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2,371,197

EXTRA-ORAL FRACTURE APPLIANCE

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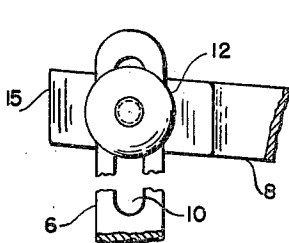


Fig 4

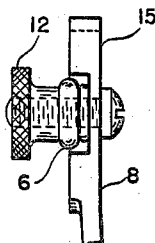


Fig 5

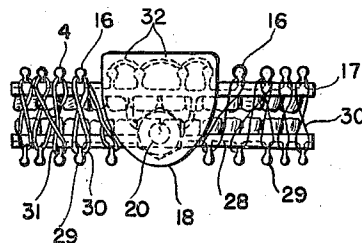


Fig 6

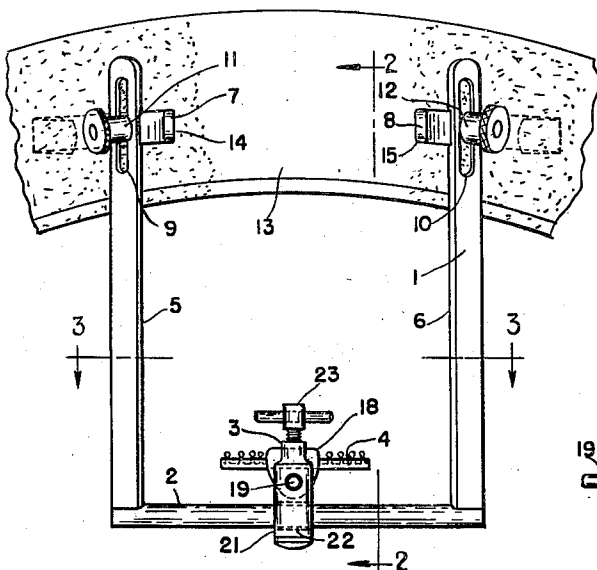


Fig 1

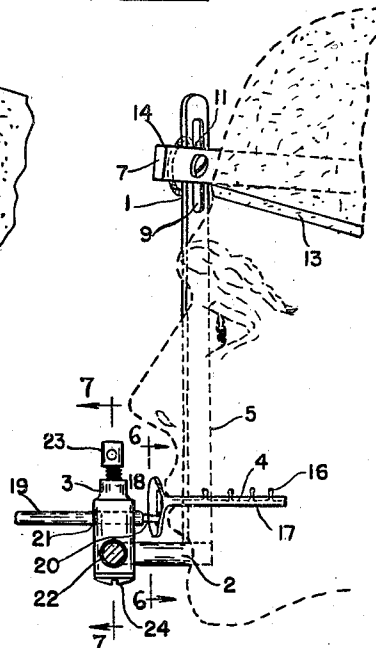


Fig 2

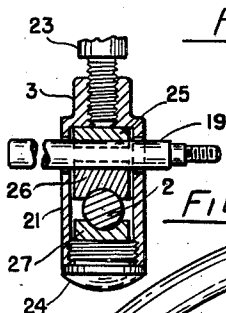


Fig 8

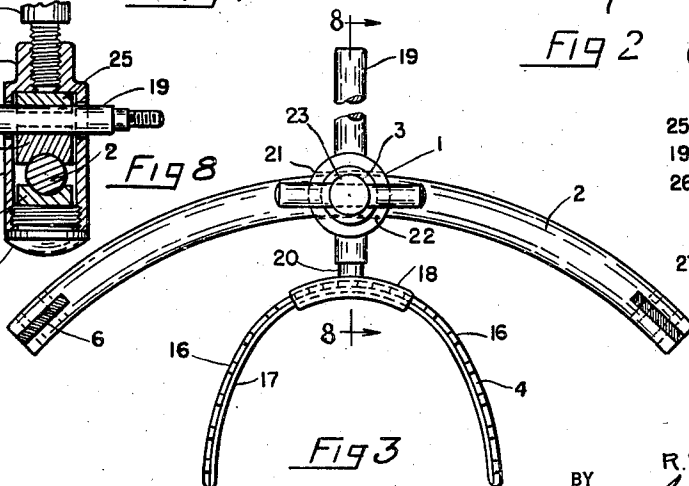


Fig 3

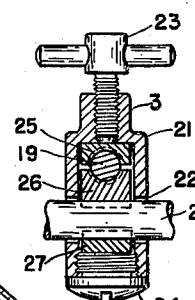


Fig 7

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EXTRAORAL FRACTURE APPLIANCE

