This invention relates to an expeller for conveniently removing the liquid or pasty contents of a collapsible tube.

One of the commonest types of containers for pasty or liquid materials especially when the contents are to be dispensed in small quantities are those known as collapsible tubes. These comprise a tubular member made from thin sheet metal having a closure at one end comprising a heavier portion with a nozzle that can be closed with a suitable type of cap. The other end of the tube is usually employed for filling it and is closed simply by pushing the two edges of the tube adjacent each other, folding them over and attaching a thin metallic strip to hold the folded portion of the tube in position. When the contents of the tube are to be removed, usually in small amounts at a time, the cap is removed and pressure applied to the body of the tube. This forces the liquid from the nozzle end where it is applied to the desired surface.

These tubes are used for dispensing a number of different types of materials including paint pigments, oils, tooth paste, medicines, ointments, creams of various types, etc. One of the problems in using such tubes is to expel all of the contents without a substantial amount of waste. Most people when removing the contents apply pressure to the tube at various points but usually near the bottom and then gradually roll up the end of the tube. This however results in a corrugated deformation of the tube and the entrapment of a portion of the contents in the pockets thereby produced when the tube is presumably empty and results in wasting a portion of the contents. Various suggestions have been made for removing the contents singly but most of these involve cumbersome apparatus which must be attached to the wall or other fixed surface and are not useful where the tube must be carried from place to place. This invention seeks to overcome the difficulties inherent in the removal of the contents of a collapsible tube and to improve upon the more or less complicated apparatus previously suggested for this purpose.

Among the objects of this invention is the provision of a collapsible tube expeller that is very simple construction, easily attached to a tube but which nevertheless can cleanly remove all of the contents thereof.

Another object is to provide a collapsible tube expeller that may be readily constructed from a plastic material and formed without any moving parts.

It is also an object of this invention to provide a collapsible tube expeller comprising a unitary rigid slotted rectangular member, the slot extending longitudinally of the member and of a thickness to receive a double layer of the metal of the tube, one edge of the slot opening rapidly to smoothly bear against the content containing portion of the tube and guide the empty portion into the slot.

It is likewise an object of this invention to provide a collapsible tube expeller that may be conveniently manipulated with but one hand thereby releasing the other hand to receive the contents thereof or to hold an object, for example a tooth brush, to which the contents are to be applied.

To obtain these and other related objects, which will be apparent from the subsequent description this invention is illustrated as to certain preferred embodiments in the accompanying drawings forming part of this disclosure and in which:

Figure 1 is a front view of a collapsible tube showing the expeller positioned thereon;
Figure 2 is a cross-sectional view of the expeller taken along the line 2--2 of Figure 1;
Figure 3 is an end view of the expeller shown in Figure 1 looking in the direction of the arrows on the line 3--3 of that figure;
Figure 4 is a sectional view of the expeller illustrated in Figure 1 taken along the line 4--4 of that figure;
Figure 5 is a sectional view similar to Figure 4 showing a modification of the invention; likewise, Figure 6 is also a sectional view similar to Figure 4 of a further modification; while,
Figure 7 is a longitudinal cross-section view of the expeller illustrated in Figure 1.

Referring to the drawing and particularly Figure 1 thereof, the reference numeral 2 designates a conventional type of collapsible tube having a heavier top end portion 4 terminating in a nozzle 6 normally closed by a screw cap 8. The lower end of the tube through which it may be filled, is closed by pressing the tube along a straight line, folding it over, and attaching a narrow U-shaped clamp 10.

It is usually preferable to attach the expeller to the tube before the lower end is closed since to obtain best results it is necessary to have a very narrow slot, slightly greater than twice the thickness of the sheet metal forming the tube, and since the end 10 is considerably thicker than the other portions of the tube when flattened out, the expeller can be attached and adjusted most
conveniently just before the end of the tube is folded over and the clamp 10 applied. The expeller designated generally as 12 is preferably formed of some type of hardened plastic material such as for example, bakelite, plasticsoid, or any other of the well known types of plastics which can be readily formed or molded and then hardened to give sufficient rigidity. The expeller is substantially rectangular considered both in plan and elevation although slight variations are possible from the exact dimensions given. The expeller 12 and extending substantially along the entire longitudinal distance thereof is a slot 14 of a length sufficient to receive the entire tube when it is flattened and of a thickness slightly in excess of the thickness of the two layers formed when the tube is flattened. The upper edge of the slot, or that which is in contact with the filled portion of the tube, is rounded as 16 in order to guide the converging sides of the tube into the slot. This results in a smooth movement of the expeller along the length of the tube and prevents any sharp edges coming in contact with which would tend to cut through the thin metal casing forming the tube and permit the contents to come out at the broken portions. The remainder of the slot comprises substantially parallel sides 18 to prevent any of the material of the tube from passing between the collapsed portion and into the lower portion 5 from which the contents have been expelled. In this way the collapsed portion 5 from which the contents have been completely removed presents a smooth outer surface. Since the expeller can slide along the tube and does not sharply engage with any portion thereof the label which may be pasted on the outside or the lithographing thereon is in no way damaged and the tube therefore presents a clean legible appearance after the expeller has passed a portion thereof. In this way the name on the outside of the tube is always available and is not destroyed. The tube can therefore always be identified as to its contents.

