Dec. 2, 1969 W. A. PATERSON 3,481,086

DENTAL MODEL TRIMMER

Filed Jan. 16, 1968 2 Sheets-Sheet 1

FIG. 1

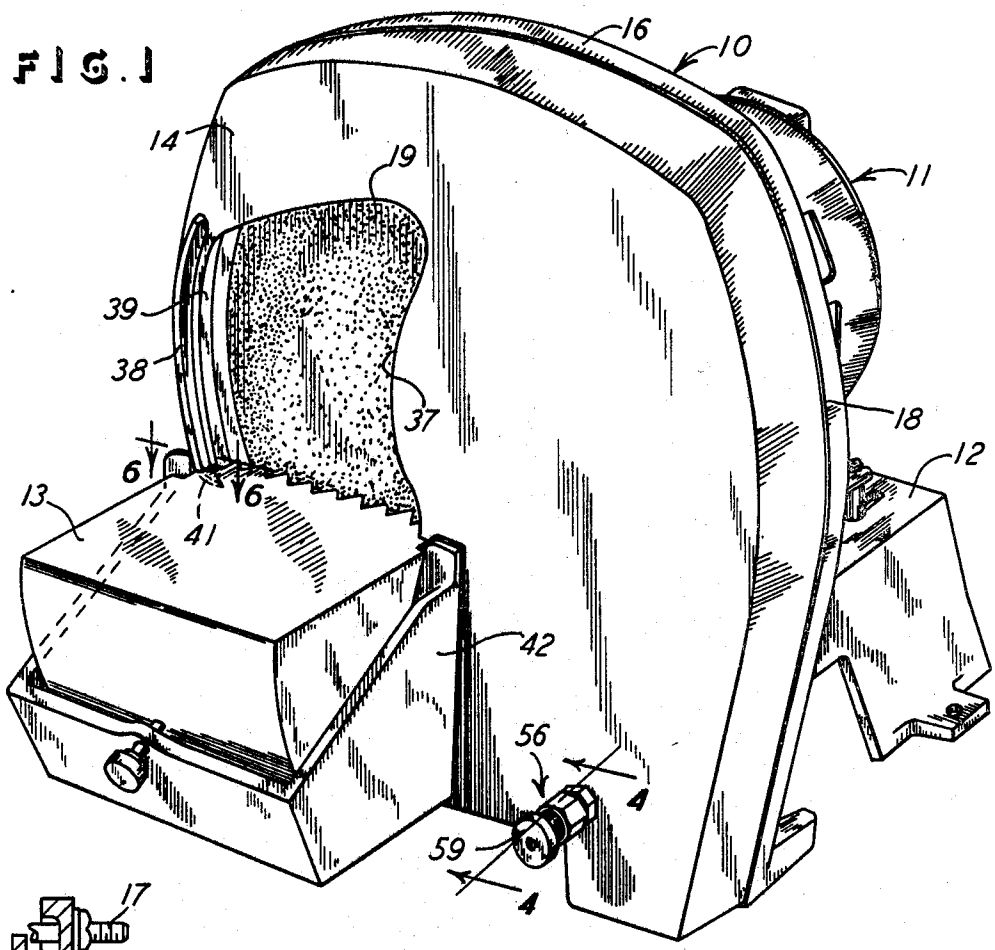


FIG. 2

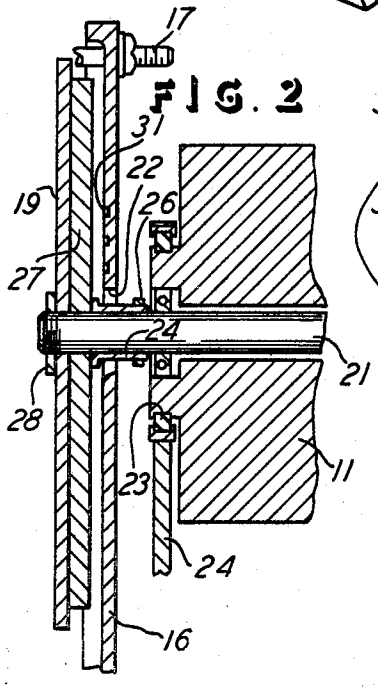
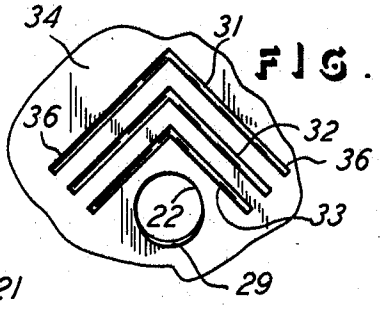


FIG. 3



INVENTOR:
WERNER A. PATERSON

Arthur J. Hansmann
ATTORNEY

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Filed Jan. 16, 1968 2 Sheets-Sheet 2

