

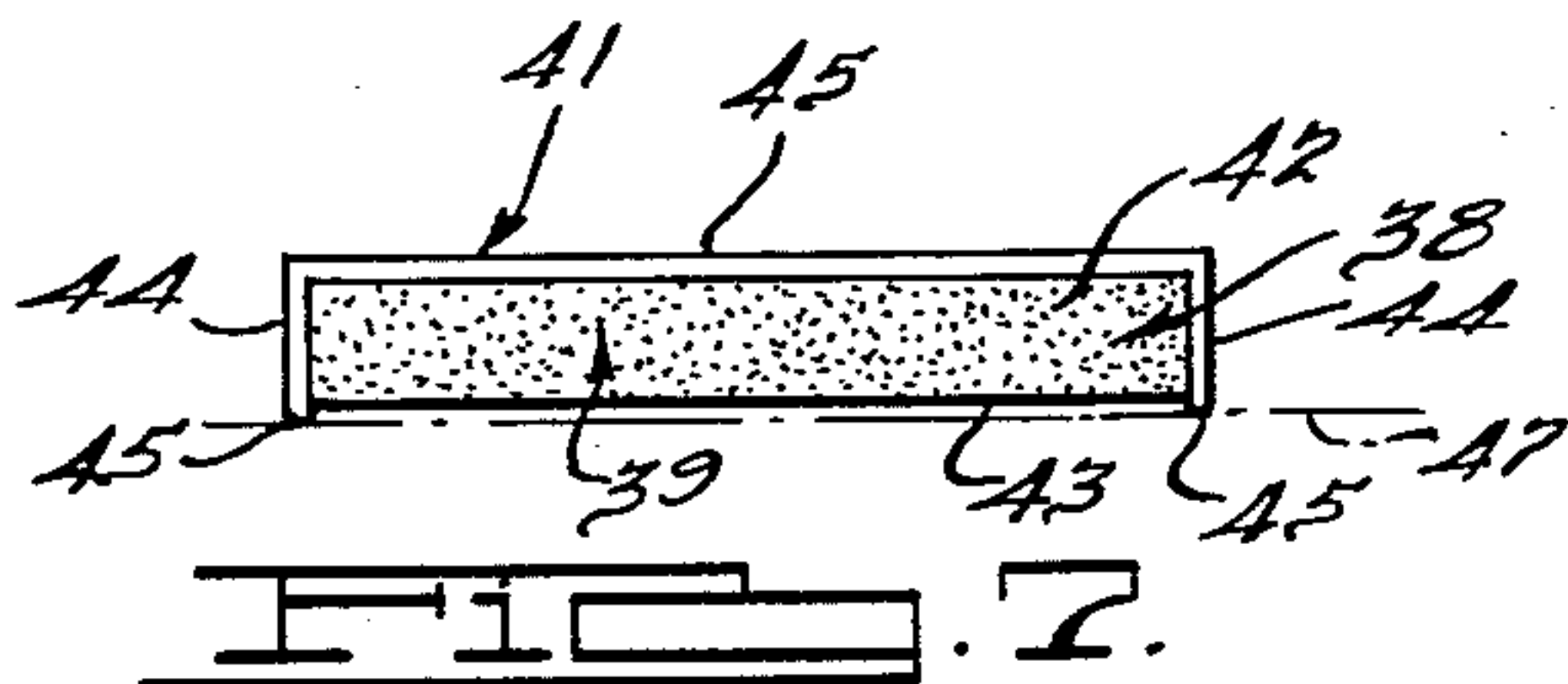
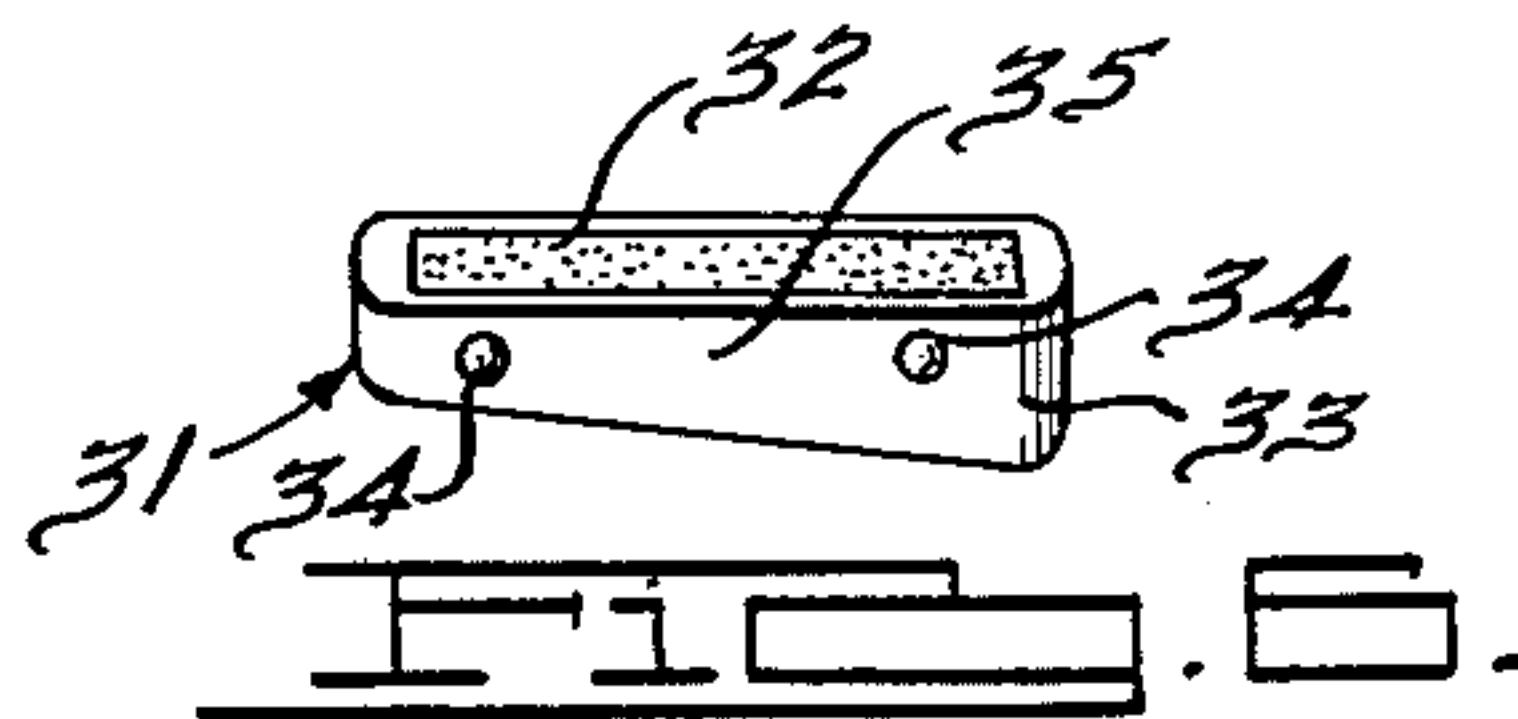
