Sept. 11, 1962 R. HARVEY 3,052,985

PRESS FOR AMALGAMS AND THE LIKE

Filed Nov. 7, 1960

Fig. 1

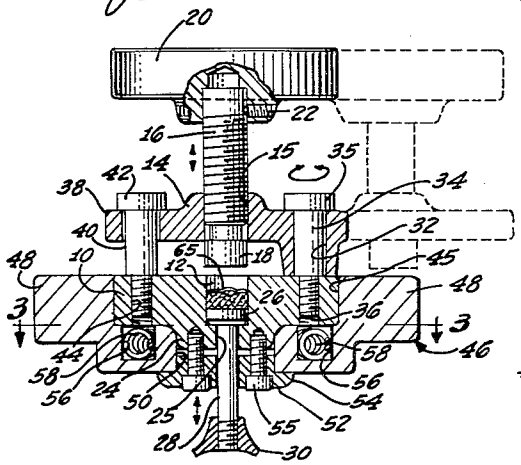


Fig. 2

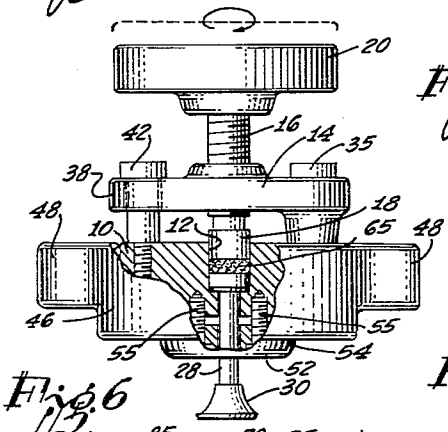


Fig. 3

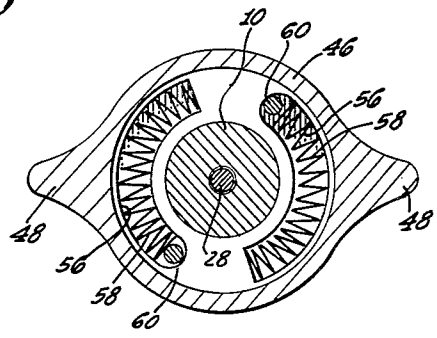


Fig. 4

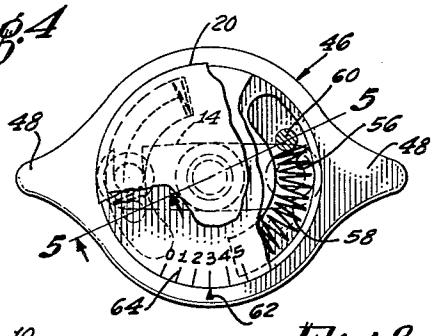


Fig. 5

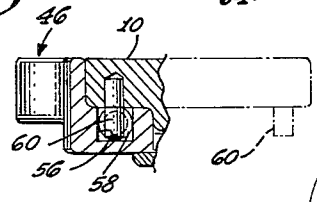


Fig. 8

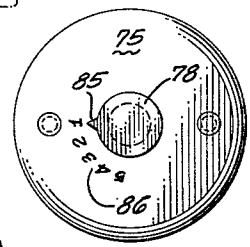


Fig. 6

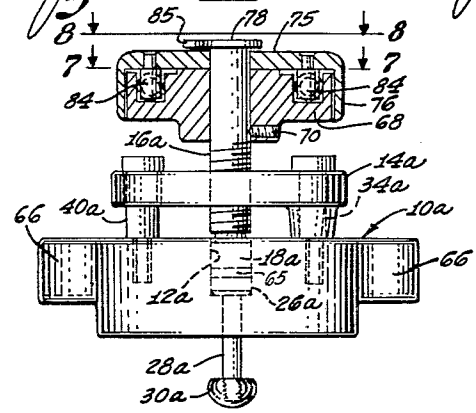
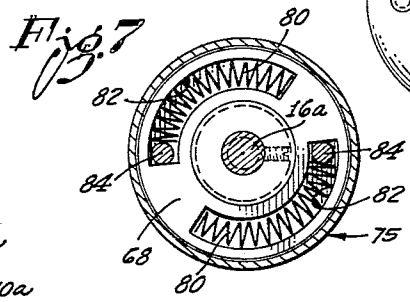


Fig. 7



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PRESS FOR AMALGAMS AND THE LIKE

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12 Claims. (Cl. 32—40)

This invention relates to presses for extracting liquids from substances.