FIG. 4

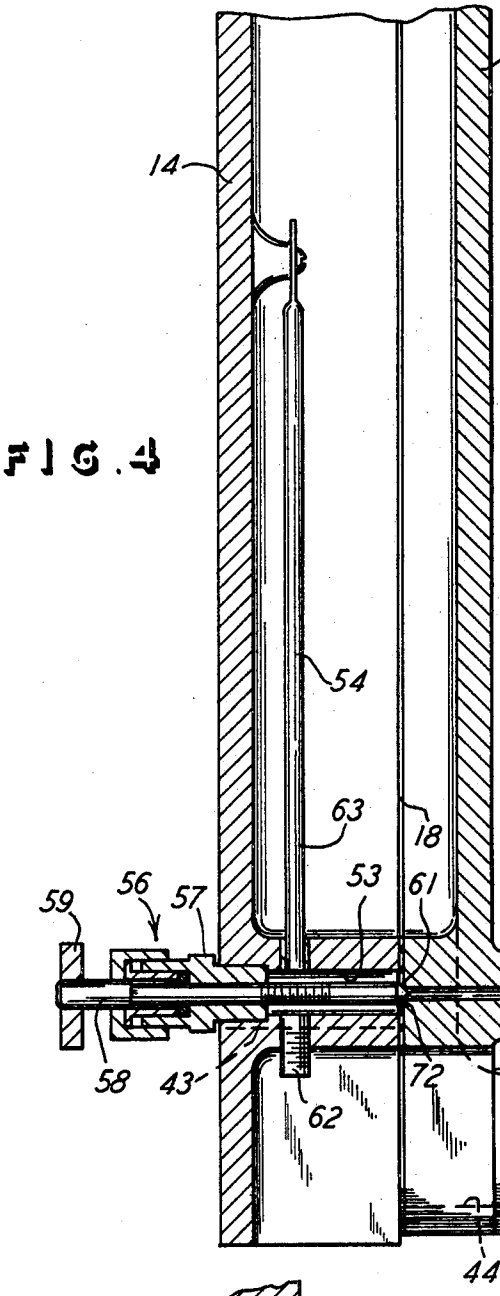


FIG. 5

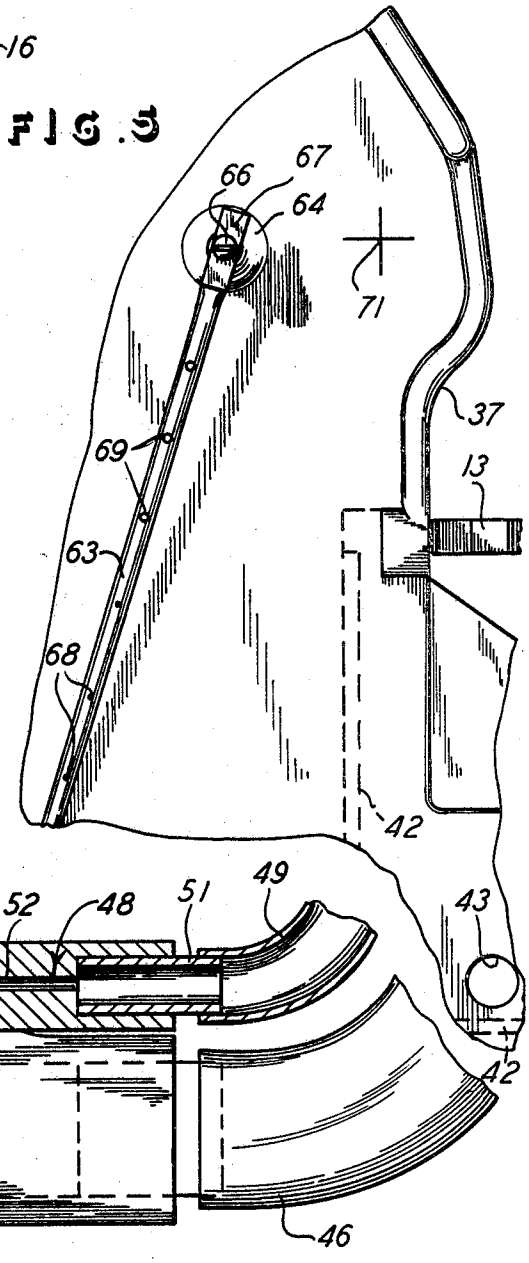
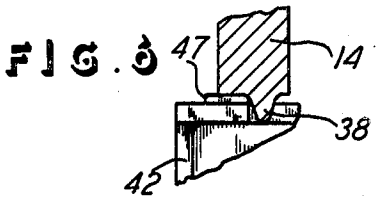


FIG. 6



INVENTOR:
WERNER A. PATERSON

Arthur J. Hansmann
ATTORNEY

United States Patent Office

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DENTAL MODEL TRIMMER

Werner A. Paterson, 3222 N. Main St.,
Racine, Wis. 53402

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ABSTRACT OF THE DISCLOSURE

A dental model trimmer including a housing wherein a grinding wheel is rotatably disposed, and water is fed into the housing and ejected against the grinding wheel. A table is attached to the housing for supporting a model to be trimmed, the housing is provided with means for retaining the water within the housing, except for a controlled drainage of the used water. A resiliently mounted motor rotates the grinding wheel. A water valve is mounted on the front of the housing for control of the flow of water into the housing.

BACKGROUND OF THE INVENTION

This invention relates to a dental model trimmer of the type commonly used for grinding a model, to trim it in the usual manner.

Model trimmers are commonly known and empolyed for trimming a dental model. Such trimmers commonly employ a grinding wheel rotatably disposed in a housing which has water directed into the housing and against the face of the wheel. The housing has an opening which exposes the grinding wheel, and a table on the housing and at the lower end of the opening provides for the support of the model to be disposed against the grinding wheel. These trimmers commonly employ resiliently mounted motors for rotating the grinding wheel, and they provide the necessary water lines and valves for leading the water to and from the housing and against the face of the grinding wheel.

The prior art is also aware of the problem of retaining the water within the housing, except for the controlled drainage of the water. That is, the motor shaft extends into the housing through a hole in the housing, and there is also the front access opening to the grinding wheel. These two openings in the housing provide a source for the escape of water, either through splashing or draining or blowing. The containment of the water is a problem since the grinding wheel is rotating at a high speed and the water is both thrown and blown from the wheel. It is therefore a common result that the water will escape to the exterior of the housing and will drain onto the table or mounting support for the housing.

The housing opening or hole for receiving the motor shaft is commonly larger than the diameter of the shaft so that the motor can be resiliently mounted and consequently the motor and its shaft will move axially under pressure applied to the grinding wheel by the model being trimmed. Of course if the motor were not resiliently mounted, then it would set up a vibration, and it would create noise, both of which would be highly undesirable in the accuracy of the trimming being performed. However, because of the larger hole mentioned, the water has a greater avenue of escape from the housing, and thus the water-escape problem exists at the rear of the housing as well as at the front of the housing. However, because of the axial movement of the grinding wheel, any anti-drainage means employed should not interfere with the axial displacement.

