Oct. 16, 1956 R. D. HOFFMAN 2,766,525

CARTRIDGE-POWERED COW DEHORNER

Filed Aug. 24, 1954 3 Sheets-Sheet 1

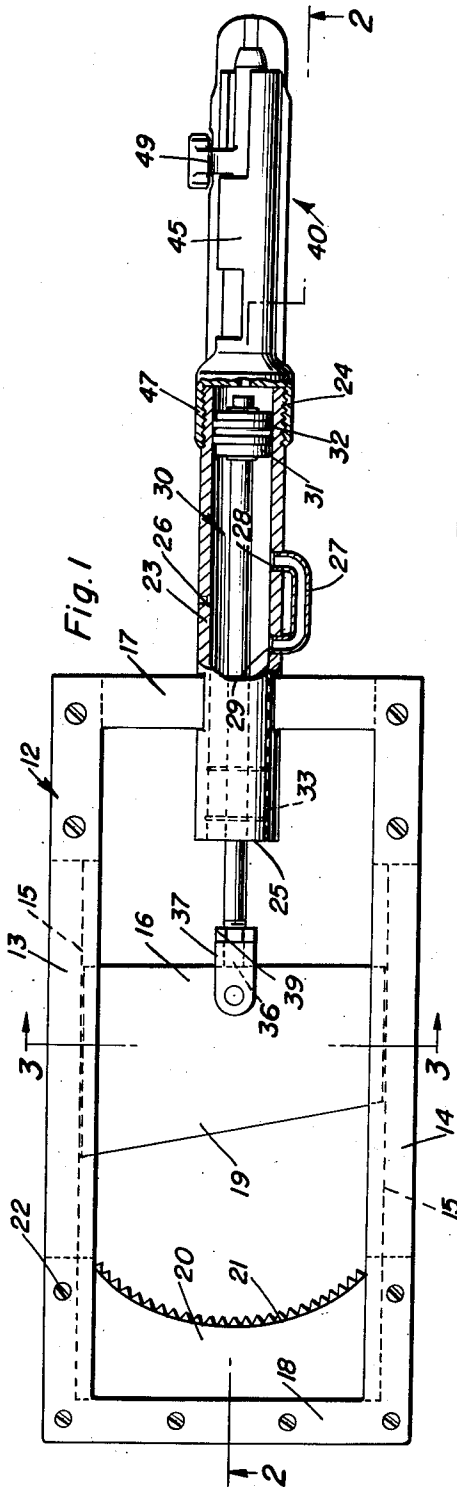


Fig. 1

