

[54] **ROTARY PUNCH FOR EXCISING UNIFORM DIOPSY SPECIMENS**

[72] Inventor: **Robert J. Schied**, 7660 Berry Dr., Pasadena, Md. 21122

[22] Filed: **April 29, 1971**

[21] Appl. No.: **138,517**

[52] U.S. Cl. ....128/2 B

[51] Int. Cl. ....A61b 10/00

[58] Field of Search.....128/2 B, 305, 310; 173/163

[56] **References Cited**

**UNITED STATES PATENTS**

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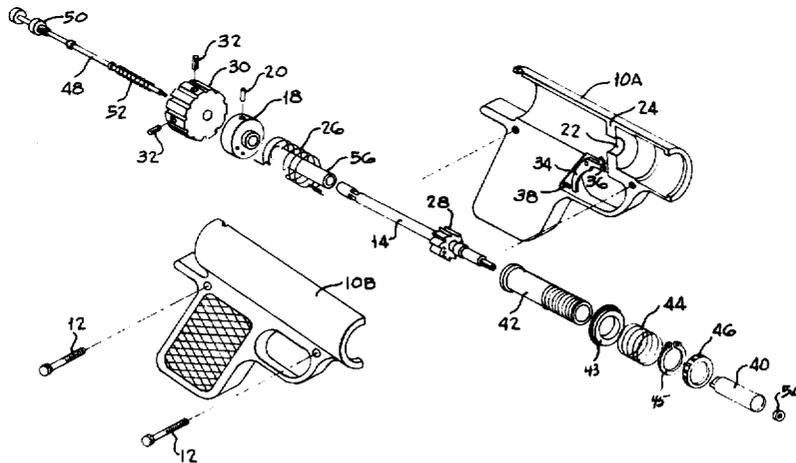
*Primary Examiner*—William E. Kamm

*Attorney*—R. Hoffman, W. Bier and W. E. Scott

[57] **ABSTRACT**

A spring-powered instrument in the shape of a gun equipped with a cylindrical cutting blade and having a collar means to control the depth of the cut and rod means for ejecting the specimen from the cutting blade. The instrument is activated by a trigger mechanism which holds the spring means in tension until it is released.