The initial embodiment of the invention is a miniature press to be used by dentists for removing excess mercury from silver amalgam. The description of this initial embodiment will provide adequate guidance for those skilled in the art who may have occasion to construct such a press for other specific purposes.

The consistency of silver amalgam depends on the proportions of mercury and silver, and may be varied simply by subjecting the amalgam to pressure for extraction of a portion of the mercury. In the usual procedure, a dentist requires a particular consistency for the initial deposit of amalgam in a cavity of a tooth and requires progressively drier increments of amalgam to complete the filling.

A common practice is to use an amalgam press of the construction disclosed in my prior Patent 2,795,850. Such a press consists essentially of two relatively rotatable parts, namely, a base assembly to be held in one hand and a screw means for operation by the other hand. The base assembly provides a cavity to receive a quantity of amalgam and includes means with a threaded bore to engage the screw means for advance against the amalgam. The dentist takes a portion of a relatively wet body of amalgam for starting a filling, and uses the press to extract successive amounts of mercury from the body of amalgam to produce the progressively drier increments to complete the filling.

The problem is to operate such hand press in such manner as to produce a body of amalgam to a desired consistency. With practice, a dentist develops a certain "feel" for guidance in the operation of such a hand press that enables him to approximate a desired result. Accuracy is lacking, however, and too often the procedure is a time wasting, trial and error procedure.

For efficiency, a dentist should have an assistant to process the amalgam. Here the further problem arises of teaching an assistant to be proficient in handling the press and of communicating to the assistant the particular consistencies required for the amalgam at different points in the procedure of filling a tooth. An assistant may become competent in the required teamwork, but the training and practice must start over again if the assistant is replaced by a new assistant.

The present invention meets this problem by adding a third relatively movable part to the two relatively movable parts of a press such as described above, with a suitable spring acting between the third part and one of the other two parts. In the first practice of the invention described hereafter, the third part is a holder which rotatably seats the base assembly. Spring means resists relative rotation between the holder and the base assembly in the direction that rotation tends to occur in reaction to the resistance that is encountered by the screw means.

With a quantity of amalgam in the press, the operator takes the holder in one hand and turns the screw means with the other hand. Until the screw means reaches pressure contact with the confined amalgam, the spring means prevents relative rotation between the holder and the base assembly so that the base assembly initially functions in effect as an integral part of the base assembly. After the screw means makes pressure contact with the confined amalgam, however, resistance to advance of the screw means rises progressively with consequent progressive yielding of the spring means to permit corresponding rotation of the base assembly relative to the holder. The yielding action of the spring means with the consequent relative rotation between the holder and the base assembly is a measure of the pressure to which the amalgam is subjected.

The yielding action of the spring is readily sensed by the operator. The operator detects the point at which the yielding action is initiated and can then sense the extent to which the spring yields as the rotation of the screw means is continued. Thus the improved press provides means for the operator to develop a more reliable "feel" for guidance in processing amalgam.

The preferred practice of the invention includes index means to measure the relative rotation between the holder and the base assembly, which relative rotation measures the extent to which the spring means yields and thus measures the rise in pressure applied to the amalgam. By employing an index means in the form of a graduated scale with an indicator movable along the scale, the invention makes it possible to apply accurately selected degrees of pressure, and thus makes it possible to process amalgam accurately to any desired degree of dryness. There is no problem in training an assistant in the use of the press and no problem in communication, because the dentist can express his requirements accurately in terms of scale values.