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7 Claims. (Cl. 128—87)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

The present invention relates to extra-oral fracture appliance which is used when the superior maxillae or the mandible bones of the skull are fractured, and said appliance assures a complete fixation of the injured fragments with relation to the other parts of the skull.

The device comprises a kind of framework structure which may be partially mounted in a plaster head-cap which is worn by the patient and is provided with one or more intra-oral fracture splints which are mounted on the framework of the appliance, said splints insuring a complete fixation of the injured skull bones with reference to the skull itself.

Various parts of the fracture appliance are adjustable for purposes which will be described hereinafter as the specification proceeds, which enables the device to be applied to various sizes of individuals who require the use of such an invention.

In the accompanying drawing forming a part of the specification:

Fig. 1 is a front view of the extra-oral fracture appliance comprising the subject matter of the present invention.

Fig. 2 is a vertical section taken on line 2—2 of Fig. 1.

Fig. 3 is a horizontal sectional view of the appliance taken on line 3—3 of Fig. 1.

Fig. 4 is an enlarged partial elevational view showing the juncture of one of the horizontal bars and one of the vertical bars forming part of the present invention.

Fig. 5 is a top plan view of Fig. 4.

Fig. 6 is a frontal view of a pair of opposed intra-oral fracture splints taken on line 6—6 of Fig. 2.

Fig. 7 is a central vertical section of a "movable attachment" forming part of the present fracture appliance taken on line 7—7 of Fig. 2.

Fig. 8 is a similar vertical section of the "movable attachment" taken on line 8—8 of Fig. 3.

The present invention 1 comprises a substantially horizontal bar 2 which is curved as shown in Fig. 3, which bar carries adjustably mounted thereon a "movable attachment" 3. The movable attachment 3 carries an adjustable intra-oral splint 4 which is normally inserted in the mouth of the patient and placed in engagement with the upper teeth as illustrated in Figs. 2 and 6 of the drawing.

Two vertical bars 5 and 6 are mounted in the ends of the horizontal bar 2 as seen in Figs. 1, 2 and 3 of the drawing clearly. At the top of these vertical bars 5 and 6 are a pair of opposed hori-

zontal curved bars 7 and 8 which are adjustably mounted in the respective vertical bars 5 and 6 by means of the slots 9 and 10 and the lock nuts 11 and 12. These horizontal bars 7 and 8 are in turn mounted in a plaster head-cap 13 shown in Figs. 1 and 2 of the drawing, and the head-cap is of course placed on the head of the patient being treated as shown in Fig. 2.

The ends 14 and 15 of the horizontal bars 7 and 8 respectively are left protruding outside the head-cap 13, as shown, so that the said bars may be adjusted with respect to the opposed vertical bars 5 and 6 locked in a suitable position by means of the nuts 11 and 12, as is at once understood.

It is seen from the drawing that when the superior maxillae of the patient are injured that the intra-oral splint 4 is inserted in the mouth of the patient just outside and in contact with the teeth and secured by wire to said teeth, using the vertically positioned metal prongs or loops 16 which are mounted on the splint 4. The splint 4 comprises the horizontal bar portion 17 which is rigidly mounted in a composition plate 18 and the latter in turn is mounted on the centric pin 19. The end of the centric pin 19 is screw threaded at 20 into the plate 18.

The centric pin 19 is slidably carried in the "movable attachment" casing 21 as clearly shown in Figs. 1, 2, 7 and 8 of the drawing. The casing 21 is also slidably mounted at 22 on the horizontal bar 2 so that the same may be adjusted along said bar 2 as shown in Fig. 1 of the drawing, and the "movable attachment" 3 and the intra-oral splint 4 are of course adjusted to suit the requirements of the particular individual patient using the device.