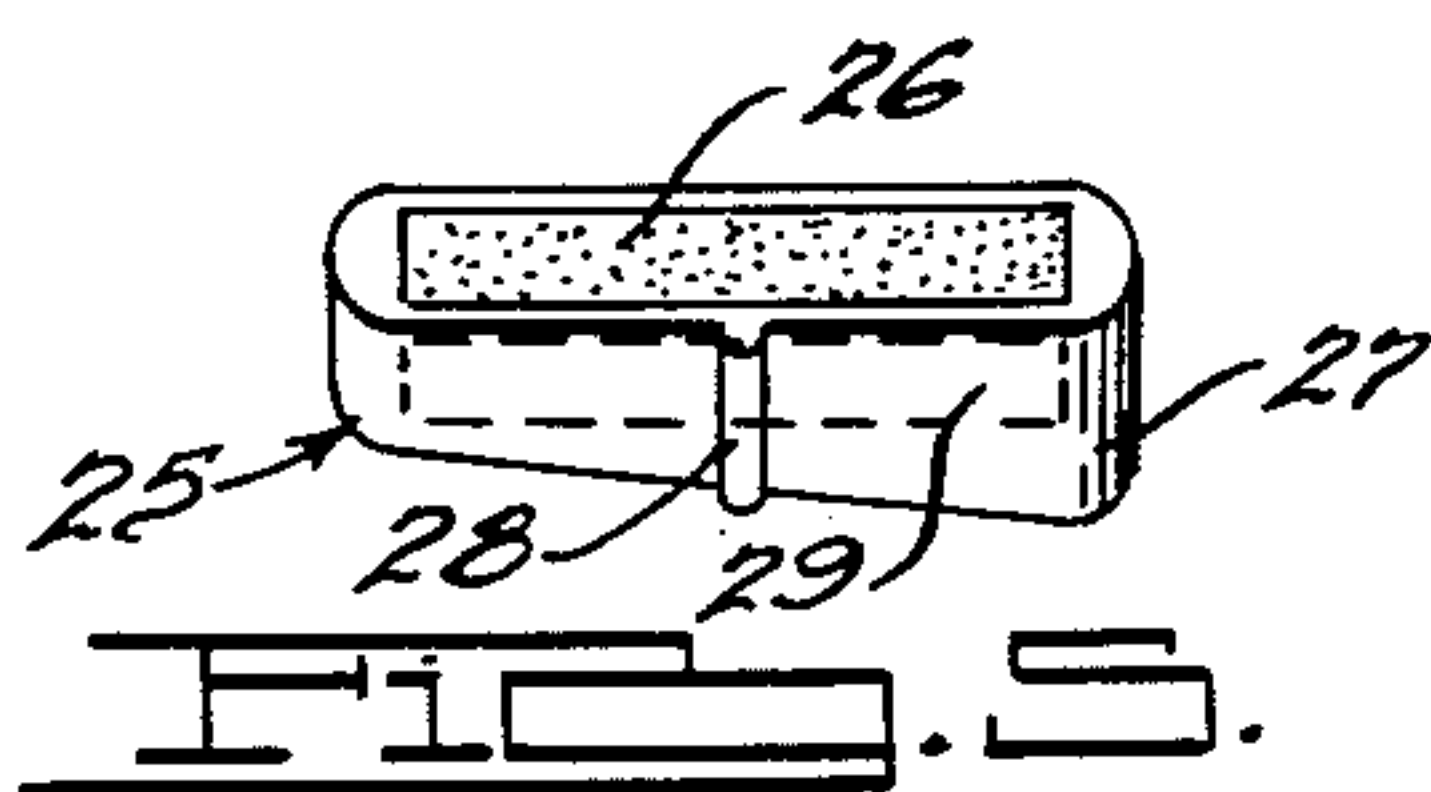