In a second practice of the invention, the third relatively rotatable part is added to the screw means, not the base assembly, and comprises a handle with suitable spring means resisting rotation between the handle and screw means. The operator holds the base assembly in one hand and rotates the handle with the other hand. The mode of operation is the same.

The features and advantages of this invention may be understood from the following detailed description and the accompanying drawing.

In the drawing, which is to be regarded as merely illustrative:

FIG. 1 is a sectional view of a selected embodiment of the invention with the screw means positioned for advance against a quantity of amalgam in the cavity of the base assembly;

FIG. 2 is a side elevation with parts broken away showing the screw means advanced into pressure contact with the amalgam in the cavity;

FIG. 3 is a transverse section taken as indicated by the line 3—3 of FIG. 1 showing the spring means in unstressed state;

FIG. 4 is a plan view of the press with parts broken away showing the spring means stressed for the application of a particular magnitude of pressure, and showing the pointer and scale for indicating the magnitude of the pressure;

FIG. 5 is a fragmentary section taken as indicated by the line 5—5 of FIG. 4 showing how a pin extends from the base assembly into an arcuate groove of the holder to act against one of the two springs that constitute the spring means;

FIG. 6 is a side elevation, partly in section, showing the second embodiment of the invention in which the third relatively rotatable part is a handle for the screw means;

FIG. 7 is a transverse section as indicated by the line 7—7 of FIG. 6 showing the two springs in their normal configurations; and

FIG. 8 is a plan view as seen along the line 8—8 of FIG. 6 showing the index means for indicating the various degrees of pressure applied to the amalgam.

In the first embodiment of the invention shown in FIGS. 1–4, the base assembly comprises a circular metal base block **10** with a cylindrical cavity **12**, and a yoke **14** that is attached to the base block and has a screw threaded

bore **15** for axial alignment with the cylindrical cavity. The screw means for cooperation with the base assembly comprises a screw member **16** for mounting in the threaded bore **15**. One end of the screw member **16** forms a cylindrical ram **18** for snug, sliding fit in the cylindrical cavity **12**. The second outer end of the screw member **16** has a knob **20** for manual operation, the knob being fixedly secured to the screw member by a suitable setscrew **22**.

The base block **10**, which is formed with a cylindrical boss **24** on its lower side, has an axial bore **25**. An ejector member **26** which normally rests on the bottom of the cylindrical cavity **12** has an axial stem **28** that is slidingly mounted in the bore **25**. The ejector member fits sufficiently loosely in the cylindrical cavity **12** and the axial stem seats sufficiently loosely in the axial bore **25** to permit drainage of the mercury that is squeezed out of the amalgam in the cylindrical cavity **12**. The lower end of the stem **28** is provided with a knob **30** for manual operation and this knob serves as stop means to limit the upward movement of the ejector member **26**. Preferably, the upper limit position of the ejector member **26** is substantially flush with the upper surface of the base block **10**.

One of the two arms of the yoke **14** is formed with a bore **32** by means of which the yoke is journaled on a stud **34** to swing laterally between the position shown in solid lines in FIG. 1 and an alternate position shown in dotted lines. The stud **34** is formed with a head **35** to retain the yoke and is mounted in a threaded bore **36** in the base block **10**. The second arm of the yoke **14** is formed with a hook **38** for releasable engagement with a second stud **40**. The second stud has a head **42** for abutment by the hook **38** and is mounted in a threaded bore **44** at the base block **10**. With the ram **18** at the end of the screw member **16** retracted from the cylindrical cavity **12**, the yoke **14** may be swung to the dotted line position in FIG. 1 to make the cylindrical cavity **12** accessible either for introducing a quantity of wet amalgam into the cavity or for removing processed amalgam from the cavity.

The circular base block **10** is rotatably mounted in a circular seat **45** in a suitable holder **46** that is dimensioned to be held in the palm of one hand. In this embodiment of the invention the holder **46** is a solid block of metal of generally circular configuration, with a pair of diametrically opposite tapered wings **48** to permit the holder to be gripped in a manner to prevent rotation of the holder in the operator's hand.

