

[54] **FLECHETTE MANUFACTURING MACHINE**

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[73] Assignee: **The United States of America as represented by the Secretary of the Army**

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[58] Field of Search.....10/43, 47, 48, 49, 52, 53; 72/76, 402; 140/71

[56] **References Cited**

**UNITED STATES PATENTS**

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[57] **ABSTRACT**

A machine for the mass production of flechettes consisting of a plurality of in-line units, each unit including outer and inner coaxial tubes. The outer tube being rotatable while the inner one is stationary. Axially spaced, spring loaded, radially slidable dies are carried by the inner tube and the outer tube is provided with similarly arranged cam lobes which force the dies inwardly and simultaneously or sequentially upon rotation of the outer tube to perform fin shaping, pointing and cutoff operations on a wire which is fed axially through the inner tube. All units are rotated by ring gears on the outer tubes and a single driven gear.

**2 Claims, 4 Drawing Figures**

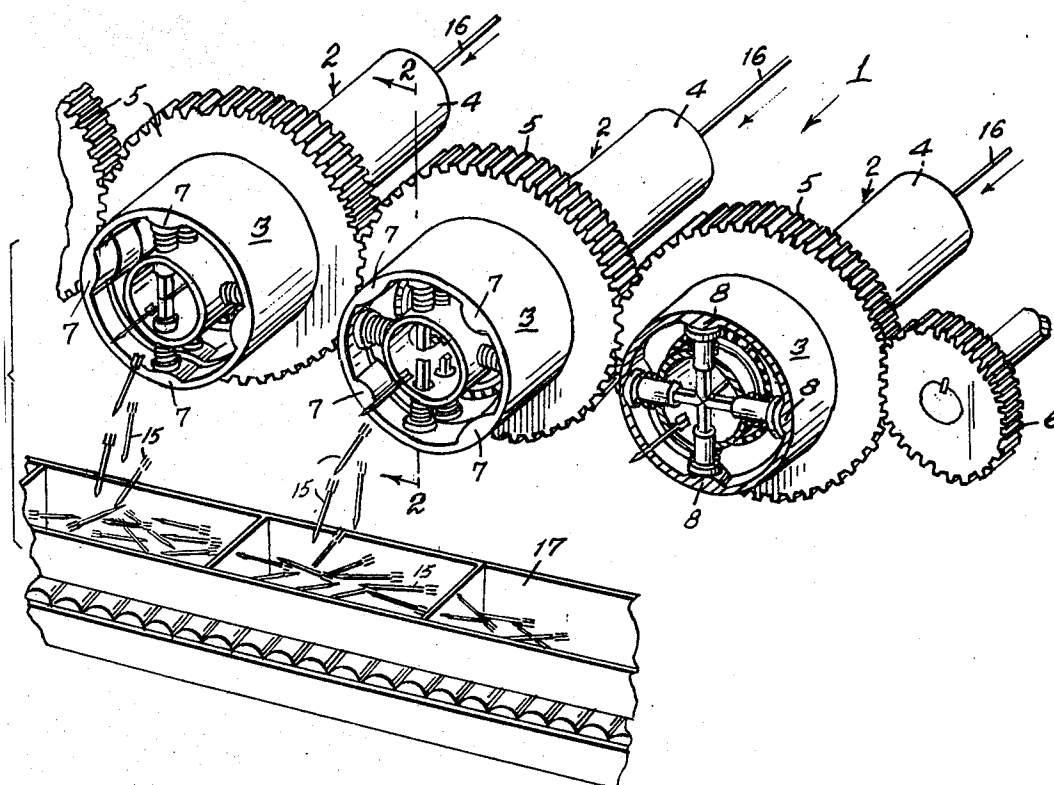


Fig. 1.