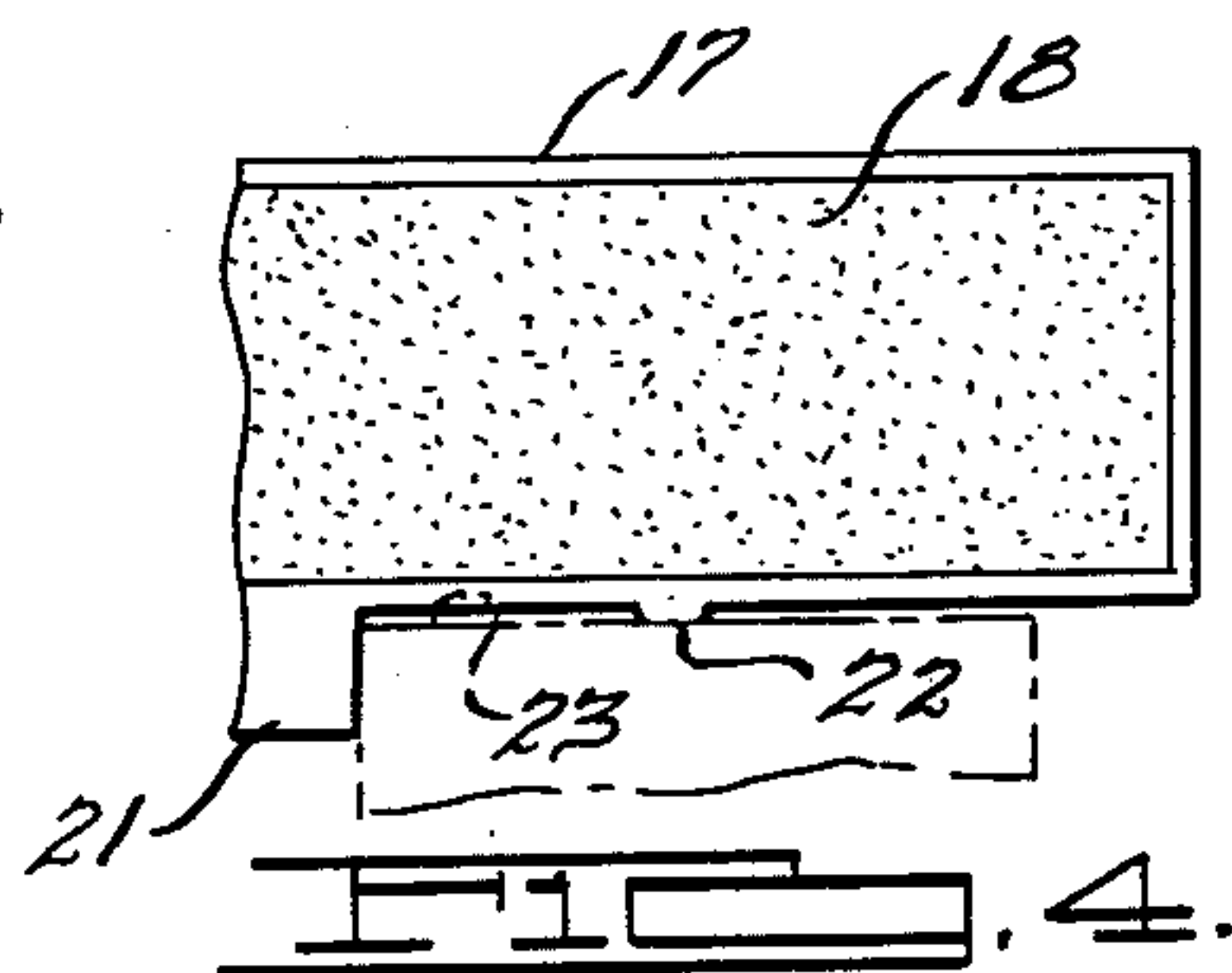
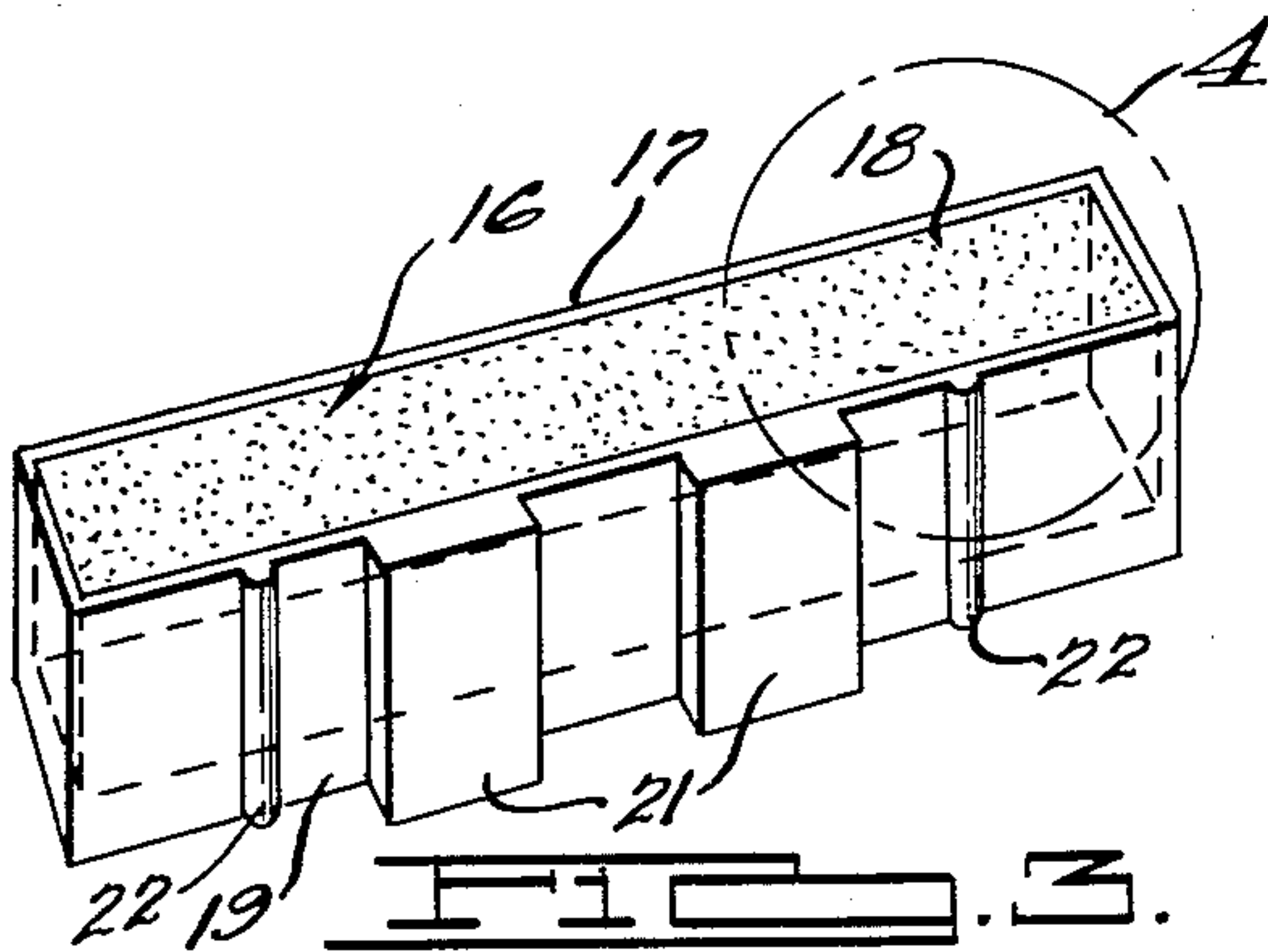