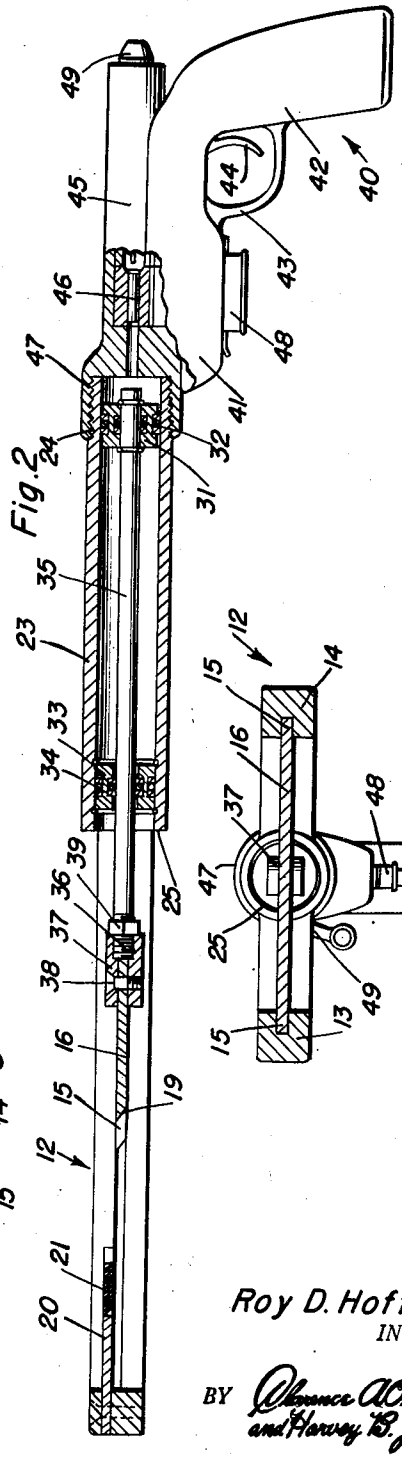


Fig. 2

Fig. 3

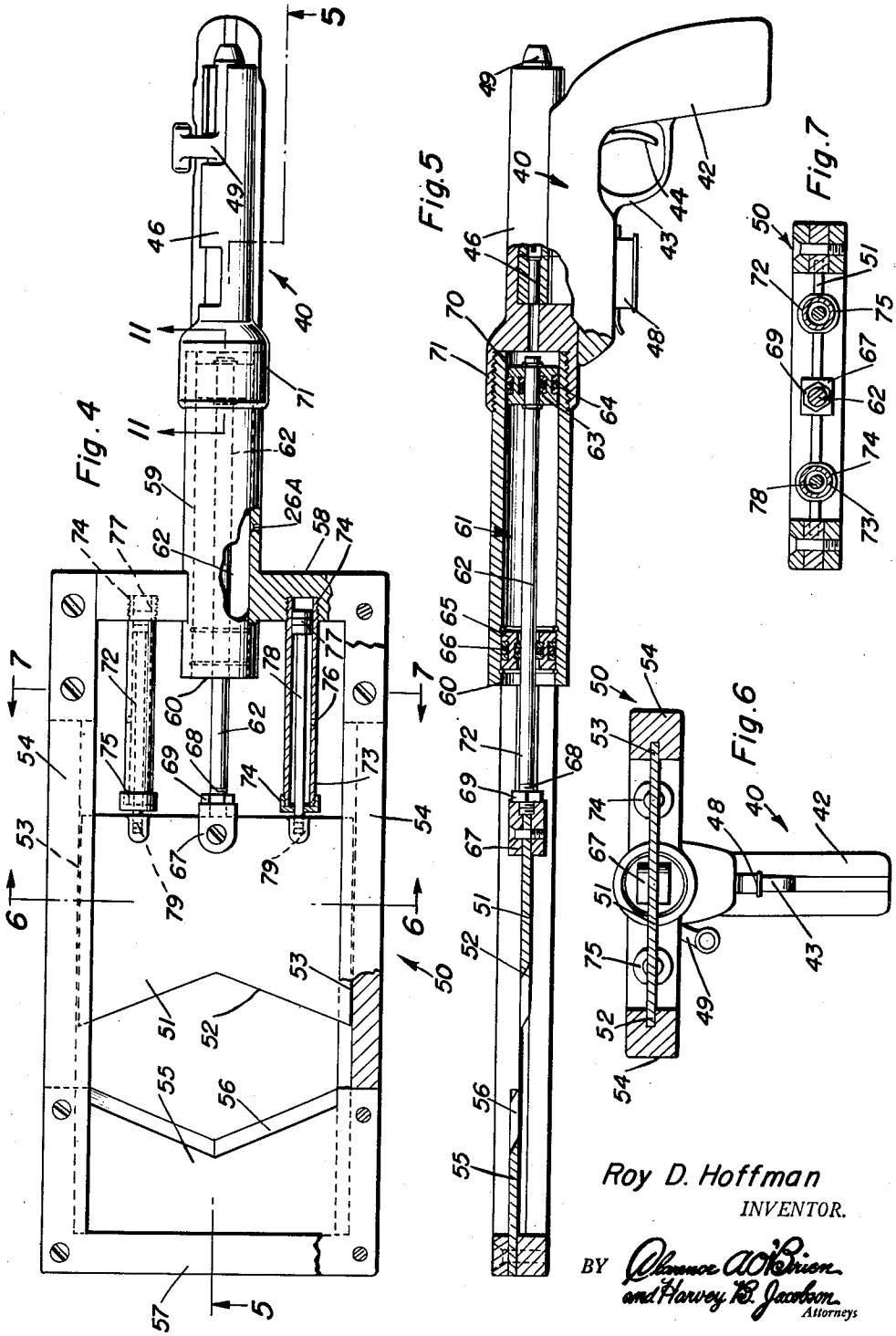
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CARTRIDGE-POWERED COW DEHORNER

