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MEANS FOR SPLITTING ANIMAL INTESTINES

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Fig. 1

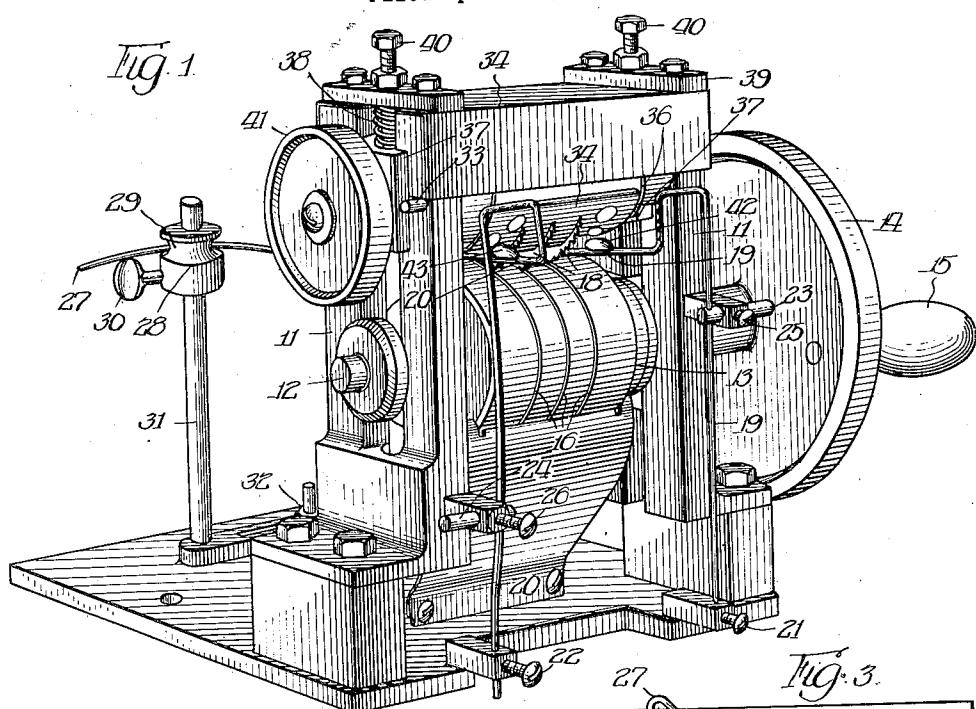
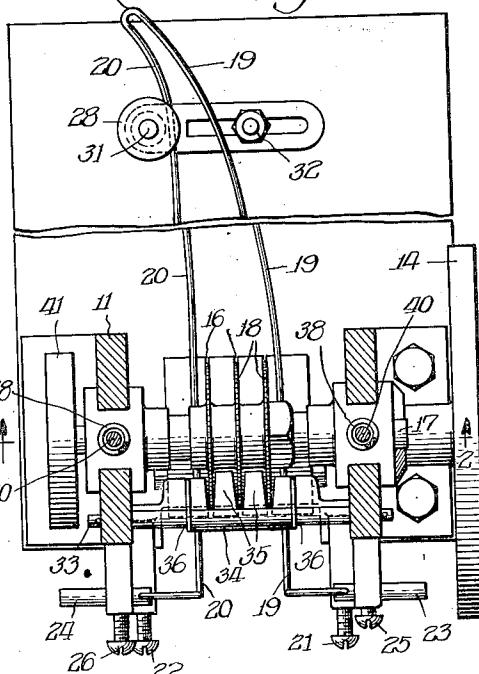
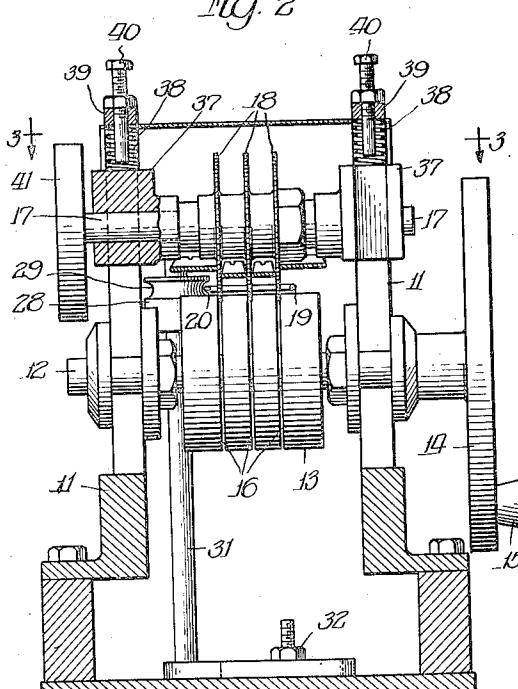


Fig. 3.

Fig. 2



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Attest.