With regard to control of the water, and the flow thereof, it is a problem to provide a water line or passageway which will not impede the disassembly of the housing for purposes of cleaning, inspection, replacement or exchange of grinding wheel, and like functions which are commonly performed. In solving the problem of housing disassembly without encountering water line complications, it is a problem in the prior art to have adequate control of the flow of water, when the trimmer is in the assembled and operating position, but yet to have the water line arranged so that it will not interfere with disassembly of the housing.

Still further, the prior art recognizes the problem of providing a means for controlling water flow, and to do so preferably through the installation and location of a valve which is both convenient and practical in its arrangement. That is, the water line must extend through the housing, and the valve is desirably mounted on the housing in a location convenient for control of flow through the line, but yet the valve should not, nor should the water line, interfere with or impede the disassembly of the housing.

Finally, the prior art trimmers are concerned with directing the water on the face of the grinding wheel for purposes of cooling and flushing the wheel. In view of the fact that the wheel both throws and blows water within the housing, and tends to cause the water to go outside the housing, as mentioned above, ejection of the water against the wheel is important, and it can be significant with regard to the escape of water from the housing. The problem of flushing the grinding wheel during operation thereof involves the matter of getting an adequate supply of water to the center of the wheel so that it can be radially displaced along the face of the wheel for flushing operation.

The present invention both recognizes and solves the problems mentioned herein. Thus, the present invention provides a trimmer which does not permit the water to drain from the housing and onto the supporting table or the like, at both the front opening and the rear hole or opening where the motor is located. Still further, water escape is prevented even though a resiliently mounted motor is employed and the hole receiving the motor shaft is larger than the shaft. Also, the means for preventing water escape at the rear hole is such that it will not interfere with axial displacement of the grinding wheel, and of course the housing need not be made over-size in order to permit axial displacement of the wheel, in view of the resilient mounting of the motor. That is, nothing is projecting into the housing to interfere with the axial displacement of the grinding wheel. Still further, the water line extending through the housing is arranged with respect to the bolting assembling the housing so that upon assembly and bolting, the water line is automatically disposed in fluid-tight and fluid-flow relation. Thus, no special assembly and disassembly of the water line is required. Still further, a valve is provided in a convenient location at the front of the housing, so the flow of water can be readily controlled, and the operational positioning of the valve is also automatically achieved simply upon assembly of the two housing pieces. Finally, the water is directed at the face of the grinding wheel by providing

that the greater quantity of water is directed near the axis of the wheel, so that adequate flushing and cooling of the wheel can be achieved by the water flowing radially outwardly along the face of the wheel to be effective for the flushing and cooling purpose, rather than have water directed at the edge of the wheel and thus be ineffective but yet available for being blown and thrown in the housing and, more likely, then also outside of the housing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a front prospective view of an embodiment of this invention.

FIG. 2 is a sectional view of a fragment of FIG. 1 and taken along the axis of the grinding wheel and motor.

FIG. 3 is a front view of a fragment of the interior of the housing in FIG. 1.

FIG. 4 is an enlarged sectional view of a fragment of FIG. 1, and taken substantially along the line 4—4 of FIG. 1.

FIG. 5 is an elevational view of a fragment of FIG. 4.

FIG. 6 is an enlarged sectional view taken substantially along the line 6—6 of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The drawings show the trimmer to generally include a housing **10**, a motor **11**, a support stand or base **12**, and a forwardly projecting table **13**. The housing **10** includes the front piece **14** and the rear piece **16**, and these two pieces are secured together by means of bolts extending around the edges of the two pieces, such as the bolt **17** shown in FIG. 2. Of course the housing **10** has water therein, so a gasket **18** is disposed between the otherwise mating edges of the housing pieces **14** and **16**, to make the housing fluid-tight at its edges.