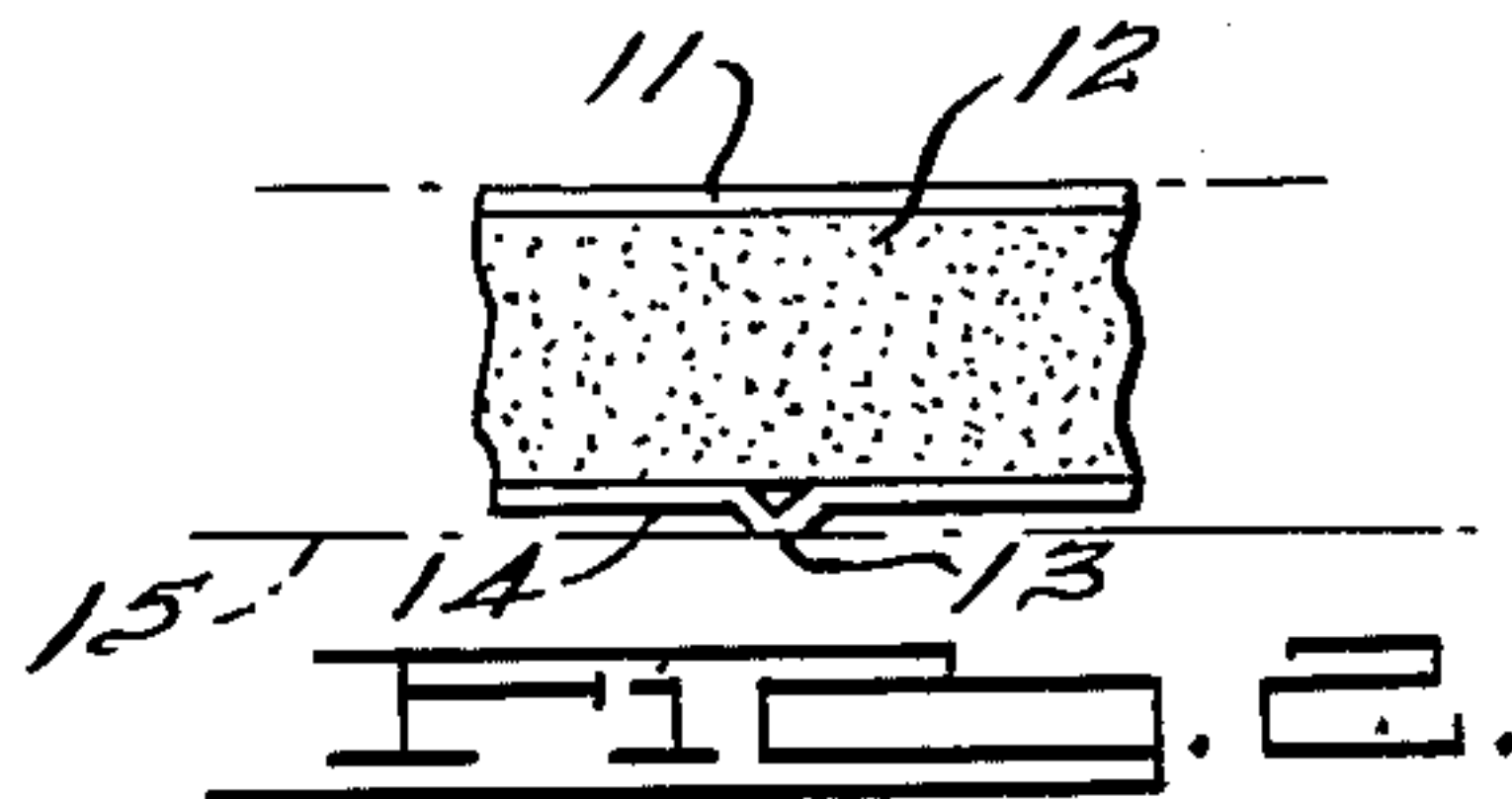
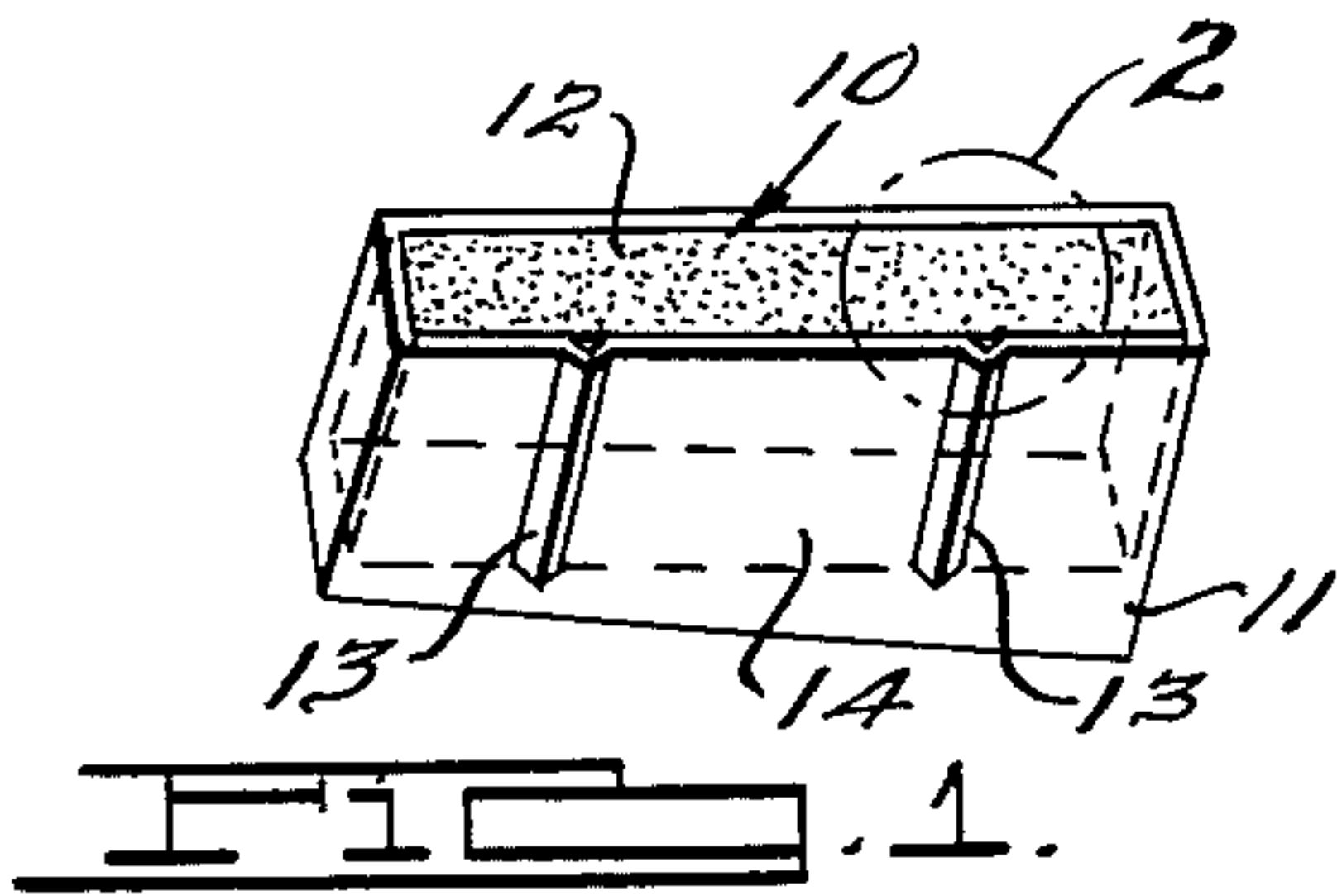
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2,952,952

