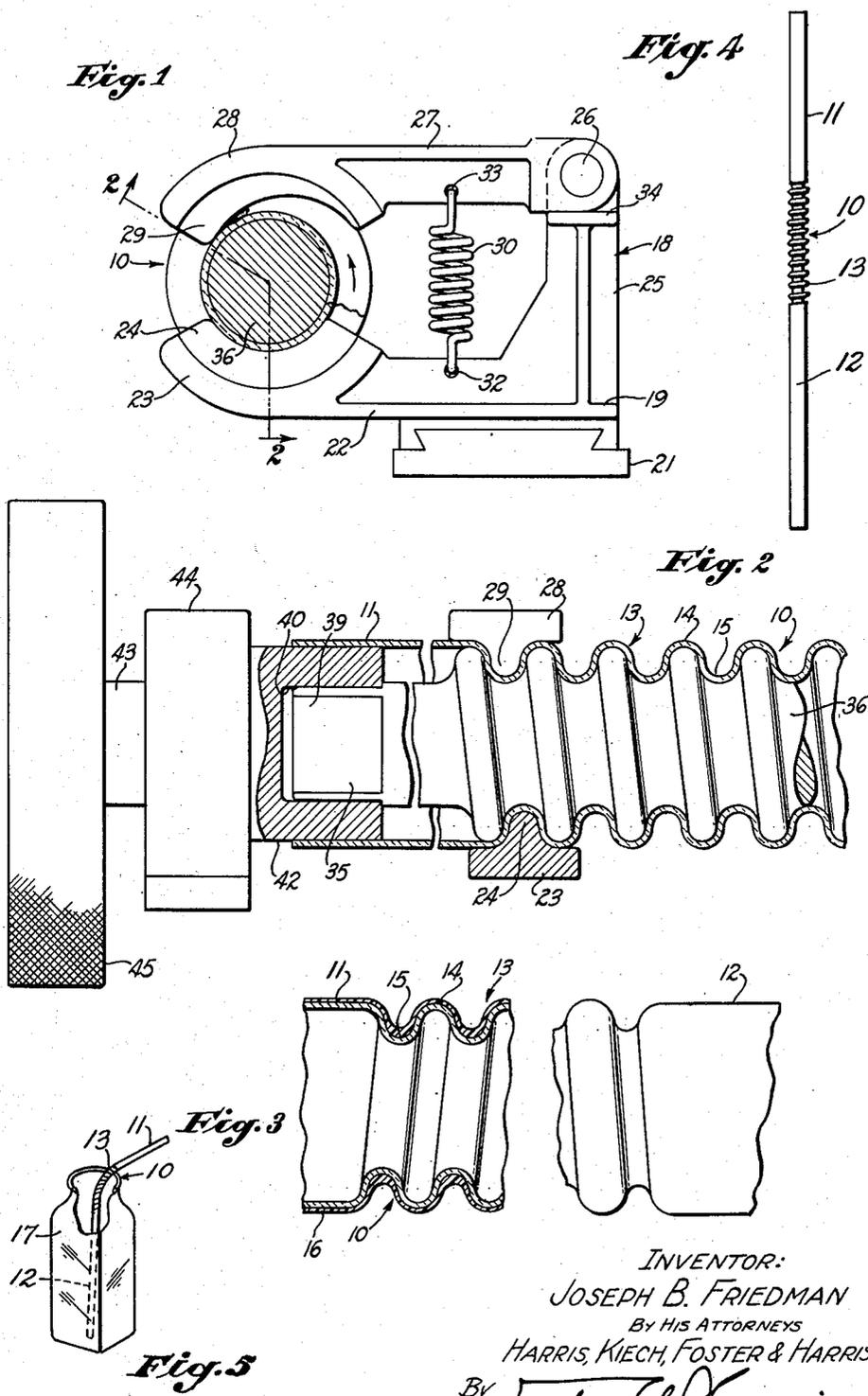


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FLEXIBLE DRINKING STRAW

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FLEXIBLE DRINKING STRAW

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This invention relates to improvements in drinking tubes and, more particularly, to that type of drinking tube known as a drinking straw.

The drinking straw which is provided by my invention comprises a generally cylindrical body having smooth end portions and an intermediate corrugated or convoluted portion which is adapted to permit one of the end portions of the straw to be bent from the vertical axis thereof into a position which will permit the person drawing liquid through the drinking straw to bend the end portion of the drinking straw into a position which permits the person drinking to more readily and easily imbibe liquid through the straw.