The bottom of the slot as illustrated in Figures 3 and 4 has its sides always parallel thereby forming a sharp angle with the bottom of the expeller. This arrangement may be used to advantage by slightly bending the collapsed tube as it leaves the expeller which will keep it in its operative position illustrated in Figure 5. The friction between the parallel sides of the slot and the collapsed section of the tube is sufficient to maintain it in position but the method just described is helpful at times.

The modification illustrated in Figure 1 has another feature in the provision of a recessed portion 20 to receive the end of the operator's thumb 22 in order to slide the expeller along the tube. If desired, the ends of the expeller can be knurled as illustrated in the end view shown in Figure 3 at 24. Alternatively the end of the expeller may contain suitable advertising material such as the trade mark of the manufacturer of the contents of the tube or the like. If this be embossed in the ends, a roughened surface is provided which forms a suitable hold for the ends of the fingers.

In Figure 5 is illustrated a modification of the slot structure shown in the preceding figure. This modification resides particularly in that in addition to the rounded portion 16 at the upper end of the expeller slot there is likewise provided at the bottom end a rounded portion 26. The modification illustrated in Figure 6 which shows a cross-section along the lines 4-4 of the expeller illustrated in Figure 1 comprises broadly two oval sections adjacent each other and separated by a distance sufficient to receive the two layers of metal comprising the collapsed tube. With this structure the surfaces 28 provide an easier and more uniform passage for the collapsed tube and apply a greater pressure to the contents so as to force them through the nozzle. This operation can be carried on very simply since when the thumb is placed in the position indicated in Figure 6 the forefinger lies at the opposite side of the tube and parallel to the expeller. When the thumb is then pressed against the tube and likewise against the opposed forefinger there is a substantial frictional grip on the end 5 of the tube 2 at the section 30 and the thumb cammed against the surface 28 applies the necessary pressure to the expeller.

Figure 7, which is a longitudinal sectional view shows the arrangement of the ends of the slot. In this case they are shown as arcuate as at 32. This form further assists in guiding the tube into the slot and prevents any sharp edges attacking the tube and puncturing it as indicated above which would permit the contents thereof to come out over the surface of the tube at undesired points.

It will thus be seen that I have provided a new and useful type of collapsible tube expeller that can be used in a very natural manner and quite similar to the normal methods of removing the contents but without any waste thereof and without damaging the exterior of the tube in the fashion herefore customary. My expeller is preferably constructed of a single piece of material although where it is to be attached to collapsible tubes after they have been filled it is usually desirable to arrange some means whereby one end portion of the expeller can be separated temporarily from the rest to insert the tube as by sliding the expeller on and then attaching the remainder of the expeller. In Figure 2 I have illustrated a structure whereby this may be accomplished. The end of the expeller 12 is cut at the line 34 substantially at the end of the slot 14 and in the manner illustrated in Figure 5 two members there produced suitable dowel pins or the like 36 are attached and a corresponding hole or holes provided in the other member. These will form a frictional contact sufficient to hold the member together after the expeller has been applied to the tube. Obviously other means for restoring the unitary construction of the device after it has been applied to a tube can be substituted for that specifically described. In any event the structure when applied to a tube is substantially unitary and has no external fastening or means.

It will thus be seen that I have provided a collapsible tube expeller characterized by the utmost simplicity of structure, ease and cheapness of manufacture, and efficiency in operation. While the invention has been described with reference to a modification of the slot structure shown in the appended claims, What is claimed is:

1. A collapsible tube expeller comprising a unitary rigid slotted rectangular member, the slot extending longitudinally of the member and of a thickness to receive a double layer of the metal
of the tube, one edge of the slot opening rapidly to smoothly bear against the content containing portion of the tube and guide the emptying portion into the slot.

2. A collapsible tube expeller comprising a unitary rigid slotted rectangular member, the slot extending longitudinally of the member and of a thickness to receive a double layer of the metal of the tube, the top edge of the slot opening rapidly to smoothly bear against the content containing portion of the tube and guide the emptying portion into the slot.

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