ABRASIVE ELEMENT

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2,952,952

ABRASIVE ELEMENT

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5 Claims. (Cl. 51—204)

This invention relates to improvements in replacement abrasive elements for honing tools, and particularly to an abrasive element which is encased in a wearable material having protrusions which retain it within a slot in a honing tool body.

Without some means for retaining abrasive elements in the slots of the honing tool body, such as by the use of spring clips, garter springs and the like, as taught in the United States Patents Nos. 2,467,094 and 2,675,654, both of which were assigned to the assignee of the present invention, it would be difficult to retain the abrasive elements within the slots. When the honing tool was rotated and was withdrawn from the work bore of the guide bushing of an associated fixture, the abrasive elements without the retaining means were ejected from the honing tool slots by centrifugal force when the slots were widened through wear.

The present invention has for its main object the provision of protrusions or ribs on the sides of the abrasive element, disposed in such manner as to produce a snug fit when inserted within a slot in the honing tool body. As the abrasive elements are inserted into the slots, the outer portion of the protrusions or ribs are sheared and/or compressed between the side walls of the slots and thereby insure the retention of the abrasive elements within the slots by virtue of the frictional fit therein.

Although it is within the purview of the invention to have the protrusions or ribs arranged on any or all sides or at the ends of the abrasive elements, it was found most advantageous to employ the ribs solely on the side of the elements leading the direction of rotation of the honing tool. In this arrangement, the ribs are not subjected to the torsional thrust at the rear wall of the body slots by which the cutting force is applied to the abrasive elements. When the leading face of the abrasive elements is omitted so that wider stones may be employed, the protrusions or ribs are provided by the extension of the end walls which eliminates the necessity of applying a durable thin material to the forward face to prevent it from abrading the forward wall of the slot.

It is a further object of the invention to provide an abrading element for a honing tool body which has self-adjusting frictional means for retaining the elements within the slots in the body.

It is a still further object of the invention to retain the abrasive elements within the slots of the honing tool body for radial adjustment by the frictional drag set up between the protrusions or ribs and the walls of the slots.

