



SYRINGE DESTRUCTING DEVICE

This invention relates to a syringe destructing device which finds particular utility in hospitals, clinics and other locations where a large quantity of syringes are commonly used.

As used herein, the term "syringe" can include the injection cartridge without a needle thereon or with a needle thereon.

Once a syringe has been used to inject medication into a patient in a hospital, clinic or physician's office, a problem arises as to how to dispose of the used syringe. It has been found that drug addicts will often attempt to acquire such used syringes for the purpose of subsequent use for drug injections. However, since such used syringes are not properly sterilized and are not actually intended for reuse, there is the danger that any such addict who uses such a syringe could contract serum hepatitis. Also, aside from the problem of drug addicts, there is simply the question of where to place the used syringes and how to dispose of the same. If such used syringes are simply dropped in a trash basket or bag, there is a strong likelihood that maintenance personnel who collect and handle such trash might become inadvertently scratched by the needles and contract infection therefrom.

The problem of used syringes and the manner of disposing of the same has been considered in the past and two separate procedures have been proposed. However, it has been found that neither of such proposals has been entirely satisfactory in practice. One such proposal involves breaking the tip off the needle and breaking the cartridge portion in half. The other proposal involves separating the needle from the cartridge portion and melting the cartridge portion in a furnace. Neither of these procedures has proved entirely satisfactory if for no other reason than both require the use of highly skilled and highly paid nurses to spend a considerable amount of time breaking needles. Also, in doing so, these nurses must be quite careful not to themselves become scratched by the needles. Additionally, it is thought that even where the tip of the needle and a portion of the cartridge have been broken away, the remaining shank of the needle and the attached portion of the cartridge can still be reused by a desperate addict.

In view of the foregoing, it is accordingly, an object of the present invention to overcome the difficulties and deficiencies associated with prior art techniques for syringe destruction and to provide in their stead, a new and improved syringe destructing device.

Another object of the present invention is to provide a syringe destructing device wherein the operator will have minimal contact with the syringe, yet wherein the syringe will be completely destroyed and incapable of being reused.

Another object of the present invention is to provide a simple yet highly efficient apparatus which is capable of rapidly fracturing a syringe cartridge and needle into a plurality of separate and discrete parts which are incapable of reuse.

Other objects, advantages and salient features of the present invention will become apparent from the following detailed description, which, taken in conjunction with the annexed drawings, discloses a preferred embodiment thereof.

The foregoing objects are attained by providing a device with a unique form of breaking means therein. The breaking means consists of a pair of counter-rotating rolls, each of which carries a plurality of surface teeth having sharp outer edges. The rolls are disposed with respect to one another so that the sharp edge of a tooth on one roll just contacts the sharp edge of a tooth on the opposite roll, at the nip formed between the rolls. This type of arrangement should be contrasted with various known forms of crushing devices utilizing counter-rotating gears and the like therein. In such devices, the peak of one gear fits into the valley on the opposed gear to provide a meshing relationship which is intended to accomplish the crushing or breaking operation. Such an arrangement would not be operative to fracture the syringes for which the present invention is intended, since the plastic material of the cartridges would quickly clog the valleys or depressions in the gears, thus hampering operations. However, because of the unique tooth configuration herein, when coupled with the careful alignment of the opposed breaking rolls, it is found that repeated and continued breaking operations can occur without any clogging of the teeth for the valleys therebetween.

Referring now to the drawings, which form a part of this original disclosure:

FIG. 1 is a perspective view of a syringe destructing device in accordance with the principles of the present invention;

FIG. 2 is a longitudinal sectional view of the device of FIG. 1, looking in the direction of the line 2—2 of FIG. 3; and

FIG. 3 is a transverse sectional view of the device, looking in the direction of the line 3—3 of FIG. 2;

Referring now to the drawings in further detail, the syringe destructing device as shown in FIG. 1 is generally designated 10. Such device includes a generally rectangular casing having a pair of opposed side walls 12 and 14, a rear wall 16, a forward wall 18, a top wall 20 and a bottom wall 22. Within the casing 10, there is provided a breaking means generally designated 24 for fracturing a syringe into a plurality of discrete pieces to prevent reuse thereof. Means generally designated 26 are provided for supplying an unbroken syringe S to the breaking means 24. As shown in FIG. 2, the syringe S includes a plunger and cartridge portion 28 and an attached needle portion 30. Finally, the device 10 includes a receiving means generally designated 32 for receiving the discrete and broken pieces from the breaking means 24.

Considering first the means 26 for supplying the syringe S to the breaking means, an opening 34 is formed in top wall 20 of the casing, above the breaking means 24, and a sleeve is disposed within the opening 34. The sleeve includes a hollow square or rectangular upper portion 36 and a depending tapered frusto-conical guide portion 38. The top of the upper sleeve portion 36 is closed, but a feeding port 40 is formed in one side thereof. The entire sleeve can be manually inserted through the opening 34 so that the upper portion 36 rests upon the top casing wall 20 while the depending portion 38 projects through the opening 34 and into the interior of the casing to guide a syringe S into the breaking means 24. Because the top of the sleeve 36 is closed and the feeding port 40 is formed in the side thereof, the chance that any upwardly flying scraps

from the breaking means could escape from the sleeve is reduced materially.