UNITED STATES PATENT OFFICE

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MEANS FOR SPLITTING ANIMAL INTESTINES

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This invention has to do with the splitting of animal intestines into strips for subsequent treatment and twisting to produce strings for musical instruments, game rackets, etc. It relates to methods of producing such strips of desirably uniform character as to width and quality, and to apparatus particularly adapted for such uniform production.

Heretofore intestines, particularly the small intestines of swine and sheep, have been drawn past a stationary knife such as a razor blade by the operator grasping the severed strips beyond the knife and pulling the same whereby to cause the knife to split the intestine into strips of approximately equal width. By reason of inequalities in thickness and consequent resistance as well as the fact that the intestine is not straight but curved due to its natural coiled position in the abdominal cavity, and the further fact that about the inner surface of the coil the intestine has fat and tissue adhering to its outer surface and imparting to it what is called a "rough" side, it is exceedingly difficult so to apply the necessary varying tension to the different strips as to secure a straight cut longitudinally of the intestine throughout its average length of twenty-four to fifty feet. Wherefore usually the most skilled operatives are unable to avoid a splitting along wavy lines and even a lateral divergence of the line of cut to the extent of occasionally severing the strip along a diagonal line.

Animal intestines vary not only in the particulars above mentioned but also in diameter or in width when evacuated of their contents, whereby it is rendered additionally difficult to guide them into the splitting knife when introduced thereto in a deflated loose condition or even over a rigid guiding horn of wood or the like as has been proposed.

According to my invention, I lead the intestine over a spreader horn formed of spaced lengths of spring wire and curved in the

plane of its length to adapt it to the natural curve of the intestine, whereby the shorter inside "rough" portion is uniformly disposed and maintained at the inner side of the spreader curve. I provide means, supplemental to the inherent tension of the wire, to adjust the spacing of the wires to adapt the same to wide variations in width of intestines, as between large hogs and pigs, sheep and lambs.

The spread intestine, with the "rough" at one edge, is fed to and beyond one or more cutters by tension mechanically applied, whereby a plurality of strips of uniform width throughout are severed along longitudinally straight lines, local differences in width of the intestine being represented in variations in strip width only at the inner "rough" side where least objectionable.

In order that the invention may be readily understood as related to the improved method and the structural features of apparatus designed for carrying out the method, a preferred form of apparatus is illustrated in the accompanying drawings as a basis for the description and claims following.

In the drawings

Fig. 1 is a rear view in perspective of a machine constructed according to the invention;

Fig. 2 is a vertical section on the line 2—2 of Fig. 3; and

Fig. 3 is a plan section on the line 3—3 of Fig. 2.

Having reference to the drawings for purposes of illustration, the preferred form of apparatus comprises a frame between the upright members 11 on which is journaled the drive shaft 12 of a driven roll or drum 13, power being applied from a suitable source through the pulley 14, which pulley may optionally be manually driven by the crank handle 15. The drum 13 presents a series of axially spaced circumferentially extending slits 16 of narrow width. Upon

a cutter shaft 17, preferably an idler, are mounted disk cutters 18 corresponding in number spacing and plane to the slits 16 of the drum. These cutters, preferably all 5 though not necessarily having spur tooth edges as indicated, are so disposed with relation to the drum 13 that the periphery of each engages within a slit 16 of the drum in close shearing relation to the side walls of 10 the slit.

A spreader horn comprising two spaced lengths of spring wire 19, 20, such as piano wire, extend from a position in advance of the cutters and drum to the rear above the 15 surface of the drum, one length of the wire being disposed on each side of the group of cutters. Thence the lengths of wire preferably extend upward and then downward at the rear end of the machine frame, the 20 lower ends being anchored in the frame by means of set screws 21, 22 while at points above the anchorage the two lengths of wire are mounted for lateral adjustment in the 25 ends of pins 23, 24 and held in adjusted position by means of set screws 25, 26. It will be observed that the adjustable mounting last referred to of the wire lengths are at unequal vertical heights, for a purpose hereafter to be made clear.

30 Adjacent the forward end of the spreader horn closed at 27, the said horn is vertically and laterally supported by means of a collar 28 having an annular groove 29 within which one length of the wire rests, such collar 35 being vertically adjustable by means of the set screw 30 upon the standard 31, said standard being adjustable as to position on the base of the machine by the set bolt 32. It will also be observed that this spreader horn 40 is curved in the common plane of the two lengths of wire comprising the same to adapt the horn for guiding thereover the curved intestines. The horn is also preferably curved downward at its forward end to facilitate 45 the entering thereupon of intestines from a suitable receptacle disposed thereunder.

