Sept. 30, 1969 J. W. SILVA 3,469,411

FRANGIBLE TARGET AND METHOD OF MANUFACTURE

Original Filed March 9, 1964 2 Sheets-Sheet 1

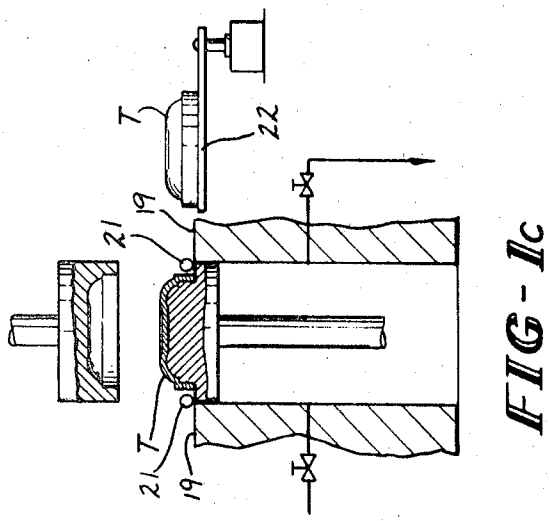


FIG-1C

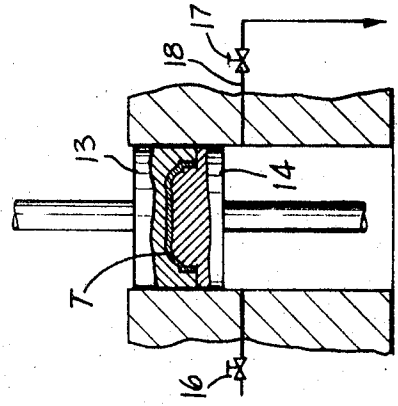


FIG-1B

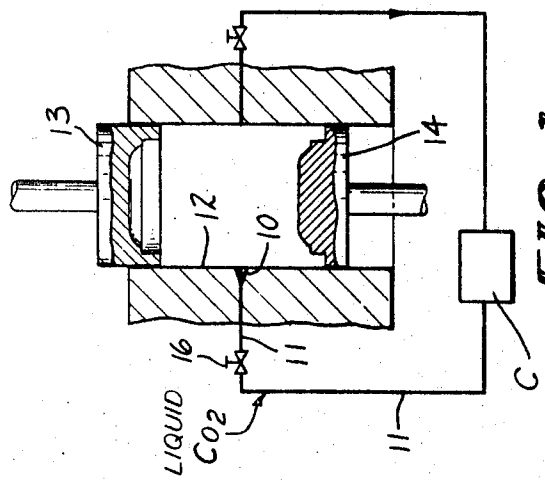


FIG-1A

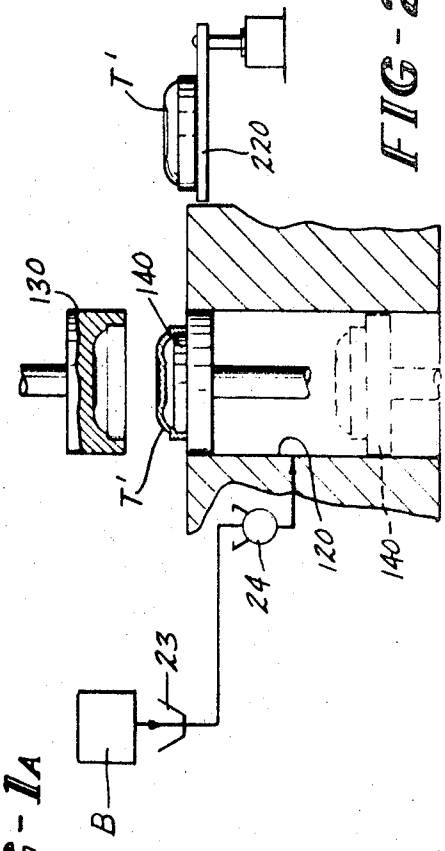


FIG-2

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FRANGIBLE TARGET AND METHOD OF MANUFACTURE

Original Filed March 9, 1964 2 Sheets-Sheet 2

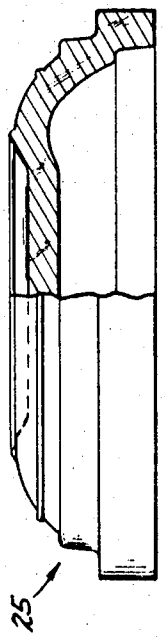


FIG-4

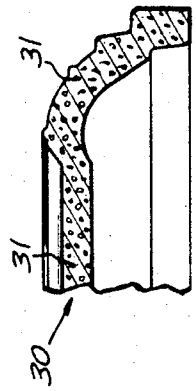


FIG-5

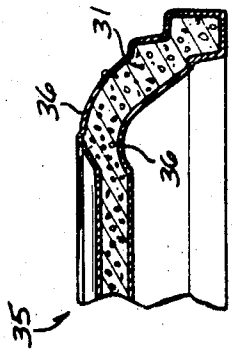


FIG-6

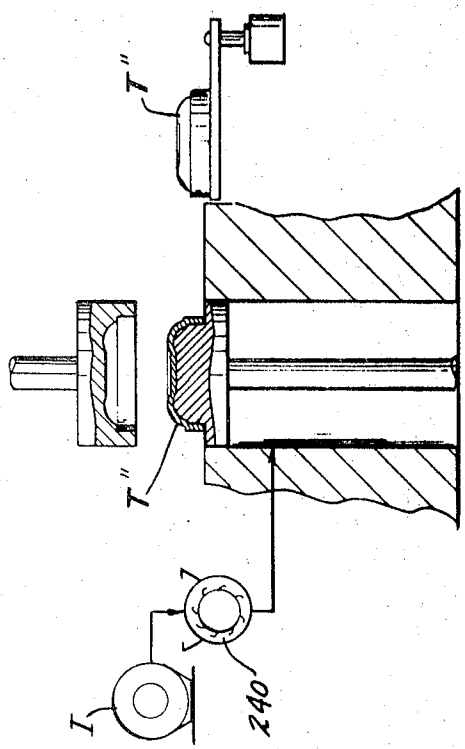


FIG-3

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3,469,411

FRANGIBLE TARGET AND METHOD OF MANUFACTURE

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Original application Mar. 9, 1964, Ser. No. 350,296, now Patent No. 3,359,001, dated Dec. 19, 1967. Divided and this application Aug. 16, 1966, Ser. No. 589,781
Int. Cl. F25c *1/00;* F41j *9/16;* B30b *13/00*
U.S. Cl. 62—66 2 Claims

ABSTRACT OF THE DISCLOSURE

A method for producing frangible trap shooting targets out of ice wherein crushed ice particles are mixed with binder material and the resulting mixture is tightly compressed by opposing die member so as to form the desired target.

The present invention relates to projectable targets and relates in particular to a frangible target of the type used in various trapshooting games.

This application is a division of copending application Ser. No. 350,296, filed Mar. 9, 1964, now U.S. Patent 3,359,001, issued Dec. 19, 1967.

The invention also relates to a novel process for manufacturing projectable, frangible trapshooting targets where the process is susceptible of practice or operation at the point of use.

A particular feature of the present invention is the provision of a novel projectable, frangible target which by virtue of its structure and method of manufacture eliminates shipping, breakage, inventory and residue problems ordinarily encountered in the use of prior art clay targets.