A drinking straw invented by me, and somewhat similar in type to that disclosed by me in this application, is shown in United States Patent No. 2,094,268, issued on September 28, 1937. The drinking straw shown in my previous patent, while a considerable advance over the prior art in that it provided a straw which was constituted by two end portions having a generally cylindrical shape and a smooth periphery joined together by an integral, intermediate, flexible portion which would permit the end portions to be displaced from the vertical axis of the straw, nevertheless, had certain inherent disadvantages which it is an object of the present invention to overcome.

Drinking straws constructed in accordance with my previous invention had their intermediate, flexible, convoluted portions so constructed that the ridges of the convolutions projected beyond the peripheral areas of the adjacent end portions. Thus, when straws so constructed were packed into the containers from which they were to be dispensed, the intermediate portions of adjacent straws became intermeshed one with another in such a manner that the withdrawal of one straw occasioned the inadvertent, simultaneous withdrawal of straws whose intermediate, flexible portions were in contact with the intermediate, flexible portion of the straw which was withdrawn. Therefore, the withdrawal of one straw necessitated the simultaneous withdrawal of several other straws and since it was difficult to replace the inadvertently withdrawn straws in the dispensing container, these straws were frequently discarded by the person withdrawing them. As can be readily appreciated, considerable wastage resulted.

In addition, packaging of straws constructed in accordance with my previous invention was rather difficult because of the flexible nature of

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straws embodying convoluted, intermediate portions. As indicated above, the flexible nature of the straws permitted the end portions thereof to depart from the vertical axes of the straws. Thus, when the straws were in the process of being packaged, it was very difficult to so align the straws that they could be readily enclosed in the dispensing container.

Furthermore, in straws constructed in accordance with my prior patent, the incorporation of the intermediate, flexible portion permitted the end portions of such a straw which projected from the mouth of a vessel or the neck of a bottle from which liquid was to be imbibed, to droop over the edge of the vessel or bottle immediately upon the placing of the straw in the vessel or bottle. Thus, it was necessary for the person utilizing the straw to hold the end of the straw in his fingers while he was drawing liquid there-through. Also, when the straw was removed from the mouth of the person utilizing it, the end portion would once again droop over the edge of the container and it occasionally happened that fluid remaining in the upper end of the straw would leak upon the surface on which the container was situated, thus creating an untidy and unsanitary condition.

As may be clearly seen from a consultation of my previous patent, the convolutions provided intermediate the smooth end portions of the straw were arranged transversely of the central vertical axis of the straw. These transverse corrugations, while achieving their purpose of permitting either end of the straw to be bent into a desired position, nevertheless, because of their inherently separated nature, served to weaken the straw in the intermediate portion thereof.

By the present invention I provide a drinking straw which, while incorporating an intermediate, flexible portion adapted to permit either end portion of the straw to assume a position divergent from the central vertical axis of the straw, nevertheless, obviates many of the difficulties encountered in straws constructed in accordance with my previous invention.

It is, therefore, a primary object of my invention to provide a drinking straw having a generally cylindrical shape and composed of two smooth-surfaced end portions joined together by an intermediate, convoluted, flexible portion adapted to permit either of the end portions to assume a position divergent from the vertical central axis of the straw, which is so constructed that the intermediate, flexible portion of the straw will not ordinarily become intermeshed

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with the intermediate, flexible portion of adjacent straws when said straws are packed in a dispensing container. This is achieved by so forming the straws that the widest diameter of the intermediate, flexible portions of the straws is always less than or at most substantially equal to the widest diameter of either of the end portions of said straw.

Another object of my invention is the provision of a drinking straw having generally cylindrical, smooth surfaced end portions joined by an integral, intermediate, flexible portion adapted to permit the divergence of either end portion from the vertical central axis of said straw, which has applied to the surface thereof a coating of a frangible, plastic substance which is adapted to temporarily rigidify the flexible, intermediate portion of the straw to facilitate the packaging of said straw. Thus, difficulties encountered in packing prior art straws because of their flexible nature are avoided.

An additional object of my invention is the provision of a drinking straw having an intermediate, flexible portion which has deposited thereupon a coating of a frangible, plastic material adapted to render the intermediate flexible portion temporarily rigid, which plastic material will readily fracture when one end of the straw is adjusted into a position divergent from the central vertical axis of said straw, but which will nevertheless retain a sufficient amount of rigidity to sustain the divergent end of said straw in the position into which it has been initially adjusted. Thus, difficulties encountered in prior art straws because of the drooping of the end portion thereof are avoided in straws constructed in accordance with my present invention.