A grinding wheel **19** is rotatably disposed in the housing by being mounted on the shaft **21** of the motor **11**. Thus the shaft **21** projects through a hole **22** in the housing rear piece **16**.

FIG. 2 shows that the motor **11** is resiliently mounted, by means of a rubber ring or block **23** extending between the motor **11** and a supporting piece **24**, and the piece **24** itself may be resilient so that the motor has vibration dampening means which will permit the desired accuracy of the model trimming and the operation with only a minimum amount of noise.

However, because of the resilient motor mounting just described, the pressure of the model being trimmed, as it is forced against the rotating grinding wheel **19**, will axially displace the wheel **19** and the shaft **21** along with the motor **11**. Therefore, it is necessary to provide that the shaft **21** can move relative to the housing **10**, and therefore the hole **22** is larger than the shaft **21**. However, because of the large hole, the water used within the housing would likely be drained and blown from the housing, and this is undesirable.

It will also be noted that a lock sleeve **24** surrounds the shaft **21** and a lock nut **26** can be tightened on the sleeve **24**, which may be a split sleeve, and the sleeve **24** will therefore hold tight onto the shaft **21**. In this manner, the grinding wheel **19** is axially fixed with respect to the shaft **21** by means of a backing plate **27** being in axial abutment with the locking sleeve **24**. Also, a lock nut **28** is threaded onto the extending end of the shaft **21** to secure the grinding wheel **19** in the forward direction.

Referring to FIGS. 2 and 3, it will be noted that the hole **22** is generally circularly shaped, and, in addition to being larger than the diameter of the shaft **21**, and even larger than the diameter of the split sleeve **24**, the hole **22** is beveled on its lower semi-circular edge **29**. The bevel is directed downwardly and toward the inside of the housing. Also, grooves **31**, **32**, and **33** are formed countersunk as recesses within the housing rear piece face **34**. These grooves are disposed directly above the uprightly extending housing **10** and particularly the uprightly extending rear piece face **34**. Also, the grooves **31**, **32**, and **33** all have laterally and downwardly extending legs, such as the legs **36** in groove **31**, so that the legs extend laterally of the direct upward projection of the hole **22**, and the legs **36** are below the intermediate higher point of each of the grooves, as shown in FIG. 3. Therefore, any water draining down the face **34** will engage the grooves **31**, **32**, and **33** and be drained laterally with respect to the hole **22**. Still further, any water getting to the edge of the face **34** defining the hole **22** will be cause to drain inwardly with respect to the housing **10**, by means of the inwardly directed bevel **29** defining the hole **22**.

With the drainage means and arrangement just described, with respect to the rear of the housing **10**, the grinding wheel **19**, and of course its supporting disc **27**, have adequate clearance with respect to the face **34** for the axial displacement desired in the operation of the wheel **19**, by virtue of the resilient mounting of the motor. That is, the drainage means does not project into the housing **10** to either require that the housing **10** be made larger to accommodate the drainage means and axial displacement of the grinding wheel **19**, or that the drainage means would interfere with the axial displacement of the wheel **19**.

With respect to preventing drainage at the front of the housing **10**, it will of course be understood that the front piece **14** has an opening **37** which permits exposure and access to the grinding wheel **19**. That is, a dental model to be trimmed is disposed on the table **13** and pressed against the wheel **19** through the access opening **37**. Of course the water which is applied to the wheel **19** is inclined to be thrown, blown, and otherwise drained from the housing through the opening **37**. To prevent escape of water, a baffle **38** projects forwardly of the housing piece **14**, but is connected thereto, and it projects along the edge **39** of the housing opening **37**, which edge **39** is disposed radially farthest from the axis of rotation of the wheel **19**. The baffle **38** extends generally in an upright direction, and its lower end **41** terminates in a position to be within the lateral extent of a drain pan **42** connected to the front piece **14** and extending completely around the bottom of the table **13**. The pan **42** is intended to collect all of the water draining from the table **13**, and such drainage is directed through an opening **43**, as shown in FIG. 5, and the opening **43** extends through the front piece **14** to ultimately drain the used water to a sump generally indicated **44** in FIG. 4, and this sump is connected to a drain tube **46** which carries the water away.