It is evident from what has been said that the composition plate 18 is adjustable by means of the centric pin 19 toward and away from the head of the patient and with respect to the casing 21. The splint 4 and the plate 18 are also adjustable in a rotary direction as seen in Fig. 1, by means of the centric pin 19 and the splint locking screw 23, that is to say, when the centric pin is operated in a longitudinal direction as seen in Fig. 2 and in a rotary direction as seen in Fig. 1 that the needed adjustments of the splint 4 may be made with relation to the individual patient being treated.

Moreover, the placement of the splint 4 with reference to the mouth of the patient and in respect of the two vertical bars 5 and 6 is also accomplished by means of the movable attachment casing 21 along the horizontal curved bar

2, and the locking screw 23 locks these two last-named adjustments by a single operation of said screw.

The nature of the casing 21 and its appurtenant parts is clearly shown in detail in Figs. 7 and 8 of the drawing, in which appears the centric pin 19 which passes slidably and rotatably through the casing 21. The curved horizontal bar 2 also passes revolvably through the casing 21. On the bottom of the casing 21 appears a threaded screw 24. Above centric pin 19 is an upper gripping piece 25, the nature of which is clearly shown in the Figs. 7 and 8 of the drawing, and beneath the centric pin 19 is an intermediate "shaped" gripping part 26 which rides on the horizontal curved bar 2 as shown and also bears against the centric pin 19.

Beneath the curved bar 2 is a third or bottom gripping member 27 which engages on its upper face against the under surface of the said bar 2, and on its bottom bears against nut 24. It will be seen that the tightening action of the locking screw 23 in the casing 21 insures the locking of the casing 21 on the bar 2 by means of the parts 26 and 27, while at the same time the same action insures the locking of the centric pin 19 within the casing 21, so that when the intra-oral splint 4 is properly adjusted, the centric pin 19 is also adjusted, and the casing 21 adjusted along the horizontal bar 2 that by a single action of the locking screw 23, the oral splint 4 is fixed with relation to the horizontal bar 2 and the up-rights 5 and 6. Also by means of the slots 9 and 10, and lock nuts 11 and 12, the oral splint 4 is adjusted and locked in desired position with reference to the head-cap 13.

In the Figure 6 is shown a double pair of intra-oral splints 4 and 28 which are intended for use when the upper maxillary bones and the mandible bones are both broken, or the mandible bones alone are injured. The upper splint 4 as before stated is carried at 20 on the centric pin 19, and the splint 4 is "wired" to the upper row of teeth of the patient and all adjustments made by means of the movable attachment 3, and the vertical bars 5 and 6 and the horizontal bars 7 and 8 and lock nuts 11 and 12.

Thereafter the lower metal splint 28 which is similar to splint 4 except that it is placed in an inverted position with the wire loops 29, 29 pointing downward as in Fig. 6, is "wired" to the lower set of teeth of the patient. The lower splint 28, it is also noted, is not attached to the composition plaque 18, since the splint 28 is attached to the upper splint 4 by means preferably of gutta percha bands 30, 31 or other fastening means. Also some of these bands such as 30 are placed vertically on the loops 16 and 29, while others may be placed diagonally as 31, one set of the bands being mounted upon the other if necessary.

In this way when the mandible or lower jaw bones of the patient are injured they can be fixedly held with relation to the upper portion of the skull, and the teeth of both jaws can be placed in proper occlusion with respect to each other. Attention is called to the fact that the plaque 18 is often made of transparent material, and that the U-shaped bar 17 is not only formed preferably integral with the plaque, but metal reinforcement such as shown at 32 may be added to the bar 17 to insure a good strong and stiff mounting of the splint 4 on the centric pin 19 and arcuate bar 2. It is evident that this construction is important since the splint 4 not only

carries the superior maxillae if fractured, but may be called upon to also carry the weight of the lower jaw, and lower splint 28 as well.

From which it is seen that I have devised a very useful and novel extra-oral fracture appliance, for the purpose intended.