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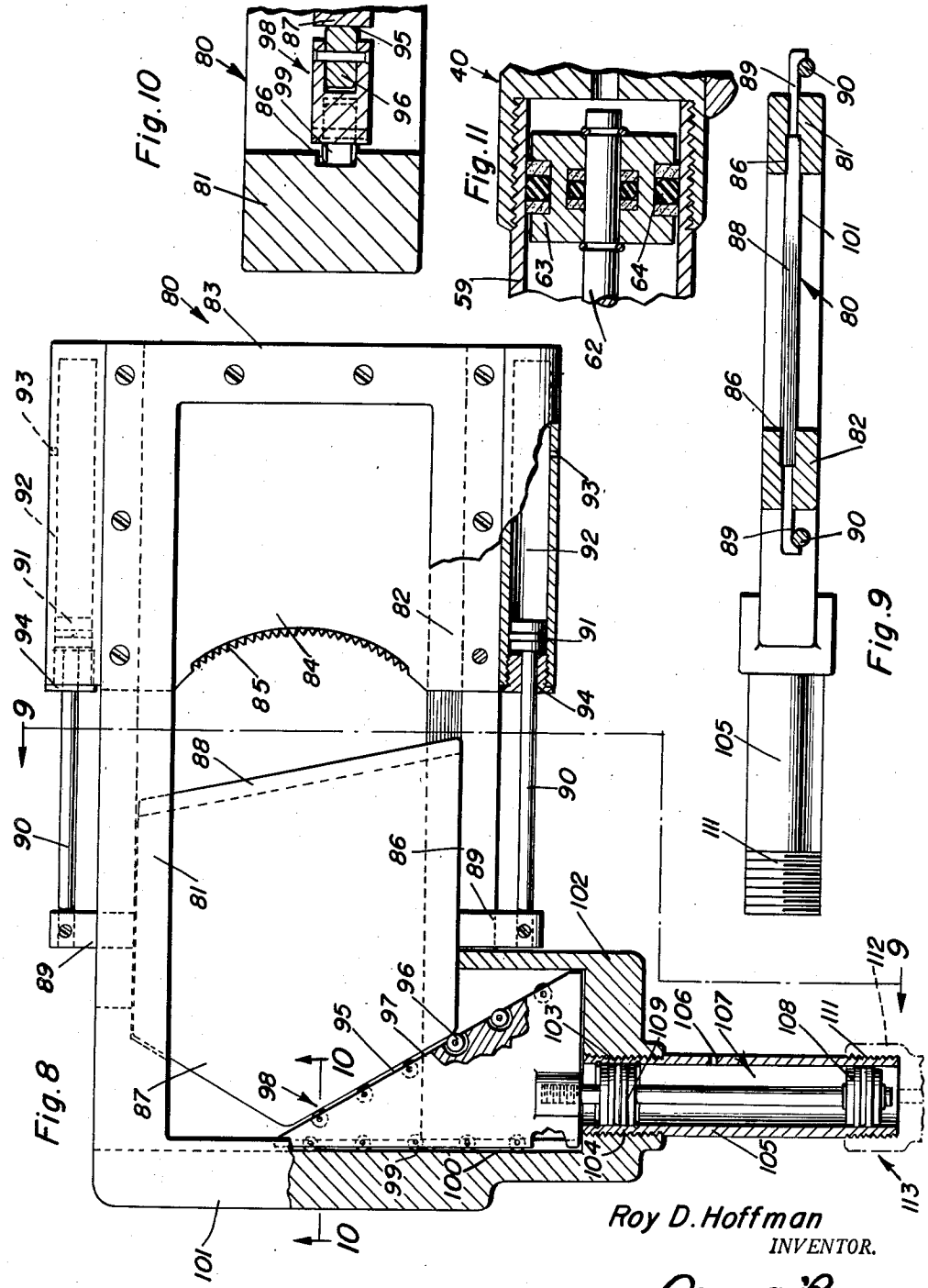
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CARTRIDGE-POWERED COW DEHORNER

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CARTRIDGE-POWERED COW DEHORNER

Roy D. Hoffman, Bedford, Pa.

Application August 24, 1954, Serial No. 451,830

9 Claims. (Cl. 30—228)

The present invention relates to certain new and useful improvements, broadly speaking, in cow dehorners, and has reference in particular to the style or form of dehorner which is characterized by a portable frame, usually a rectangular type of a frame, a pair of cooperating cutter blades operatively mounted in said frame for shearing the intended horn in a generally well known manner, it being the principal objective here to provide cartridge-powered means which develops desired pressurized force to operate a reciprocable piston in a complemental fixed cylinder on the frame, all in a manner to actuate the movable blade, to forcibly impel it toward the complemental blade and to thus shear the stated horn quickly and with requisite nicety.