It is therefore significant that the baffle **38** extends in a plane and to an extent to where it remains and directs the water, so that the water can flow into the drain pan **42**. Thus FIG. 6, along with FIG. 1, shows the baffle **38** extending downwardly to within the lateral limit of the drain pan **42** so that the water will go into the pan **42**. A gasket **47** is shown between the pan **42** and the housing front piece **14**. Therefore, even when the wheel **19** is rotating at a high speed and causes a blowing of the water along the opening edge **39** and even along the baffle **38**, as is commonly the action, the water blown around the baffle **38** will nevertheless drain down the baffle **38** and into the pan **42** because of the lateral location of the baffle **38** and its downward extent into the pan **42**.

FIG. 4 shows the water line or passageway, generally designated **48**, extending exteriorly of the housing and to a point where water is ejected to the face of the grinding wheel **19**. Thus the passageway **48** includes a water line **49**, a connecter **51**, a water passageway **52** extending in the rear piece **16**, a water passageway **53** extending in the front piece **14**, and a water tube **54** mounted on the front piece **14**. The passageways **52** and **53** are formed directly within the rear and front housing pieces, respectively, and they align in the manner shown in FIG. 4, when the hous-

ing pieces are assembled and bolted together. Therefore, the water line or passageway **48** is completed upon simply assembling the housing pieces, and, upon disassembling the pieces, the water line need not be taken apart. Therefore, ready access may be had to the interior of the housing **10**, no special disassembly is required of the water line. Of course, the water would be turned off in the line **49** for the disassembly mentioned.

The alignment of the housing passageways **52** and **53** permits the location and mounting of a water valve **56** at the front of the housing **10** and on the front piece **14**. Thus, a threaded adapter **57** extends to the housing **14**, and it threadedly supports the valve stem **58** which is therefore axially movable in the opening **53**. The valve handle **59** is disposed forwardly of the housing **10**, and it is in a convenient place for the control of the flow of water through the line. The stem **58** terminates in a closure **61** which is conically shaped and which aligns with and abuts the end of the passageway **52**. This therefore controls the flow of water from the passageway **52** and into the passageway **53**, as desired. A plug **62** is mounted in the housing piece **14** on one side of the opening **53** and an upstanding tube **63** is mounted on the other side of the opening **53**. Therefore, the tube **63** receives the water from the opening **53** and directs the water upwardly and onto the disc or wheel **19**, as desired.

FIG. 5 shows the support of the tube **63** by means of a boss **64** and a screw **66**, anchoring the tube upper end **67** to the housing **14**. Also, FIG. 5 shows the tube **63** has a plurality of openings spaced therealong, and there are small openings **68** at the lower end of the tube and larger openings **69** at the upper end of the tube. The openings **69** are therefore disposed closer to the center of rotation or axis, designated by the mark indicated **71**, and therefore the greater quantity of water is directed to the center of the disc **19** for the cooling and flushing functions desired. This therefore provides for the optimum use of the water, with less of the water being directed at the outer edge of the disc **19**, and only available for being thrown and blown from the housing.

Still further, the problem of having adequate supply of water directed toward the axis **71** of the wheel **19** is solved by providing the larger holes **69** nearer the axis **71**, with respect to the smaller holes **68**. Thus any normal pressure drop in the tube **63** will be negated by the differential in the sizes of the holes **68** and **69** so that the adequate supply of water can be directed toward the center of the wheel **19**.

Also, the housing pieces **14** and **16** are alignably secured together so that the water holes **52** and **53** are aligned in water-flow communication. The edge of the hole **52** then forms a valve seat designated **72**, for water-tight mating with the valve closure **61**. Thus the closure **61** and seat **72** automatically align and mate upon assembly of the housing pieces.