Carried by the cross head of the machine frame upon the pivot rod 33 is a curved stripper plate 34 circumferentially split to provide 50 tongues 35 corresponding in relation to the spacing between the cutters 18. This stripper plate normally occupies a position between the drum and the cutter shaft with the tongues occupying a position between the 55 cutters, and it may be held in this position by any suitable means, such as supporting wires 36.

The cutter shaft 17 is not rigidly mounted in the frame as is the drum shaft 12 but in 60 journal boxes 37 slidable within the uprights 11, with a coil spring 38 disposed between each journal box and a cross head 39, set screws 40 within the cross head entering the springs 38 and terminating short of the 65 journal box whereby the springs may be ad-

justed as to tension and an upper abutment formed for the journal box. A hand wheel 41 is mounted on the end of the cutter shaft.

Upon the wire lengths 19, 20 of the spreader horn, at a point at the rear of the cutters, deflectors 42, 43 are provided, the purpose of which will presently appear.

The operation of the device is as follows: One end of an intestine is telescoped over the closed end 27 of the spreader horn and caused by hand to traverse the horn until its forward end is engaged between the toothed edges of the cutters and the drum, such engagement being facilitated, if the machine be idle at the time, by a manual turning of the hand wheel 41. The forward end of the intestine being in surface friction engagement with the drum 13 and also in engagement with the cutter edges, the rotation of the drum will draw the intestine over the horn and through the cutters, mechanical accuracy as to fit being assured by the engagement above and below by the drum and cutters. The slits in the drum are of a width corresponding quite accurately to the thickness of the cutters whereby the upper and lower stretches of the intestine, spread by the horn, are sheared by the cooperation of the cutters and drum. The tongues 35 of the stripper plate clear the strips of intestine from the cutters and cause them to follow down over the drum surface to a receptacle suitably disposed at the rear of the machine. It will be noted that the upper and lower stretches of the intestine passing between any pair of cutters have a uniform width whereas the upper and lower stretches of the intestine adjacent the wires 19, 20 of the horn together have a corresponding width. As the intestine passes beyond the cutters, the deflectors 42, 43 on the wires of the horn open up this folded portion of the intestine, causing it to clear the angle of the wire at the rear and to fall into the receptacle in an open flat condition. An intestine having been started through the machine, no further attention by the operator is required to insure its uniform splitting and delivery.

The inherent springiness of the wires from which the horn is constructed and the spacing apart of the wire lengths a distance in excess of the average width of the deflated intestine being treated, causes the upper and lower stretches of the same to be held taut, the wire tension taking care of ordinary deviations in dimensions of intestines of animals of the same size. If a run of larger or smaller intestines is to be made, the spreading tension of the wire horn is affected by a lateral adjustment of the pins 23 and 24 by means of the set screws 25 and 26. As previously explained, the inner side of the coiled intestine has adhering fat and tissue causing a roughness which detracts in a measure from the quality of that portion. Inasmuch as

variations in the cross section of the intestine are reflected in a non-uniform width of the strips obtained from the two sides of the flattened intestine, it is desirable that such variations occur in one side only, and that the "rough" side. This result is accomplished by maintaining a greater degree of flexibility or resiliency in that side of the spreader horn which corresponds to the "rough" side of the intestine and which would be that wire length forming the concave side of the horn. To this end, the adjusting pin 23 is below the adjusting pin 24, leaving a greater extent of wire length between said adjusting point and the forward end of the horn. Thus the wire length 19 will present greater resistance and the variations in width of intestine will be presented at the cutters on that side where the rough occurs.

20 The drum 13 may obviously be of wood or metal or other suitable substance, and it may be formed integral or made up of a series of drum elements disposed axially adjacent on the shaft 12. An advantage of the latter arrangement is the capacity for adding to and subtracting from the number of slits and cooperating cutters; also, by a variation of width in the constituent drum elements and cutter hubs, adapting the machine for producing a greater or less number of strips of greater or less width.

I claim:

1. In a device of the character set forth, a rotary feed drum, a cutter having edge engagement with the drum, and means to introduce an intestine between the cutter edge and the drum and to hold the same flat in two-ply relation, said means comprising a horn flattened in a plane parallel to the cutter axis and adapted to be telescoped and traversed by the intestine, said horn curved in the plane of its length.

2. In a device of the character set forth, a rotary feed drum, a cutter having edge engagement with the drum, and means to introduce an intestine between the cutter edge and the drum and to hold the same flat in two-ply relation, said means comprising a laterally resilient horn flattened in a plane parallel to the cutter axis and adapted to be telescoped and traversed by the intestine, said horn curved in the plane of its length.

3. In a device of the character set forth, a rotary feed drum, a cutter having edge engagement with the drum, means to introduce an intestine between the cutter edge and the drum and to hold the same flat in two-ply relation, said means comprising a laterally resilient horn adapted to be telescoped and traversed by the intestine and comprising spaced lengths of spring wire, said horn curved in the plane of its length, and means to vary the spacing of the two lengths of wire.