Other objects and features of novelty of the invention will be specifically pointed out or will become apparent when referring, for a better understanding of the inven-

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tion, to the following description taken in conjunction with the accompanying drawing, wherein:

Figure 1 is a perspective view of an abrasive element having protrusions thereon embodying features of the present invention;

Figure 2 is an enlarged, broken plan view of the abrasive element illustrated in Fig. 1, as viewed within the circle 2 thereof;

Figure 3 is a perspective view of an abrasive element substantially larger than that of Fig. 1, with the protrusions of the present invention provided thereon;

Figure 4 is an enlarged, broken plan view of the abrasive element illustrated in Fig. 3, as viewed within the circle 4 thereof;

Figure 5 is a perspective view of an abrasive element provided with a single protrusion on one side thereof;

Figure 6 is a perspective view of an abrasive element, similar to that illustrated in Fig. 5 but having a plurality of protrusions on one side thereof, and

Figure 7 is a plan view of an abrasive element, similar to that illustrated in Fig. 2 showing another form which the invention may assume.

An abrasive element 10 is illustrated in Fig. 1 comprising a molded shell 11 made from a wearable, preferably nonabrasive substance in which an abrasive stone 12 is retained by a suitable adhesive. The shell protects the abrasive stone from fracture and sock and the wall of the slot in the honing tool body from direct abrasion by the stone. The shell is rectangular in shape and in one wall 14 V-shaped protrusions or ribs 13 are provided. The ribs are disposed in the forward wall 14 with reference to the direction in which the honing tool body is rotated and are not subjected to the pressure applied through the abrasive elements as they are thin and hollow and not suited to withstand such stresses.

In Fig. 2, the abrasive element is illustrated with the rib 13 bearing against the forward side of the honing tool body slot 15 as can be determined by the arrow. Although the slot 15 has been worn and enlarged so as to be considerably oversize, an abrasive element of the present invention will be retained therein as the added width produced by the rib 13 will provide the necessary holding pressure therefor.

In Figs. 3 and 4, an abrasive element 16 is illustrated having a shell 17 encompassing a stone 18 on all the surfaces except the working face. The shell is made from a nonabrasive wearable material and is provided on the leading wall 19 with a pair of spaced lugs 21 which extend into recesses communicating with the slots in the honing tool body for preventing longitudinal movement of the stones within the slot. Between the lugs and the ends of the stones, protrusions or ribs 22 are provided on the leading wall 19 of the shell. The ribs 22, as illustrated in Fig. 4, have had the outward arcuate surface sheared off when forced into the slot 23 in the tool body, producing a pressure between the walls of the shell and those of the slot to provide a frictional drag which prevents the stone from falling from the slot.

In Fig. 5, the invention is illustrated as being applied to a small abrasive element 25 having an abrasive stone 26 secured within a shell 27. The shell is made for wearable material which is so shaped as to have a protrusion or rib 28 on the leading wall 29 thereof. The rib is of arcuate semicylindrical shape, the outer arcuate portion of which may be sheared off when the stone is forced into a slot or may be compressed to provide the holding force necessary to retain it within the slot.

A similar arrangement is illustrated in Fig. 6, wherein an abrasive element 31 has a stone 32 mounted within a shell 33, the same as in Fig. 5 with the exception that a pair of semispherical protrusions 34 are provided on the leading wall 35 of the shell toward the ends thereof. The two protrusions may be sheared and/or compressed when the abrasive stone is forced within the slot in the honing tool body. The spaced protrusions provide holding forces near the ends of the stone rather than in the center as occurs with the stone of Fig. 5.

In Fig. 7, an abrasive element 38 is illustrated, having an abrasive stone 39 mounted within a shell 41 which encloses the stone on all except its working face 42 and its leading face 43. The end walls 44 are extended to provide the protrusions or ribs 45 extending beyond the leading face 43 of the stone. With this arrangement, the thin coating of a suitable plastic or other material on the face 46 is omitted as the abrasive grains of the face are prevented from engaging and abrading the side 47 of the slot in the honing tool body by the ribs 45.