**1 Claim, 2 Drawing Figures**



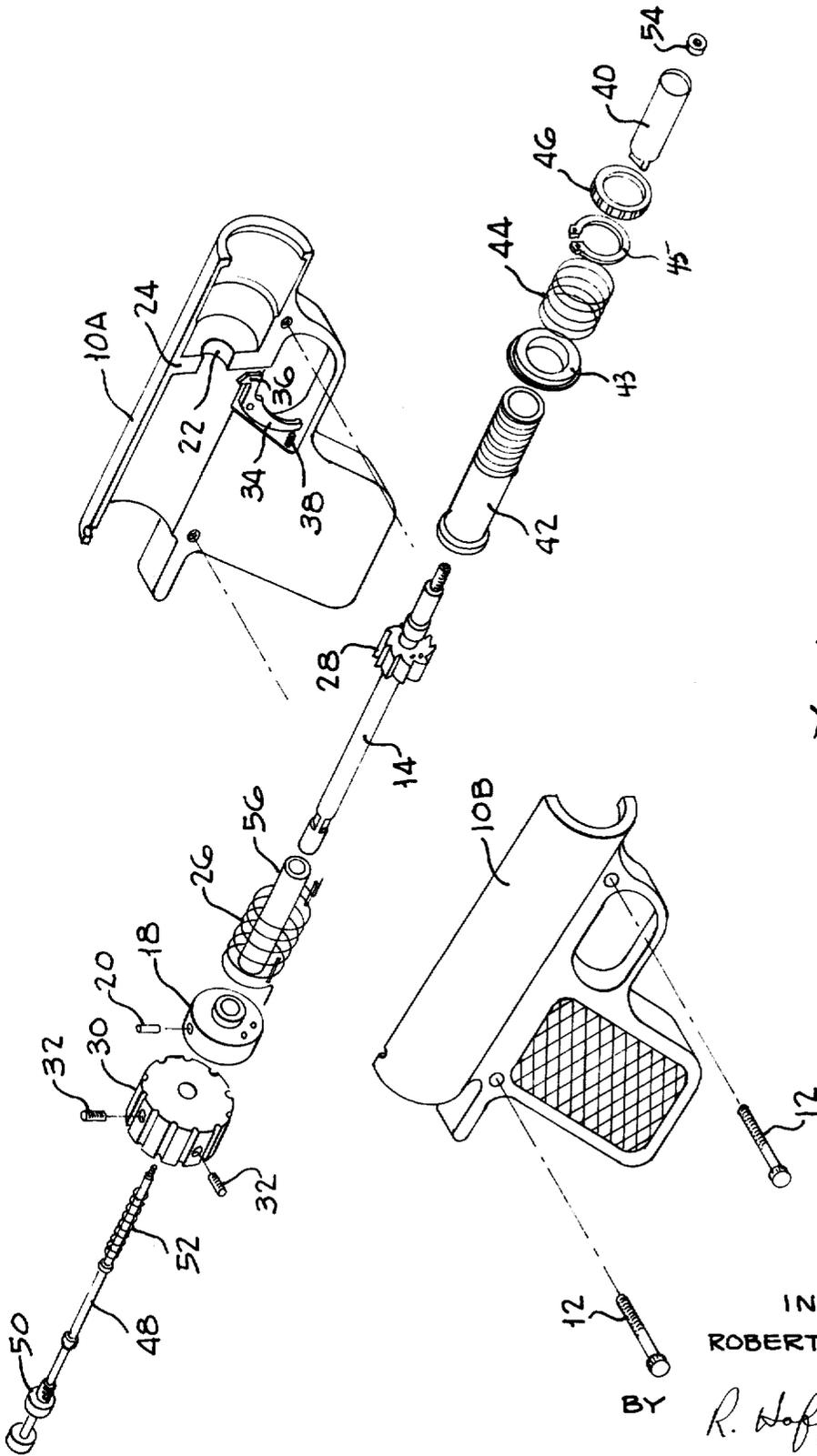


Fig. 1

INVENTOR  
ROBERT J. SCHIED

BY *R. Hoffman*  
ATTORNEY

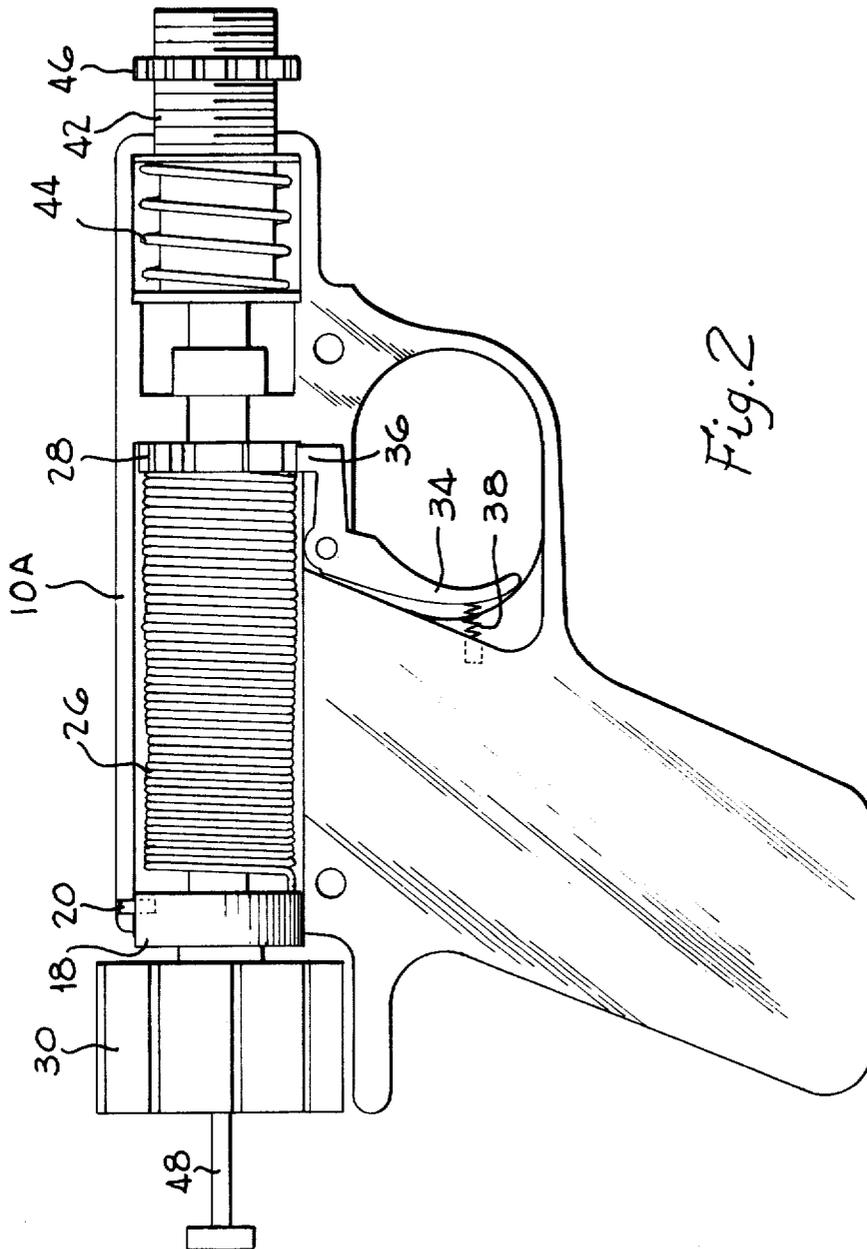


Fig. 2

INVENTOR  
ROBERT J. SCHIED

BY

*R. Hoffman*  
ATTORNEY

## ROTARY PUNCH FOR EXCISING UNIFORM DIOPSY SPECIMENS

A non-exclusive, irrevocable, royalty-free license in the invention herein described, throughout the world for all purposes of the United States Government, with the power to grant sublicenses for such purposes, is hereby granted to the Government of the United States of America.

This invention relates to an instrument for excising uniform cutaneous biopsy specimens from animals.

When done by conventional procedures, obtaining a skin biopsy is generally time consuming and often an arduous task. Also, when dealing with large numbers of animals, the usual procedures and instruments are not very satisfactory. For example, the customary motor driven biopsy punch requires a power supply and may leave a scar if driven too far into the skin. Although an ordinary razor blade can be used, at least two people are needed, one to hold the animal while the other takes the sample. In addition, the sample taken is usually larger than needed and it is nearly impossible to get uniform size specimens. Core biopsy punches or skin trephines are available but many people are squeamish about using these instruments.

Therefore, it is an object of this invention to provide a new, improved instrument for obtaining uniform cutaneous biopsy specimens.

Another object of this invention is to provide an instrument that is fast and efficient in obtaining uniform biopsy specimens.

Still another object is to provide an instrument that takes uniform samples and causes little or no bleeding and that requires no anesthesia and no stitches.

A still further object of this invention is to provide a biopsy gun that can be used to obtain uniform skin specimens from a variety of animals such as sheep, mink, cattle, pigs and even all kind of wild animals.

In general, the above objects are accomplished by a spring-powered instrument equipped with a cylindrical cutting die for cutting the biopsy specimen, means for controlling the depth of the cut, and means for ejecting the specimen from the cutting die. The cutting die is easily replaced and dies of different diameters may be used. The instrument is activated by a trigger mechanism which holds the spring means in tension until it is released.