Any suitable arrangement may be used to retain the base block in the circular seat. In the construction shown, the holder **46** has a relatively large axial bore **50** extending from the circular seat **45** to the underside of the holder, this bore being dimensioned to receive the boss **24** on the underside of the base block **10**. A retainer bushing **52** is seated in the axial bore **50** with a radial flange **54** of the bushing abutting the bottom surface of the holder. The retainer bushing **52** surrounds the axial stem **28** of the ejector member **26** and is releasably connected to the base block **10** by a pair of screws **55**. The knob or handle **30** of the ejector member **16** abuts the retainer bushing **52** at the upper limit position of the ejector member **16**.

Any suitable spring arrangement may be provided for the required yielding resistance to relative rotation between the base block **10** and the holder **46**. In this particular embodiment of the invention, the circular seat **45** in the holder **46** is provided at its bottom with a pair of diametrically opposite arcuate slots **56** as shown in FIGS. 3 and 5 to seat a pair of corresponding coiled springs **58**. The base block **10** is provided with a pair of corresponding downwardly extending pins **60** that extend into the arcuate slots **56** in abutment with the ends of the corresponding coiled springs **58**.

These springs **58** resist the relative rotation between the base block **10** and the holder **46** that tends to occur in reaction to resistance encountered by the ram **18**. The two springs are strong enough to overcome the normal frictional resistance to rotation of the screw member **16** that occurs in the screw threaded bore **15** of the yoke **14** so that the two springs yield only when the ram **18** makes pressure contact with a quantity of amalgam in the cylindrical cavity **12**.

In this particular embodiment of the invention, a suitable index means is provided to indicate the magnitude of relative rotation between the base block **10** and the holder **46**, thereby to indicate the corresponding compression of the two coiled springs **58** and the corresponding magnitude of pressure that is exerted by the ram **18** against the amalgam in the cylindrical cavity **12**. Such an index means may comprise an index mark **62** on the holder **46** to serve as a pointer or indicator to traverse a scale **64** on the base block **10**. In this instance, the scale shows a series of arbitrary values numbered 1 to 5.

The manner in which the described press functions for its purpose may be readily understood from the foregoing description. With the ejector member **16** at its normal position in the bottom of the cylindrical cavity **12** and with the screw member **16** retracted and the yoke **14** swung to one side, as shown in dotted lines in FIG. 1, the cylindrical cavity **12** in the base block **10** is exposed to receive a small body **65** of wet amalgam, i.e., silver amalgam with a high content of mercury.

The yoke **14** is then swung to its operative position shown in FIG. 1 with the hook **38** on the swinging end of the yoke in abutment with the head **42** of the stud **40**. The operator then grips the holder **46** in the palm of one hand and rotates the knob **20** to advance the cylindrical ram **18** by screw action.

Until the cylindrical ram **18** makes pressure contact with the amalgam body **65** in the cylindrical cavity **12**, no relative rotation occurs between the base block **10** and the holder, the holder functioning in effect as an integral portion of the base block. When the cylindrical ram **18** makes pressure contact with the amalgam body **65**, continued rotation of the screw member **16** relative to the base assembly results in a rise in the resistance to advance of the ram and this rising resistance results in corresponding relative rotation between the base block and the holder against the resistance of the pair of coiled springs **58**. The index mark **62** is correspondingly advanced along the scale **64**.

By always starting with an amalgam body **65** of a given wetness or mercury content, the operator is assured that the amalgam body is reduced in mercury content to a given degree each time the index marker **62** reaches a given value on the scale **64**. Thus, the scale numerals accurately represent corresponding predetermined, progressive degrees of dryness of the amalgam body.

Once the dentist has standardized this procedure, starting with amalgam of a given mercury content, he may readily carry out the operation to produce successive increments of amalgam with predetermined changes in mercury content. It requires no skill whatsoever for an assistant to manipulate the press for the same accurate results. It is a simple matter for a dentist to guide an assistant in the operation of the device by merely referring to selected values on the scale **64**.

