base against rocking movements of the tongs.

4. In the extractor defined in claim 1, said tongs having opposing tooth-gripping heads, a pivot interconnecting the heads with each head portion crossing the other at the pivot and extending outwardly to form one of said arms.

5. In the extractor defined in claim 1, said tongs having opposing tooth-gripping heads, said arms being formed as a single member with one tooth-gripping head being affixed to the arm member, the other tooth-gripping head being slidably mounted thereon and locking means on the arm member adapted to urge the sliding head toward the affixed head as to grip a tooth between the heads and to hold the slidable head in position as against a tooth.

6. In the extractor defined in claim 1, said lifting means including an hydraulic cylinder affixed to the side wall of the base and an extendible piston in the cylinder contacting with an arm.

7. In the extractor defined in claim 1, a ledge at the side wall of the base, an hydraulic cylinder mounted in the ledge with the extendible piston thereof being connected with a tong-arm.

8. In the extractor defined in claim 1, an hydraulic cylinder affixed to each side wall of the base with the extendible piston thereof being connected with a tong arm, a pressure line extending from each cylinder to said remote powering means and said powering means including an hydraulic pressure supply and drain line and valving means adapted to regulate the pressure intensity and the pressure and fluid flow to each of said cylinders.

9. A mechanical tooth extractor, comprising, a channel-like base having side wall portions adapted to be set at each side of a to-be-extracted tooth of a patient and adapted to be anchored against tooth and jaw portions of the patient in front of and behind the to-be-extracted tooth, a stabilizer arm affixed to a side wall of the base to outstand therefrom and extend across the patient's mouth and having thickened biting pads at the extended end thereof adapted to permit the patient to bite against this extended end to stabilize the base against rocking, a tooth-gripping tongs adapted to grip the to-be-extracted tooth and having an arm extending over each side wall of the base, an hydraulic cylinder affixed to each side wall of the base having its piston contacting the adjacent tong arm, a pressure line extending from each cylinder and a remote control means connecting with the pressure lines, said remote control means including pressure supply and drain lines, and valving means adapted to supply fluid to each line at selected pressure to extend and retract each piston individually and in unison with the other whereby to provide selective rocking and lifting movements of the tongs during a tooth pulling operation.

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