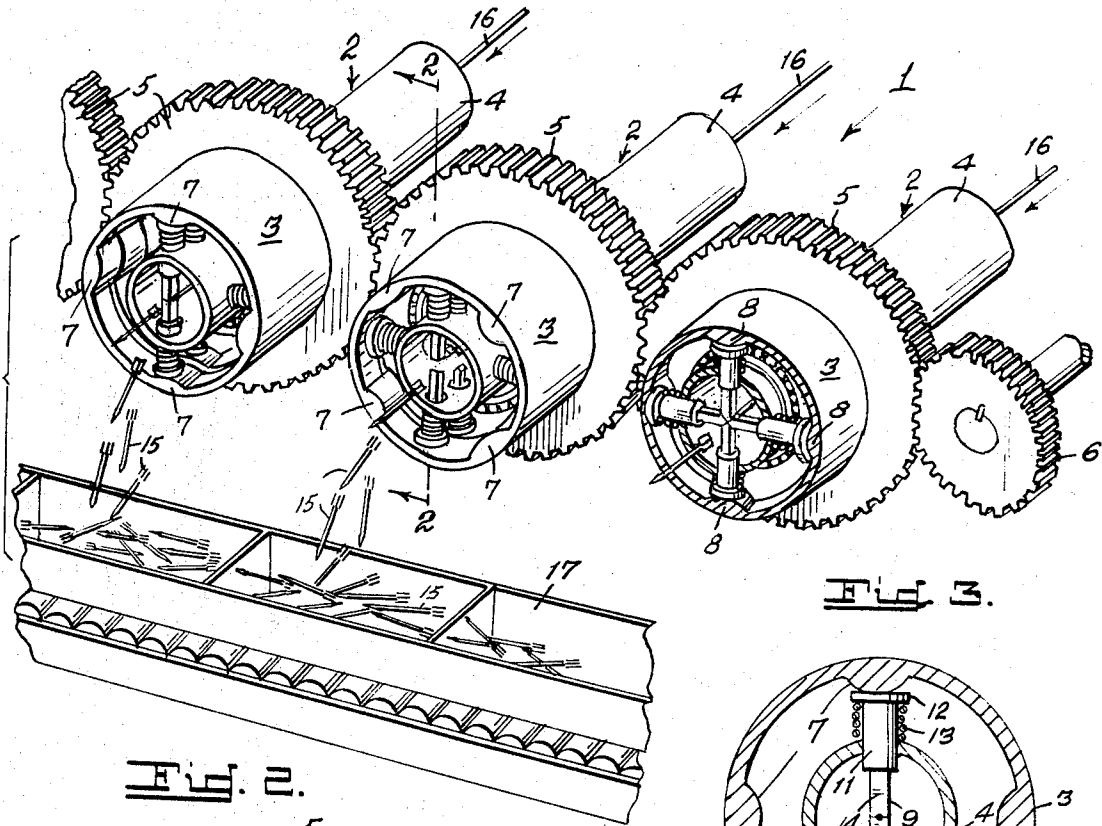


Fig. 2.

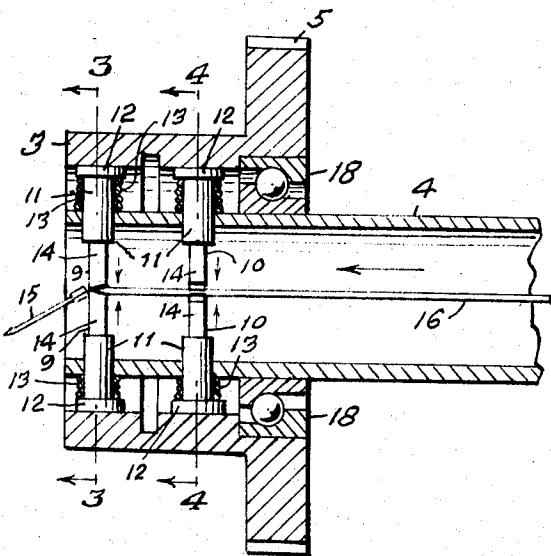


Fig. 3.

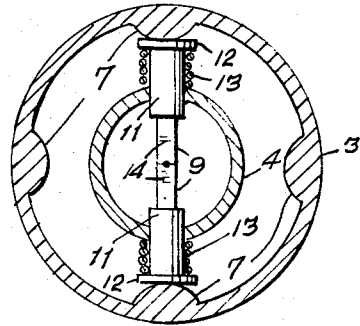
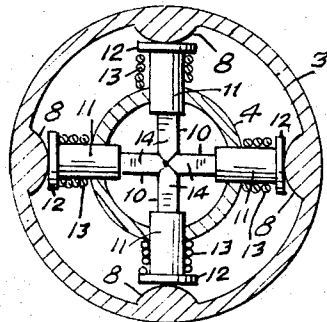


Fig. 4.



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**FLECHETTE MANUFACTURING MACHINE**

Flechettes are small, arrow shaped darts which are often used with cannister type ammunition. They are shaped from wire or the like stock and are manufactured much in the manner of nails, only the ends of which are formed as fins instead of a head. Present machines are complicated, costly and require considerable maintenance due to many moving parts, frequent adjustment, bushings, bearings and die replacement.

The invention described herein may be manufactured, used, and licensed by or for the Government for governmental purposes without the payment to me of any royalty thereon.

The present invention is designed to produce flechettes by a machine having fewer moving parts, a more rigid construction and the production of more accurately formed flechettes at a reduced cost.

Briefly this invention consists of a plurality of flechette forming units. Each unit is made up of an outer tube with cam lobes formed on its inner peripheral surface and an inner tube carrying spring loaded dies. All outer tubes have idler ring gears and a single driven gear to rotate all outer tubes. When a wire stock is fed axially through the inner tube, the rotating outer tube cam lobes force the dies inwardly to form fins and points as well as cutting off each flechette when completed.

It is therefore a principal object of this invention to provide a machine for the mass production of flechettes.

Another object is to provide a flechette forming machine having fewer moving parts.

A further object is to provide a flechette forming machine which is operated more economically.

A still further object is to provide a flechette forming machine that will perform fin shaping, pointing and cut-off operations simultaneously.