The second embodiment of the invention, shown in FIGS. 6, 7 and 8, operates in the same general manner as the first embodiment of the invention but in this instance the third relatively rotatable part is associated with the screw member **16** instead of being associated with the base assembly.

In the second embodiment of the invention the base block **10***a* is large enough to be conveniently gripped in the palm of the hand and is of the same general shape as the previously described holder **46**. Thus, the base block **10***a* is formed with a pair of diametrically opposite tapered wings **66** to permit the holder to be gripped against rotation. The base block **10***a* has the usual cylindrical cavity **12***a* and is equipped with the usual ejector

member 28*a*, having the usual axial stem 28*a* and knob 30*a*.

A yoke 14*a* of the previously described construction is mounted in the usual manner on a stud 34*a* for swinging movement into and out of hook engagement with a second stud 40*a*. The screw member 16*a* is of the previously described construction, with a cylindrical ram portion 18*a* on its leading end. A circular knob 68 is fixedly mounted on the screw member 16*a* and is anchored against rotation thereon by a suitable setscrew 70.

A handle 75 in the form of a cap is rotatably mounted on the screw member 16*a* and is formed with a cylindrical skirt that rotatably surrounds the circular knob 68. The upper or outer end of the screw member 16*a* is formed with a radial flange 78 to retain the rotary handle 75 against axial separation from the circular knob 68.

The means to resist rotation of the handle 75 relative to the circular knob 68 may comprise a pair of coiled springs 80 seated in a corresponding pair of arcuate slots 82 in the circular knob 68. In the previously described manner, a pair of pins 84 extend downward from the handle 75 into the arcuate slots 82 for abutment against the ends of the corresponding coiled springs 80. A suitable index-means for indicating degrees of relative rotation between the handle 75 and the circular knob 68 may comprise a pointer 85 formed on the radial flange 78 of the screw member 16*a* to traverse a cooperating scale 86 on the upper surface of the handle 75.

It is apparent that the second embodiment of the invention functions in the same basic manner as the first embodiment.

My description in specific detail of the selected embodiments of the invention will suggest various changes, substitutions and other departures from my disclosure, within the spirit and scope of the appended claims.

I claim:

1. In a press for squeezing a quantity of a substance, the combination of: a first means providing a cavity to receive said substance and providing a screw-threaded bore in axial alignment with the cavity; a second means having a ram portion to enter the cavity and a screw portion in threaded engagement with said bore to advance the ram; a member rotatably connected to one of said two means for rotation relative thereto coaxially thereof, said member having a normal rotary position relative to said one of the two means; and spring means acting between said member and said one of the two means to oppose relative rotation between the member and said one of the two means in reaction to resistance to advance of the ram against the substance in the cavity, whereby said member and the other of the two means may be rotated relative to each other to advance the ram against the substance in the cavity until the substance is subjected to a predetermined pressure as indicated by yielding of the spring means and by corresponding relative rotation between the member and said one of the two means.

2. In a press for subjecting a substance to pressure of a predetermined magnitude, the combination of: a first means providing a cavity to receive said substance and providing a screw-threaded bore in alignment with the cavity; a second means having a ram portion to enter the cavity and a screw portion in threaded engagement with said bore to advance the ram; a member rotatably connected to one of said two means for rotation relative thereto coaxially thereof, said member having a normal rotary position relative to said one of the two means; spring means interposed between said member and said one of the two means to yieldingly resist relative rotation of said member out of its normal position in reaction to resistance to the advance of the ram; and cooperative index means on said member and on said one of the two means to indicate the extent to which said member rotates relative to said one of the two means when said ram is advanced against resistance, whereby said member and the other of the two means may be rotated relative to each other to advance the ram against the substance in the cavity until said spring means yields to a predetermined degree to place the substance under predetermined pressure as indicated by said index means.