A further object of my invention is the provision of a drinking straw having an intermediate, flexible portion which is adapted to permit the divergence of either end of said straw from the vertical central axis thereof and which is constituted by a helix or spiral. The helix or spiral provides a continuous ridge and an associated continuous groove for the entire length of the flexible, intermediate portion of the straw. The construction and formation of the intermediate, flexible portion of the straw in the shape of a spiral materially strengthens the straw and permit the more effective distribution of the frangible, plastic, stiffening substance upon the intermediate, flexible portion of the straw. In addition, the frangible, plastic, stiffening substance which is deposited in the continuous groove formed by the spiral provides a columnar effect which tends to make the stiffening action of the plastic substance more effective.

Further objects and advantages of the present invention will be apparent from the following specification and drawing, which is for the purpose of illustration only, and in which:

Fig. 1 is a vertical elevational view of an apparatus adapted to be utilized in the construction or formation of straws made in accordance with my present invention;

Fig. 2 is a partly elevational, partly sectional view taken on the broken line 2—2 of Fig. 1;

Fig. 3 is an enlarged, longitudinal sectional view of a straw formed in accordance with my invention showing the manner in which the frangible plastic stiffening substance is deposited upon the surface of the intermediate, flexible portion of the straw;

Fig. 4 is an elevational view of a flexible drink-

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ing straw constructed in accordance with my invention; and

Fig. 5 is a perspective view showing a flexible drinking straw constructed in accordance with my invention in the position in which it may be disposed when in use.

Referring now to the drawing, as best shown in Figs. 3 and 4, I show an adjustable drinking straw 10 which is preferably formed of readily deformable material, and which has a generally cylindrical, smooth surfaced end portion 11 joined to a generally cylindrical, smooth surfaced end portion 12 through the medium of an integral, intermediate, flexible, convoluted portion 13. The provision of the intermediate, flexible portion 13 joining the smooth surfaced, generally cylindrical end portions 11 and 12 permits either of said end portions 11 or 12, when said straw is in use, to be positioned at an angle divergent from the central vertical axis of said straw to facilitate the utilization of said straw by an individual who intends to use the straw.

The utilization of a readily deformable material in the formation of the drinking straw 10 permits the intermediate, flexible portion 13 to be more readily formed in the body of the straw. The intermediate, flexible portion 13 of the drinking straw 10 is constituted by a spiral or helix which provides a continuous ridge running the length of the intermediate, flexible portion and an alternate continuous groove which also runs the length of said intermediate, flexible portion. The construction of the intermediate, flexible portion of the straw by the utilization of a spiral or helix materially strengthens the straw in this region and is a considerable advance over the transverse corrugations disclosed in my previous patent.

As best shown in Fig. 3 of the drawing, there is deposited upon the surface of the intermediate, flexible portion 13 of the drinking straw 10 a coating of a frangible, plastic substance 16 which is deposited upon the alternately disposed ridge 14 and groove 15 of the intermediate portion 13 of the straw 10.

The deposition of the plastic, frangible coating 16 upon the intermediate, flexible portion 13 of the straw 10 serves to temporarily render the intermediate, flexible portion of the straw rigid and thus permits the straw 10 to be as easily handled in packaging as conventional straws. In addition, as can be observed from the drawing, the frangible, plastic coating tends to become more thickly deposited in the groove 15 of the spiral or helix and thus provides a continuous ribbon or band of increased thickness which substantially enhances the stiffening effect of the plastic, frangible coating. In addition to temporarily stiffening the intermediate, flexible portion 13 of the straw 10 and thus permitting the packaging of the straw to be facilitated, the plastic frangible coating 16 also permits the more effective adjustment of the end of the straw into a desired position.

When straws constructed in accordance with my previous invention were removed from the dispensing package and inserted in the mouth of a vessel or the neck of a bottle, the end of the straw which projected from said vessel or bottle would immediately droop over the side of the vessel or bottle. Thus, the user of the straw had to hold the straw in his fingers at all times when he was drawing liquid therethrough. When he released the straw there was a tendency for liquid contained in the end of the straw to be deposited

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upon the surface on which the vessel or bottle rested.