A further feature of the invention is the provision of a frangible target formed by freezing, compacting or molding, in a suitable die, shaved or cracked ice, water, snow or carbon dioxide.

A further feature of the invention is the provision of frangible targets of the above general description including dispersed particulate matter within the target such as coloring material, fluorescent particles or other liquid, solid or gaseous components.

The frangible target of the present invention further contemplates the combination of a skin or envelope surrounding the target where the skin may take the form of impregnated or waxed paper, a thin film of plastic sheet material or a metallic foil.

The invention also provides a novel process for manufacturing targets.

A projectable, frangible target embracing certain principles of the present invention and defined in its simplest form may comprise a slug of ice or solid carbon dioxide or a compacted mass of crushed ice or ice particles.

A process for producing frangible targets at the trapshooting area and embracing certain principles of the present invention may comprise the provision of a source of liquid carbon dioxide, water, crushed ice, or crushed carbon dioxide ice, compacting or molding one of said source materials into a characteristic target configuration and thereafter placing the molded target upon a trap and projecting the target.

Oher features and advantages of the present invention will become more apparent from an examination of the succeeding specification when read in conjunction with the appended drawings in which:

FIGS. 1A, 1B, 1C, 2 and 3 are schematic representations of typical machinery useful to practice the process of the present invention, and;

FIGS. 4, 5 and 6 are representations of typical target structures.

In FIG. 1A there is shown a source of liquid carbon dioxide connected by a suitable conduit **11** to a cylindrical cavity **12** encolsed by a pair of reciprocating, mating dies or molds **13** and **14**. By suitable operation of valve **16** liquid carbon dioxide is introduced through expansion nozzle **10** effective to develop carbon dioxide snow within the cylinder **12**.