3. A combination as set forth in claim 2 in which said member is rotatable relative to said first means, and said spring means is interposed between said member and said first means.

4. A combination as set forth in claim 2 in which said member is rotatable relative to said second means, and said spring means is interposed between said member and said second means.

5. A combination as set forth in claim 2 in which said index means comprises a scale and a cooperative indicator.

6. In a press for removing excess mercury from silver amalgam for dental use, the combination of: a base assembly providing a cavity to receive the amalgam and providing a screw-threaded bore in axial alignment with the cavity; a manually operable screw means in threaded engagement with said bore to exert pressure on amalgam in the cavity; a holder for the base assembly rotatably mounted thereon to be gripped manually for operation of the press; spring means interposed between the base assembly and the holder to oppose relative rotation between the base assembly and the holder in reaction to resistance to advance of the screw means against the amalgam in the cavity, whereby said screw means and said holder may be rotated relative to each other to advance the screw means against the amalgam in the cavity until the amalgam is subjected to a predetermined pressure as indicated by yielding of the spring means and corresponding relative rotation between the holder and the base assembly.

7. In a press for removing excess mercury from silver amalgam for dental use, the combination of: a base assembly providing a cavity to receive the amalgam and providing a screw-threaded bore in axial alignment with the cavity; a manually operable screw means in threaded engagement with said bore to exert pressure on amalgam in the cavity; a holder for the base assembly rotatably mounted thereon to be gripped manually for operation of the press; spring means interposed between the base assembly and the holder to oppose relative rotation between the base assembly and the holder in reaction to resistance to advance of the screw means against the amalgam in the cavity; cooperative index means on said holder and base assembly to indicate the extent to which the holder rotates relative to the base assembly when the screw means is advanced against the resistance of the amalgam in the cavity, whereby the holder and the screw means may be rotated relative to each other to advance the screw means against the amalgam in the cavity until the spring means yields to predetermined degree to place the amalgam under predetermined pressure as indicated by the index means.

8. A combination as set forth in claim 7 in which said index means comprises a scale and a cooperative indicator.

9. A combination as set forth in claim 7 in which one of said holder and base assembly has an arcuate concentric slot with said spring means therein and the other of said holder and base assembly has a portion extending into said slot to stress the spring means in response to relative rotation between the holder and the base assembly.

10. In a press for removing excess mercury from silver amalgam for dental use, the combination of: a base assembly providing a cavity to receive the amalgam and providing a screw-threaded bore in axial alignment with the cavity; screw means in threaded engagement with said bore to exert pressure on amalgam in the cavity; a handle rotatably mounted on said screw means; and spring means interposed between the holder and the screw means to oppose relative rotation between the handle and

the screw means in reaction to resistance to advance of the screw means against the amalgam in the cavity, whereby said handle and said base assembly may be rotated relative to each other to advance the screw means against the amalgam in the cavity until the amalgam is subjected to a predetermined pressure as indicated by yielding of the spring means and by corresponding relative rotation between the handle and the screw assembly.

11. A combination as set forth in claim 10 which includes cooperating index means on said handle and said screw means to indicate relative rotation between the handle and the screw means thereby to indicate the magnitude of the pressure exerted by the screw means against the amalgam in the cavity.

12. In a press for removing excess mercury from silver amalgam for dental use, the combination of: a base assembly providing a cavity to receive the amalgam and providing a screw-threaded bore in axial alignment with the cavity; screw means in threaded engagement with said

bore to exert pressure on amalgam in the cavity; a handle rotatably mounted on said screw means; an arcuate concentric slot in one of said handle and screw means; a coiled spring in said slot; and means extending into said slot from the other of said handle and screw means to compress said spring in response to relative rotation between the handle and the screw means, whereby said base assembly and said handle may be rotated relative to each other to advance the screw means against amalgam in the cavity until the amalgam is subjected to a predetermined pressure as indicated by yielding of the spring means and corresponding relative rotation between the handle and the base assembly.

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