By providing the intermediate, flexible portion 13 of the straw 10 with a coating 16 of frangible, plastic material, I am able to produce a straw which, when placed in the mouth of a vessel or the neck of a bottle, will stand therein with the end portion projecting from said vessel or bottle aligned with the vertical central axis of said straw. The immediate drooping of the end of the straw over the mouth or neck of the vessel or bottle when the straw is placed therein is thus eliminated. In addition, when the user of the straw grasps the end portion thereof between his fingers he is enabled to adjust the end portion to an angle divergent from the vertical central axis of said straw which is most suitable to his specific needs. Further, when he has adjusted the end of the straw to this angle, the plastic coating upon the intermediate, flexible portion of the straw, although partially fractured, will serve to retain the end portion of the straw in the position into which it has been initially adjusted. The manner in which the upper end portion 11 of the straw 10 is maintained in its adjusted position is most clearly shown in Fig. 5 of the drawing where the straw is shown disposed in the neck of a bottle 17. I thus provide a straw which is capable of being adjusted to a position suited to the needs of the user of the straw and which will remain in the adjusted position. The adjustable nature of my straw makes it most desirable for use in hospitals and similar institutions where a bedridden individual is incapable of holding the end of the straw in his fingers while he draws liquid therethrough. It is possible for the attendant who places the straw in the vessel in which the liquid is contained to adjust the straw to the most desirable angle and be sure that the end of the straw will not diverge from the initially adjusted position.

I provide an apparatus or machine 18, as best shown in Fig. 1, adapted to effectively manufacture straws constructed in accordance with my present invention and including a frame 19 of generally L-shaped configuration having a bed 21 to which it is rigidly but movably secured. Formed integrally with the frame 19 and the apparatus 18 is an outwardly projecting lower arm 22 which has positioned on its outermost end a lower fixed shoe 23 of generally arcuate configuration. Formed upon the upper surface of the lower fixed shoe 23 is an integral die member 24 which is adapted to form the spiral convolutions of the intermediate, flexible portion 13 of the straw 10 in a manner which will be described below.

Secured upon an upstanding leg 25 of the apparatus 18 through the medium of a pin 26 or similar fastening device is a pivotally mounted, outwardly projecting upper arm 27 which bears upon its outermost end an upper, arcuately shaped shoe 28. Formed integrally with the under side of the upper shoe 28 is an arcuately shaped die member 29 adapted to cooperate with the lower die member 24 in the formation of the flexible, intermediate portion 13 of the straw 10.

Interposed between the upper side of the outwardly projecting lower arm 22 and the under side of the outwardly projecting, pivotally mounted upper arm 27 is a tension coil spring 30 secured in position through the medium of a hole 32 formed in the lower arm 22 and a hole 33 formed in the upper arm 27. The spring 30 urges the upper arm 27 and its associated upper shoe

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28 toward the lower arm 22 and its associated lower fixed shoe 23. A stop seat 34 formed upon the upper end of the upstanding leg 25 of the machine 18 is adapted to contact the inner end of the outwardly projecting upper arm 27 and prevent the downward declination thereof beyond a certain point.

Adapted to be interposed between the lower fixed shoe 23 and the upper movable shoe 28 and to be contacted by the lower die member 24 and the upper movable die member 29 is a mandrel 35 which has formed thereupon a convoluted central portion 36 in the shape of a spiral or a helix. The convoluted, central portion 36 of the mandrel 35 is thus provided with a continuous ridge and an alternate continuous groove of the same configuration as that which it is desired to form in the intermediate, flexible portion 13 of the straw 10. Formed integrally upon the end of the mandrel 35 is a square, reduced end portion 39 which is adapted to be inserted removably in a square socket 40 formed in a cylindrical rotating socket member 42. The socket member 42 is fixedly secured to the end of a shaft 43 which is rotatably mounted in a bearing 44 which has secured to the end thereof projecting beyond the bearing 44 a turning wheel 45 through the medium of which the mandrel 35 is adapted to be rotated.

When a straw 10, constructed in accordance with my present invention, is to be manufactured, a generally cylindrical sleeve of readily deformable material is slipped over the mandrel 35. The mandrel 35 is then interposed between the upper and lower die members 24 and 29 and the squared end 39 thereof is inserted in the socket 40 of the socket member 42. The interpositioning of the mandrel 35 between the upper and lower die members 24 and 29 is facilitated by raising the upper die member 29 against the bias of the spring 30. The frame 19 of the apparatus 18 is longitudinally movable upon the bed 21 thereof and when the mandrel 35 has been inserted in the socket member 42 the frame 19 is so shifted that the die members 23 and 29 will be positioned adjacent one end of the convoluted, central portion 36 of the mandrel 35.