While it has been indicated that the protrusions or ribs are molded in the shell, such protrusions and ribs may be made of a suitable material which is adhered to the sides or end walls of the shell. Such protrusions or ribs may be of resilient compressible and/or shearable materials, such as fluid or pastelike synthetic resins, silicones or butanes laid in beadlike fashion upon the wall of the shell and thereafter cured to become permanently adhered thereto. The thickness of such protrusions or ribs may be thin or thick, depending upon the amount of wear which occurred to the slot in which the abrasive element is to be secured. Such material may be a brittle substance, such as synthetic paste or varnish which readily shears when the abrasive element is pushed into the slot of the honing tool body to achieve a snug fit therewithin. For small diameter honing tools or those having low-duty application, better retention is obtained for the small abrasive elements by the use of elastomeric materials for forming the ribs or dots, as shown on the abrasive elements of Figs. 5 and 6. The Dow-Corning Silastic solidifies into a resilient, permanent, adherent protrusion and makes a satisfactory material for application to the face of the shell of the abrasive element. It is desirable that the material be such that it is impervious to any reaction with the hydrocarbons or other solutions used as coolants during the honing process. It was found that by selecting the proper materials and designing the proper shape for the protrusion, the abrasive elements are not only retained secured in the slot of the honing tool body under all conditions of operation but such protrusions provide the abrasive elements, when assembled in the slots of the honing tool body, with an added degree of stability, preventing their lateral movement and chatter and the deleterious effects which result therefrom on the life of the abrasive elements.

What is claimed is:

1. An abrasive element adapted to be carried in the slot of a honing tool wherein said slot widens from use and in which the abrasive element is movable toward and from the center of the tool, said element including an abrasive stone having a working face and a plurality of sides adjacent to said face, a wearable, substantially non-abrasive material engaging said stone on at least one side thereof and at least one rib on a side of the element to add to the dimension thereof, said rib being disposed generally perpendicular to said working face and being integral with and made from the same material as said wearable material and having a sufficiently small cross-sectional area to be readily deflectable and shearable upon insertion of the abrasive element in said slot to thereby provide a binding force which is sufficient to prevent the element from falling from said slot even though the dimension of the slot has enlarged, but which is not sufficient to prevent the element from being moved outwardly and inwardly in the slot.

2. An abrasive element adapted to be carried in the slot of a honing tool wherein said slot widens from use and in which the abrasive element is movable toward and from the center of the tool, said element including an abrasive stone having a working face and a plurality of sides adjacent to said face, a wearable, substantially non-abrasive material engaging said stone on at least two sides thereof and a thin, elongated rib integral with and made from the same material as said wearable material disposed perpendicularly to said working face, said rib being of sufficiently small cross-sectional area as to be readily deflectable and shearable upon insertion of the abrasive element in said slot to thereby retain said abrasive element in said slot with a force sufficient to prevent the element from falling therefrom, even though the dimension of the slot has enlarged, but which is not sufficient to prevent the element from being moved outwardly and inwardly in the slot.

3. An abrasive element adapted to be carried in the slot of a honing tool wherein said slot widens from use and in which the abrasive element is movable toward and from the center of the tool, said element including an abrasive stone having a working face and a plurality of sides adjacent to said face, a wearable, substantially non-abrasive material engaging said stone on at least one side thereof, said material having an integrally molded rib extending outwardly therefrom to add to the dimension of said abrasive element, said rib being made from the same material as said wearable material and being disposed generally perpendicular to said working face and having a sufficiently small cross-sectional area as to be readily shearable from said abrasive element upon insertion of the abrasive element in said slot to thereby retain said abrasive element in the slot with a binding force sufficient to prevent the abrasive element from falling from said slot, even though the dimension of the slot has enlarged, but which is not sufficient to prevent the abrasive element from being moved inwardly and outwardly in the slot.

4. An abrasive element adapted to be carried in the slot of a honing tool wherein said slot widens from use and in which the abrasive element is movable toward and from the center of the tool, said element including an abrasive stone having a working face and a plurality of sides adjacent to said face, a wearable, substantially non-abrasive shell encompassing said stone on all but its working face and having a pair of oppositely facing sides, a protrusion on at least one of said sides made from the same material as said shell and integrally formed with said shell, said protrusion being of a sufficiently small cross-sectional area in a plane substantially parallel to the working face of said stone as to be readily shearable from said shell upon insertion of the abrasive element in said slot to provide a binding force between said abrasive element and said slot sufficient to prevent the abrasive element from falling from said slot, even though the dimension of the slot has enlarged, but which is not sufficient to prevent the abrasive element from being moved outwardly and inwardly in the slot.

5. An abrasive element adapted to be carried in the slot of a honing tool wherein said slot widens from use and in which the abrasive element is movable toward and from the center of the tool, said element including an abrasive stone having a working face and a plurality of sides adjacent to said face, a wearable, substantially non-abrasive material engaging said stone on at least one side thereof, and at least one integral protrusion projecting from said material on said one side of the element to add to the dimension thereof, said protrusion being made of the same material as said wearable material and having a sufficiently small cross-sectional area in a plane substantially parallel to the working face of the stone so as to be readily shearable upon insertion of the abrasive element in said slot to thereby provide a binding force which is sufficient to prevent the element from falling

from said slot even though the dimension of the slot has enlarged, but which is not sufficient to prevent the element from being moved outwardly and inwardly in the slot.

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