After an appropriate interval the valve **16** is closed and mating dies **13** and **14** are moved towards one another effective to convert the snow into a solid figure or frozen target T as indicated in FIG. 1B.

A check valve **17** communicating with the cavity **12** by means of conduit **18** may be advisable to relieve gas pressure during the molding operation.

In addition, considerations of economy may require that the exhaust carbon dioxide gas be directed to a compressor C for reconversion into liquid carbon dioxide in a closed circuit of the type shown schematically in FIG. 1A.

After the carbon dioxide snow has been converted into a round or disc-like target T having the cross sectional configuration shown in FIG. 1B the cavtiy **12** is opened and the dies **13** and **14** are so manipulated to bring target T flush with surface **19**; thereafter fingers **21** are operative to transfer the target to trap arm **22** whereupon the target T is ready for projection in conventional fashion.

FIG. 2 is a representation of an alternative process for producing a target T′ wherein the starting product is a carbon dioxide or ice block B which is processed through a crusher or granulator **23** and thence through a pulverizer **24** prior to introduction into a die cavity **120**. After suitable compacting by dies **130** and **140** the target T′ is transferred to trap arm **220** in the manner previously described.

FIG. 3 discloses in similar fashion a still further alternative wherein the starting material is flaked or coarsely crushed ice I processed through a pulverizer **240** and thence introduced into the die cavity for molding and compaction in the fashion previously described to produce target T″.

It is anticipated that the source material introduced to the die cavity **12**, for example, of FIG. 1A may be water; however, in view of the time interval necessary to freeze water and the continuous requirement of targets, it is preferable to use as a starting material liquid or solid carbon dioxide, crushed or shaved ice.

It is also within the contemplation of the invention that the starting material be natural or artificial snow.

The process represented schematically in FIGS. 1A, 1B, 1C, 2 and 3 may include the additional step of lining or covering dies **13** and **14** with a flexible sheet prior to the molding step in order to produce a frangible target T, T′, or T″ having an exterior skin or envelope.

The skin or envelope may take the form of a thin web or sheet of treated paper, plastic or metal foil.

The above-described processes also contemplate the additional step, if desired, of introducing particulate matter in combination with the starting material, suitably dispersed, to effect coloring, fluorescence, control frangibility, density or flight characteristics.

It is anticipated that the particulate matter may be introduced or admixed in liquid, solid or gaseous form.

Referring now to FIGS. 4, 5, and 6, note that the reference numeral **25** designates a typical circular or disc-shaped trapshooting target, partially in section, where the target comprises molded or compacted carbon dioxide, artificial or natural snow, crushed or shaved ice or water.

The partial representation of a frangible, frozen target indicated by the reference numeral **30** in FIG. 5 is molded or compacted of any of the starting materials described with respect to FIG. 4 plus the inclusion of dispersed particulate matter as represented by the reference numerals **31—31.**

The target represented in FIG. 6, indicated generally by the reference numeral **35**, can be fabricated from any combination or permutation of the source materials of FIG. 4 and a desired particulate material **31—31** plus a protective skin or envelope indicated by the reference numeral **36.**

The frozen, frangible target and method of manufacture of the present invention is advantageous for the following reasons:

(1) The targets may be produced at the place of trapshooting.

(2) The method of manufacture eliminates very substantial transportation charges incurred in distributing prior art targets.

(3) The targets do not develop any appreciable residue.

(4) The target and method of manufacture in accordance with the present invention eliminates bothersome inventory and breakage problems encountered in prior art target operations.

It is anticipated that a wide variety of embodiments of the present invention may be devised without departing from the spirit and scope thereof.

What is claimed is:

1. A method of producing a frozen, projectable, frangible target useful in trap shooting or the like comprising the steps of providing a pair of mating die members defining a die cavity, said die members having a size and shape such that when they are moved together said die cavity conforms to the size and shape of a target, providing a plurality of crushed ice particles mixed with particulate matter, placing said ice particles and particulate matter in said die cavity, moving said die members toward each other to apply pressure to the particles and particulate matter in said die cavity and releasing said pressure to convert said ice particles and said particulate matter into a solid mass having the size and shape of a target.

2. A method of producing a frozen, projectable, frangible target useful in trap shooting or the like comprising the steps of providing a pair of mating die members defining a die cavity, said die members having a size and shape such that when they are moved together said die cavity conforms to the size and shape of a target, lining said die cavity with a skin, providing a plurality of crushed ice particles, placing said particles in said die cavity, moving said die members toward each other to apply pressure to said particles in said die cavity and releasing said pressure to convert said particles into a solid mass having an exterior skin and the size and shape of a target.

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U.S. Cl. X.R.

62—1; 100—39; 241—3; 264—122; 273—105.4