The receiving means 32 includes an open-topped drawer 42, the bottom of which rests upon the bottom wall 22 of the casing and the forward wall 44 of which fits within a congruent opening in the front casing wall 18. A handle 46 is attached to the front wall 44 of the drawer 42 to enable the drawer to be manually removed and emptied at periodic intervals. Side guide rails 48 coact in cooperation with the drawer 42 to guide it into and out of the casing and to facilitate its sliding movement therein.

The breaking means 24 includes a pair of counter-rotating generally cylindrical rolls 50, each of which is fixed upon a transversely extending shaft 52, the ends of which are journaled in bearings 54 attached to the interior of the casing side walls 12 and 14. Each shaft 52 carries a drive gear 56 and a collar 58 to lock the same onto the shaft 52. An idler gear 60 mounted in similar manner, cooperates with the inner most of the gears 56 and serves to mesh the same with a drive gear 62 which is mounted by a locking collar 64 onto a drive shaft 66 of a suitable drive motor 68. The drive motor 68 is supported upon a bracket or a platform 70 attached to the rear wall 16 of the casing. Thus, when the drive motor 68 is energized, by any suitable actuating means, the rolls 50 are caused to rotate in opposite directions as shown by the arrows thereon in FIG. 2, to create a downward feeding motion. Each of the rolls 50 carries a plurality of tooth means about the exterior surface thereof. Such tooth means, in each instance, includes a first portion 72 which extends radially of the roll 50 and a second portion 74 extending angularly in the direction of roll rotation from the inner end of a first portion 72 to the outer end of the next adjacent first portion 72. Thus, at the outer end where a portion 72 merges with a portion 74, a sharp edge 76 is created and this sharp edge is axially elongated along the axis of rotation passing through each shaft 52. In other words, the sharp edges 76 actually form elongated blades which perform the breaking operation.

As shown in FIG. 2, the shafts 52 and hence the axes of rotation are aligned parallel with one another, with both axes of rotation lying in a common plane. The shafts 52 and hence the axes of rotation are spaced apart by a distance sufficient so that a sharp edge 76 on one roll just contacts against a sharp edge 76 on the opposite roll to thus form the nip between the two rolls. It will also be seen that at the nip, there are two first tooth portions designated 72' which are coplanar with one another and which lie in the same plane as the plane containing the axes of rotation for the two rolls.

A sufficient number of teeth are provided along the exterior surface of each of the rolls 50 so that as the syringe S passes therebetween, it progressively moves through the nip and is progressively contacted by several separate sets of sharp edges 76 on the teeth. This causes the syringe S to be broken into a plurality of discrete pieces P which fall into the drawer 42 which acts as the receiving means. It is important in the present invention that there be an adequate number of teeth about the exterior surface of each roll 50 to assure that the syringe will be broken at multiple locations and into multiple pieces. It is also important to note that the sole contact between either of the rolls or the teeth thereon occurs as a line to line contact between the sharp edges 76 just at the plane passing through the nip. Thus, not

only does the syringe gravitationally drop into the breaking means, but additionally, the forward rotating motion of the rolls and the teeth thereon actually feed the syringe through the nip as the breaking occurs.

It is preferred that the number of teeth formed about the periphery or exterior surface of each roll be between 10 and 30. In one satisfactory embodiment of the invention, 20 separate teeth were formed along the exterior of each roll. The width of each roll was 2-1/2 inches and the outside tooth diameter, measured from one sharp edge 76 to its diametrically opposite edge 76, was also 2-1/2 inches. The diameter of the roll 50 was 1-3/4 inches, thus making each tooth 3/8 inch in height, as measured along the first portion 72 thereof.

After reading the foregoing detailed description, it should be apparent that the objects set forth at the outset thereof have been successfully achieved. However, while the invention has been described and is hereinafter claimed in connection with "syringes" per se, it will be apparent to those skilled in the art that the apparatus disclosed herein can also be used for the destruction of other materials, such as plastic tubing, test tubes, vacuum-tainer needles, and the like. Use of the apparatus for such purposes is regarded as falling within the spirit and scope of the appended claims.

What is claimed is:

1. A syringe destructing device comprising:

breaking means for fracturing a syringe into a plurality of discrete pieces to prevent re-use thereof;

means for supplying an unbroken syringe to said breaking means; and

receiving means for receiving said discrete pieces from said breaking means;

said breaking means including a pair of counter-rotating rolls, each of which carries tooth means about the exterior surface thereof, said rolls being driven at equal speeds and in opposite rotational directions;

each of said tooth means including a first portion extending radially of said roll and a second portion extending angularly in the direction of roll rotation from the inner end of a first portion to the outer end of the next adjacent first portion;

the juncture of a second portion with the outer end of a first portion forming a sharp edge;

said rolls being cylindrical in configuration and mounted for rotation about spaced parallel fixed axes and said axes being spaced apart by a distance sufficient so that a sharp edge on one roll contacts a sharp edge on the opposite roll to form a nip in a plane passing through both axes;

said rolls containing a sufficient number of teeth so that a syringe passes through said breaking means and passes progressively through said nip, it will be broken into a plurality of discrete pieces.

2. A syringe destructing device as defined in claim 1 wherein the first portions on the teeth forming said nip are disposed within said plane.

3. A syringe destructing device as defined in claim 1 wherein said device further includes a casing and wherein said receiving means is an open-topped receptacle movably mounted beneath said breaking means.

4. A syringe destructing device as defined in claim 3 wherein said means for supplying the syringe includes an opening in said casing above said breaking means and a sleeve mounted in said opening, said sleeve having a closed top and a feeding port in the side thereof.

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