Since the die members 24 and 29 are formed on the same pitch as the convolutions of the central portion 36 of the mandrel 35, the die members will fit within the groove 15 formed thereby. The force of the spring 30 will tend to drive the lower die member 24 and upper die member 29 into the groove 15. When the turning wheel 45 is rotated the simultaneous rotation of the shaft 43 through its connection with the end of the mandrel 35 will cause the simultaneous rotation of the mandrel and will permit the frame 19 of the machine 18 to be shifted longitudinally along its bed 21 as the die members 24 and 29 travel through the groove 15 of the convoluted portion 36 of the mandrel 35. The die members 24 and 29 will thus form a convoluted, flexible, intermediate portion in the generally cylindrical body of the straw 10. When the forming operation is completed the upper die member 29 is raised against the force of the spring 30 and the mandrel 35 is removed from between the die members 24 and 29. When the mandrel 35 has been removed the straw can then be displaced from its position thereupon.

After the formation of the flexible, intermediate portion 13 in the body of the straw 10 has been accomplished, the coating of plastic, frangible substance is applied to the intermediate

flexible portion 13. This coating of a frangible, plastic substance can be applied to the surface of the intermediate, flexible portion of the straw in any desired manner such as immersion or spray. It is also conceivable that it might be advantageous to coat the entire body of the straw with the plastic, frangible material to enhance the strength of the entire straw. I have discovered that a most efficient and suitable plastic, frangible coating material is provided by a microcrystalline wax having a melting point of not less than 150° F.

As was explained above, when the plastic, frangible coating is applied to the intermediate flexible portion of the straw, the intermediate flexible portion is rendered temporarily rigid. As was also indicated, the partial fracturing of the coating of the plastic frangible substance permits the adjustment of the end portion of the straw; it also serves to retain the end portion in the position to which it is initially adjusted. The utilization of the high melting point wax described above to rigidify the intermediate flexible portion of the straw avoids the possible softening of the plastic coating when hot liquids are drawn through the straw. Thus, the inadvertent softening of the plastic coating and the consequent drooping of the end of the straw are avoided and the retention of the end portion of the straw in its initially adjusted position is assured when hot drinks are drawn through the straw.

I thus provide by my invention a drinking straw which has smooth surfaced, generally cylindrical end portions joined by an intermediate flexible portion adapted to permit the end portion thereof to be adjusted to an angle divergent from the central vertical axis of the straw which has deposited upon the intermediate flexible portion thereof a coating of a plastic, frangible substance which is adapted to temporarily render said intermediate flexible portion rigid to facilitate the handling of and packaging of the straws and to permit the end of the straw projecting from a vessel or a bottle to be adjusted into a desired position and to be retained in that position during the use of the straw.

Although I have herein shown and described my invention in simple and practical form, it is realized that certain modifications may be made in the embodiment of the invention shown, and I, therefore, do not intend to be limited to the details of the construction shown but intend my invention to be accorded the full scope of the following claims.

I claim as my invention:

1. An adjustable drinking straw made of flexible material and to be utilized in drawing liquid from the interior of a suitable vessel, compris-

ing: an end portion having a smooth surface and being of generally cylindrical shape; an intermediate, flexible portion formed integrally with said end portion, the wall of said flexible portion being constituted by a series of convolutions, the greatest diameter of said convolutions being no greater than the largest diameter of said smooth end portion; and another end portion having a smooth surface and being of generally cylindrical shape formed integrally with said intermediate flexible portion.

2. An adjustable drinking straw made of flexible material and to be utilized in drawing liquid from the interior of a suitable vessel, comprising: an end portion having a smooth surface and being of generally cylindrical shape; an intermediate, flexible portion integrally formed with said end portion, the wall of said flexible portion being constituted by a spiral providing a continuous alternating ridge and groove for the entire length of said intermediate, flexible portion, the widest diameter of said ridge being no greater than the widest diameter of said end portion; and another end portion having a smooth surface and being of generally cylindrical shape, integrally formed with said intermediate, flexible portion.

3. An adjustable drinking straw made of flexible material and to be utilized in drawing liquid from the interior of a suitable vessel, comprising: an end portion having a smooth surface and being of generally cylindrical conformation whose greatest diameter is no less than the greatest diameter of said straw; an intermediate, flexible portion formed integrally with said end portion, the wall of said flexible portion being constituted by a spiral which provides a continuous alternating ridge and groove extending the entire length of said intermediate, flexible portion, with the greatest diameter of said ridge being no greater than the greatest diameter of said end portion; a coating of microcrystalline wax deposited upon the surfaces of said ridge and said groove; and another end portion having a smooth surface and being of generally cylindrical configuration the greatest diameter of which is no less than the greatest diameter of said intermediate, flexible portion formed integrally with said end portion.

JOSEPH B. FRIEDMAN.

REFERENCES CITED

The following references are of record in the file of this patent:

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Number	Name	Date
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