These and other objects will become apparent from a description of the drawing in which:

FIG. 1 is a perspective view of a plurality of flechette forming machines of this invention with parts broken away to disclose mechanism;

FIG. 2 is a cross sectional view taken along line 2—2 of FIG. 1;

FIG. 3 is a cross sectional view taken along line 3—3 of FIG. 2, and,

FIG. 4 is a similar view taken along line 4—4 of FIG. 2.

Referring to the drawing in which like reference characters denote like parts throughout the several views, reference character 1 indicates generally the arrangement of the flechette forming machine of this invention. Each unit of the machine is designated generally by 2 and is composed of an outer tube 3 and an inner tube 4 of smaller diameter than outer tube 3. Outer tube 3 is provided with a ring gear 5 as shown and all gears 5 mesh with each other. Outer tube 3 is capable of rotation while inner tube 4 is stationary. Inner tube 4 will be suitably supported by structure, not shown. Tubes 3 are rotated by a single driven spur gear 6 as shown in FIG. 1.

As best viewed in FIGS. 3 and 4, tube 3 is provided with two sets of integral cam lobes along the forward portion of its inner circumferential surface. The forward cam lobes 7 of which there are four in number

and are spaced ninety degrees from each other. The Second set of cam lobes 8 are rearwardly spaced from the frontal cam lobes and are four in number, each cam lobe 8 being spaced ninety degrees from each other.

There are provided two sets of dies, a frontal set 9 being aligned with frontal cam lobes 7 of which there are four in number, as seen in FIG. 3. A rearward set 10 of which there are four in number is in alignment with cam lobes 8, as seen in FIG. 4. All dies 9 and 10 are slidably mounted in a radial manner in inner tube 4. Each die of sets 9 or 10 are identical and consists of a cylindrical portion 11 having a head 12 which will be engaged by a cam lobe 7 OR 8 when tube 3 is rotated. A coil spring 13 biases between head 12 and inner tube 4. The lower portion 14 is for the purpose of flechette forming or cutting, the rearward set being for the purpose of fin forming the frontal portions 14 being for the purpose of forming the points and to cut off the finished flechettes. The cylindrical portion 11 of both sets slide radially inward in tube 4 when pressed by a cam lobe 7 or 8.

The flechette 15 is formed from a wire stock 16 which is fed axially through inner tube 4 by a feeding mechanism, not shown.

A ball bearing 18 provides means to effect a bearing between tubes 3 and 4, see FIG. 2.

**OPERATION**

When the front cam lobes 7 and the rear cam lobes 8 are spaced ninety degrees apart and in radial alignment all operations will occur simultaneously.

Wire 16 will be fed axially through inner tube by a mechanism, not shown. The shaping operations will start when the wire 16 has traveled slightly forward of frontal die members 9. Suitable means, such as an electric eye, etc., not shown could be used to cause the gearing to be set in motion at this point, so as to eliminate any wastage of the wire.

As the wire 16 is fed through tubes 4, and driven gear 6 is rotating gears 5 and tubes 3, and cam lobes 8 press rearward die sets 9, a fin is formed in wire 16. At the same time cam lobes 7 press frontal die sets 10 inwardly to form a point and cut the wire 16 so that the completed flechettes 15 are formed. The completed flechettes 15 can be dropped in a traveling conveyor 17 as shown in FIG. 1 or in any other container.

Alternatively, the frontal cam lobes 7 can be positioned, say at an angle of 45 degrees, not shown rather than in radial alignment with respect to the rear cam lobes 8 whereby all operations will occur sequentially. In such case cam lobes 8 first actuate the rear die sets 10 after which cam lobes 7 press frontal die sets 9. In either simultaneous or sequential operation the wire feed is incremental and synchronized with the stamping operations in known manner.

It is apparent that a large number of flechette forming units 2 can be employed so that a large number of flechettes are formed simultaneously. A single motor, not shown, can drive spur gear 6 and eliminates the necessity of each unit having its own power source.

What is claimed is:

1. A flechette manufacturing machine comprising a plurality of flechette forming units arranged in closely spaced parallel relation, each of said forming units comprising a rotatable outer tube and a stationary

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inner tube coaxially arranged within the outer tube, axially spaced outwardly biased fin and point forming die sets extending radially through the inner tube and movable toward and away from the axis of the inner tube, cam means carried by the outer tube in axial alignment with the biased die sets and adapted to engage the dies of each die set and move them towards the axis of the inner tube, means to feed a wire stock axially through each inner tube, a ring gear of substantially larger diameter than the outer tube and carried by the outer tube of each forming unit and meshing with the ring gears of the adjacent forming units, and means

to rotate one of the ring gears to thereby rotate the outer tube of each forming unit and move its cam means into intermittent engagement with the biased dies of each die set to force them into engagement with the axially fed wire stock and simultaneously form complete flechettes in each forming unit.

2. A flechette machine as set forth in claim 1 in which the fin and point forming die sets are spaced apart axially a distance such that simultaneous operation of such die sets will form a flechette of a desired predetermined length.

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