4. In a device of the character set forth, a

circumferentially slitted rotary feed drum, a series of laterally spaced cutters having edge engagement respectively within the slits of the drum, means to introduce an intestine between the cutter edges and the drum and to hold the same flat in two-ply relation, a laterally resilient horn adapted to be telescoped and traversed by the intestine and comprising spaced lengths of spring wire, and means to vary the spacing of the two lengths of wire whereby to adapt the same to intestines of different cross section. 70

5. In a device of the character set forth, a circumferentially slitted rotary feed drum, a series of laterally spaced cutters having edge engagement respectively within the slits of the drum, means to introduce an intestine between the cutter edges and the drum and to hold the same flat in two-ply relation and comprising a laterally resilient horn adapted to be telescoped and traversed by the intestine and comprising spaced lengths of spring wire, and means to vary the spacing of the two lengths of wire and to vary the flexibility of the two lengths independently whereby to adapt the horn to intestines of different cross section and to the curvature of the intestine. 80

6. In a device of the character set forth, a circumferentially slitted rotary feed drum, a series of laterally spaced rotary cutters provided with spur teeth having edge engagement respectively within the slits of the drum, means to introduce an intestine between the cutter edges and the drum and to hold the same flat in two-ply relation. 90

7. In a device of the character set forth, a circumferentially slitted rotary feed drum, a series of laterally spaced rotary cutters provided with spur teeth having edge engagement respectively within the slits of the drum, means to introduce an intestine between the cutter edges and the drum and to hold the same flat in two-ply relation and comprising a laterally resilient horn adapted to be telescoped and traversed by the intestine, said horn curved in the plane of its length. 105

8. In a device of the character set forth, a circumferentially slitted rotary feed drum, a series of laterally spaced rotary cutters provided with spur teeth having edge engagement respectively within the slits of the drum, means to introduce an intestine between the cutter edges and the drum and to hold the same flat in two-ply relation and comprising a laterally resilient horn adapted to be telescoped and traversed by the intestine and composed of spaced lengths of spring wire, said horn curved in the plane of its length. 115

9. In a device of the character set forth, a circumferentially slitted rotary feed drum, a series of laterally spaced rotary cutters provided with spur teeth having edge engage- 120

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ment respectively within the slits of the drum, means to introduce an intestine between the cutter edges and the drum and to hold the same flat in two-ply relation and comprising a laterally resilient horn adapted to be telescoped and traversed by the intestine and composed of spaced lengths of spring wire, said horn curved in the plane of its length, and means to vary the spacing of the two lengths of wire and to vary the flexibility of the two lengths independently.

10. In a device of the character set forth, a circumferentially slotted rotary feed drum, a series of laterally spaced rotary cutters provided with spur teeth having edge engagement respectively within the slits of the drum, means to introduce an intestine between the cutter edges and the drum and to hold the same flat in two-ply relation, and 15 means to direct the severed strips of intestine from the cutters.

11. In a device of the character set forth, a circumferentially slotted rotary feed drum, a series of laterally spaced rotary cutters provided with spur teeth having edge engagement respectively within the slits of the drum, means to introduce an intestine between the cutter edges and the drum and to hold the same flat in two-ply relation and 20 comprising a laterally resilient horn adapted to be telescoped and traversed by the intestine and composed of spaced lengths of spring wire, said horn curved in the plane of its length, and means to direct the severed 25 strips of intestine from the cutters.

12. In a device of the character set forth, a circumferentially slotted rotary feed drum, a series of laterally spaced rotary cutters provided with spur teeth having edge engagement respectively within the slits of the drum, means to introduce an intestine between the cutter edges and the drum and to hold the same flat in two-ply relation and comprising a laterally resilient horn adapted to be telescoped and traversed by the intestine and composed of spaced lengths of spring wire, said horn curved in the plane of its length, and means to vary the spacing of the two lengths of wire and to vary the 40 flexibility of the two lengths independently, said means comprising laterally adjustable pins attached to the two lengths of wire beyond the cutters and at different distances therefrom.

55. 13. In a device of the character set forth, a circumferentially slotted rotary feed drum, a series of laterally spaced rotary cutters provided with spur teeth having edge engagement respectively within the slits of the 60 drum, means to introduce an intestine between the cutter edges and the drum and to hold the same flat in two-ply relation and comprising a laterally resilient horn adapted to be telescoped and traversed by the intestine and composed of spaced lengths of

spring wire, said horn curved in the plane of its length whereby to sever the medial portion of the intestine passing between each pair of cutters into two strips corresponding in width to the space between the cutters and the folded edges of the intestine into single folded strips, and means to open up the folded edge strips.

70 In testimony whereof I have hereunto subscribed my name.

GUSTAV REDEMSKE.

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