What is claimed is:

1. In an orthodontic model trimmer including a separable housing having an uprightly disposed front piece and an uprightly disposed rear piece bolted together and having a horizontally oriented hole in said rear piece, a resiliently mounted motor disposed exteriorly of said housing and including a shaft extending into said housing through said hole and being limited resiliently displaceable axially of said shaft, a grinding wheel mounted on said shaft and rotatably disposed in said housing and being axially displaceable with said shaft, a water passageway connected to said rear piece and being in water-flow communication with the interior of said housing for directing water onto said grinding wheel at the side thereof adjacent said front piece, a model support table on said front piece, said housing having an opening in said front piece above said table to permit access to said grinding wheel and with said opening terminating in a side located adjacent the circumference of said grinding wheel, a water baffle on said front piece and extending uprightly along the exterior of said housing at said side of said opening, and a drain pan on said front piece below said table for collecting the water coming from said housing, the improvement comprising said rear pieces with first means above said hole for directing water draining down said back piece away from said hole, said rear piece having second means below said hole for keeping inside said housing any water which reaches said hole, and said baffle having its lower end terminated in a location directly above said drain pan within the lateral limits of said drain pan for draining water along said baffle and into said drain pan.

2. The subject matter of claim **1**, wherein said first means and said second means are both countersunk drainage recesses in said rear piece to leave maximum clearance for the axial movement of said grinding wheel within said housing.

3. The subject matter of claim **1**, wherein said first means includes a groove in said back piece and with said groove having two ends terminating on opposite sides of the upright plane of said hole and with said ends being lower on said grooves than any other portions thereof.

4. The subject matter of claim **1**, wherein said second means includes a beveled surface on that portion of said rear piece defining the lower edge of said hole, and with the direction of the bevel being down and inwardly with respect to said housing.

5. The subject matter of claim **1**, wherein said water passageway includes a water tube mounted in said front piece and extending in front of said grinding wheel and substantially radially thereto, said water tube having outlet holes spaced therealong and faced toward said grinding wheel and with the ones of said holes nearer the center of rotation of said grinding wheel being larger than the ones of said holes further from the center of rotation of said grinding wheel.

6. The subject matter of claim **1**, in a trimmer having said front piece and said rear piece formed with aligned holes extending therebetween to provide a portion of said water passageway, and having said front piece and said rear piece with the bolts extending therebetween being in positions to align said holes for fluid-tight water flow between said holes, the additional improvement comprising a valve operably mounted in said front piece and including a closure disposed in said hole in said rear piece for selectively interrupting water flow to said front piece.

7. The subject matter of claim **6**, wherein said holes in said pieces are axially aligned and of different cross-sectional sizes, and said valve including a valve stem threadable along the axis of said holes, and said closure being larger than the smaller one of said holes for seating on the end thereof in selectively interrupting water flow.

8. The subject matter of claim **7**, wherein said hole in said back piece is the smaller hole, and said valve is a needle type valve having a conical end on the end of said valve stem forming said valve closure said conical end being larger than said cross-sectional size of said smaller hole to fluid-tightly seat in said end of said smaller hole, and said stem being smaller than said cross-sectional size of said hole in said front piece for movement in said front piece.

9. A dental model trimmer including a separable housing of a front piece and a rear piece alignably secured together and forming a hollow interior, a grinding wheel rotatably disposed in said interior in said housing, means connected to said grinding wheel for rotating the latter, a water passageway extending into said interior of said housing for directing water onto said grinding wheel, and said front piece and said rear piece each having a hole extending therein and being axially aligned for water-flow communication therebetween by having said

housing pieces alignably secured together, the improvement comprising a valve mounted on one of said housing pieces and including a valve closure extending into said water passageway for selective interruption and adjustment of water flow into said housing.

10. The subject matter of claim **9**, wherein said hole in said rear piece includes a valve seat, said valve is mounted on said front piece and said closure is operative on said valve seat for interruption and adjustment of water flow to said front piece.

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U.S. Cl. X.R.

51—267, 356