The invention described herein may be manufactured and used by and for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

I claim:

1. In an extra-oral fracture appliance for facial bones, a pair of opposed curved bars adapted to be fixedly mounted on the forehead of a patient, a pair of opposed vertical bars each adjustably mounted on one of the said curved bars, a curved horizontal bar fixedly mounted on the lower ends of the opposed vertical bars, a movable attachment slidably and revolvably mounted on the horizontal curved bar, an intra-oral splint adapted to be mounted around a set of teeth of a patient, a composition carrying plate mounted on the said splint, a centric pin slidably and revolvably mounted in the movable attachment for the purpose of adjusting the intra-oral splint to the teeth of the patient, and means for adjustably locking the centric pin in the movable attachment, and for adjustably locking said attachment on the horizontally curved bar.

2. In an extra-oral fracture appliance for facial bones, a pair of upper opposed curved bars adapted to be fixedly mounted on the forehead of a patient, an intra-oral splint adapted to be mounted around a set of teeth of a patient, means for adjusting said splint inwardly and outwardly with reference to said teeth, means for adjusting said splint vertically in relation to said pair of upper opposed curved bars, means for rotatably adjusting said splint on said teeth, and means comprising a substantially rigid member having a pair of vertical bars slidably secured adjacent their upper ends to said pair of upper opposed curved bars and a single curved bar, firmly secured to the lower ends of said pair of vertical bars, upon which is slidably supported said splint for adjustment thereof in a lateral direction with reference to the vertical centerline of the patient's set of teeth.

3. In an extra-oral fracture appliance for facial bones, a pair of upper curved bars adapted to be fixedly mounted on the forehead of the patient, by means of a plaster head-piece, an intra-oral splint adapted to be mounted around a set of teeth of a patient, a lower horizontal arcuate bar shaped to conform with the general shape of the face of a patient, a movable attachment rotatably and slidably mounted on said arcuate bar, rotatably mounted adjustable means carried in the movable attachment, and attached to the intra-oral splint for adjusting the splint inwardly and outwardly with reference to the patient's teeth, and adjustable locking means for raising and lowering the horizontal arcuate bar with reference to the upper pair of curved bars in order to adjust the oral splint vertically in relation to the plaster head-piece used on the head of the patient.

4. A movable attachment for an extra-oral fracture appliance, comprising a hollow cylindrical casing, having a pair of opposed apertures in the walls of said casing adapted to slidably and rotatably receive a curved arcuate bar, and a second pair of opposed apertures in said casing formed in a direction of ninety degrees with

reference to the first-named pair, and adapted to slidably and rotatably receive a centric pin therein, an upper gripping member within the casing adapted to bear upon the centric pin, an intermediate gripping member within the casing adapted to bear against both the centric pin and the arcuate bar, a lower gripping member bearing against the latter, a closure nut mounted in the lower end of the casing, a locking screw threaded into the upper end of the casing, for the purpose in conjunction with the gripping members, of locking the centric pin and the arcuate bar in adjusted relations in the casing.

5. In an extra-oral fracture appliance for facial bones, a pair of upper curved bars fixedly mounted on the forehead of a patient, an intra-oral splint mounted around a set of teeth of the patient, a centric pin connected with the said splint, a horizontal arcuate bar, a movable attachment mounted on the arcuate bar, comprising a hollow cylindrical casing having a pair of opposed apertures therethrough adapted to slidably and rotatably receive the arcuate bar, a second pair of opposed apertures in the walls of the casing formed in a direction of ninety degrees with reference to the first mentioned pair, and adapted to slidably and rotatably receive the centric pin therein, an upper gripping mem-

ber within the casing adapted to bear upon the centric pin, an intermediate gripping member within the casing adapted to bear against both the centric pin and the arcuate bar, a lower gripping member bearing against the latter, a closure nut mounted in the lower end of the casing, a locking screw threaded into the upper end of the casing, for the purpose in conjunction with the gripping members of locking the centric pin and the arcuate bar in adjusted relations in the casing, and adjustable locking means for raising and lowering the arcuate bar with reference to the upper curved bars, and adjusting the oral splint vertically in relation to the said upper bars.

6. An extra-oral fracture appliance as in claim 3 in combination with a lower intra-oral splint adapted to be mounted around the lower set of teeth of a patient, and means for securing both intra-oral splints to the patient's teeth, and to each other.

7. An extra-oral fracture appliance as in claim 5 in combination with a lower intra-oral splint adapted to be mounted around the lower set of teeth of a patient, and means for securing both intra-oral splints to the patient's teeth, and to each other.

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