The biopsy gun of this invention is fast and efficient, it takes uniform samples, and causes little or no bleeding. In addition, no anesthesia or stitches are needed. The biopsy gun has been used to obtain samples from a number of animals such as sheep, cattle, pigs and mink. It has great potential for use with many other types of animals because it is easy and convenient to use and accomplishes its purpose rapidly and efficiently. For example, it could be used to obtain biopsy specimens from wild animals in Africa and Asia. It could also be used by animal breeders to improve their stock; study of skin samples taken would help the breeder identify or corroborate his selections in attempting to produce desired traits in the animal population.

A fuller understanding of the nature and objects of this invention will become apparent from the following detailed description of a preferred embodiment thereof when taken together with the accompanying drawings in which:

FIG. 1 is an exploded view of the components of the instrument for excising biopsy specimens.

FIG. 2 is an elevational view with the near side of the housing removed to show the working parts assembled in operative relationship.

Referring to FIGS. 1 and 2 it is seen that the mechanism is assembled in a pistol-like housing comprising two halves, 10 A and 10 B, which are held together by machine screws 12. A hollow cylindrical spindle 14 which supports the mechanism is journaled in anchor collar 18 which is secured within the housing and prevented from rotating by pin 20 and in bearing aperture 22 in internal wall 24.

A torque spring 26 is anchored to collar 18 and to ratchet wheel 28 which is integral with spindle 14. A bushing 56 supports torque spring 26 to maintain its shape. Winding knob 30 is secured to spindle 14 by set screws 32 external of the housing so that manual rotation of knob 30 rotates ratchet 28 thus storing torque to spring 26. Trigger 34 maintains storage of torque by pawl 36 which is biased into engagement with teeth of ratchet 28 by spring 38. Cutting die 40 is secured to the forward end of spindle 14. Thus, it is evident that by pulling trigger the stored torque in spring 26 rotates cutting die 40 at high speed.

In addition to cutting die 40, the cutting or excising means includes die guard sleeve 42, compression spring 44 with spring-stop 43 and spring retaining ring 45, and threaded collar 46. Die guard sleeve 42, which normally covers die 40, is held in place by compression spring 44. When the pistol-like instrument is held against the skin of the subject to obtain a biopsy specimen, die guard sleeve 42 retracts into the housing thus exposing cutting die 40. The depth of retraction is governed by threaded collar 46 which makes the depth of penetration controllable.

Ejector rod 48 extends coaxially through spindle 14 and is held in place by retaining nipple 50 and is biased rearward by spring 52. The forward end of rod 48 is threaded and extends into hollow die 40. Secured to the threaded end of rod 48 is ejector disc 54 within the die cavity. When a biopsy specimen has been taken it may be removed or ejected from cutting die 40 by pressing ejector rod 48.

I claim:

1. An instrument for excising uniform biopsy specimens, comprising:
  - a. a housing;
  - b. a hollow cylindrical spindle longitudinally disposed within said housing, said spindle having a ratchet wheel integrally secured on its forward portion and an anchor collar rotatably mounted on its rear portion and secured to said housing;
  - c. a torque spring axially aligned over the external surface of the aforesaid spindle and attached to the anchor collar and to the ratchet wheel;
  - d. a winding knob for rotating the aforesaid ratchet wheel and storing torque in the spring, said knob being circumferentially secured to the spindle immediately rearward of the aforesaid anchor collar;
  - e. a cutting die assembly comprising:
    1. a cutting die for excising a biopsy specimen threaded onto the forward end of the aforesaid spindle;
    2. a die guard sleeve covering and coaxially aligned with the cutting die;
    3. a compression spring for holding the die guard sleeve in place; and

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- 4. a cutting die depth control collar threaded on said sleeve for regulating the penetrating depth of the cutting die;
- f. an actuating mechanism including a trigger means for engaging the aforesaid ratchet wheel and main- 5  
 taining storage of torque in the spring and for releasing the torque thus causing the spindle and attached cutting die to rotate at high speed;

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- g. a specimen ejector mechanism for ejecting biopsy specimens from the aforesaid cutting die, including an ejector rod and spring means, said rod extending coaxially through the hollow cylindrical spindle into the cutting die and provided at its forward end with a disc.

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