It is desired to state at the outset of the description that the subject matter of the instant disclosure has to do with analogous subject matter covered in the Cartridge-Powered Cow Dehorner, Serial No. 428,186, filed by me on May 7, 1954. Briefly, the copending application has to do with a rectangular or equivalent frame, a pair of cooperating cutter blades, one of which is preferably fixed and the other relatively slidable and movable toward and from the fixed blade. The cartridge-powered means takes the form of what is broadly referred to as a pistol-like gun in which blank cartridges are fired to engender the necessary explosive forces and to impose or impact the same against a piston, the piston being reciprocable in a cylinder fixedly joined with the frame. The piston rod is connected with the movable blade, and hence, by firing the gun, this in a generally well known manner, sufficient forces are generated to "shoot" and thus drive the sliding cutter blade toward the cooperating blade and to, in this manner, bring about the desired horn shearing result.

Since filing the above stated application, Serial No. 428,186, other variations and modifications of the over-all broad concept have been devised for likely adoption and use, and these are herein revealed singly and collectively with the thought in mind of providing members of the public, manufacturers and retailers with diversified adaptations which stem from the generic aspects of the over-all invention as will be clear upon considering the subjects-matter of Serial No. 428,186 and that which constitutes the instant disclosure.

In carrying out the principles of the instant invention, one phase of the same has to do with the aforementioned cylinder attached to one end of the frame, an explosive gun attached to the other end of the cylinder, a piston reciprocable in the cylinder and connecting with the cooperating blade, a vent in the intermediate portion of the cylinder, and a by-pass carried by a diametrically opposite side of the cylinder.

The objective in reference to the structural adaptation just comprehended is to utilize the stated vent to facilitate the return of the blade and piston to their respective starting positions and to employ the by-pass, preferably exteriorly of the cylinder, so that ample compressed gases are trapped in the remote end of the cylinder, that is,

the end opposite to the gun end, to utilize the same as a desirable ways and means of cushioning and, in fact, limiting the travel of the piston so that the intended travel action of the cutter blade will be limited to prevent over-driving and damaging of the same.

Novelty in addition to the above is predicated on a further embodiment which has to do with, briefly summarized, the stated rectangular frame, the fixed and movable cutter blades, a cylinder affixed to and projecting laterally from one end member of the frame, the gun on an end of the cylinder away from the frame, a piston operable in the cylinder and having a rod connected with the movable cutter blade, and buffer and cushioning cylinders, auxiliary to the first named cylinder, and which are interposed between the sliding blade and the adjacent and member of the frame, the blade having correspondingly fitted pistons operable in these auxiliary cylinders so that the air which is trapped in these cylinders serves to enable the same to provide cushioning or check devices which, obviously, limit the travel action of the movable blade.

Then, too, another phase of the invention has to do with a distinctive mode and means for imparting sliding motion to the movable or slidable cutter blade, this by way of the formation of a cam surface or edge on one end of the blade and a cooperating piston-driven wedge or block which latter is provided with idling rollers, certain of which engage the cam edge in a manner to transmit motion from the force-driven piston to the wedge member, and consequently, to the movable cutter blade.

Objects, features and advantages in addition to those specifically enumerated will become more readily apparent from the following description and the accompanying sheets of illustrative drawings.

In the drawings:

Figure 1 is a top plan view, with portions broken away and shown in section, of one embodiment of the over-all invention herein shown, described and claimed;

Figure 2 is a section on the irregular longitudinal line 2—2 of Figure 1, looking in the direction of the arrows;

Figure 3 is a cross-section on the line 3—3 of Figure 1, looking in the direction of the arrows;

Figure 4 is a plan view, similar to Figure 1, showing another modification similar to that depicted in Figure 1 and with portions broken away and shown in section;

Figure 5 is a lengthwise section in section and elevation, taken on the irregular line 5—5 of Figure 4, looking in the direction of the arrows;

Figures 6 and 7 are transverse or cross-sectional views taken on the planes of the line 6—6 and 7—7, respectively, of Figure 1, looking in the direction of the respective arrows;

Figure 8 is a plan view showing another modification, and in section and elevation;

Figure 9 is a cross-section on the irregular line 9—9 of Figure 8, looking in the direction of the arrows;

Figure 10 is an enlarged or exaggerated detail section on the line 10—10 of Figure 8, looking in the direction of the arrows; and

Figure 11 is a section on an enlarged scale taken on the line 11—11 of Figure 4, looking in the direction of the arrows.

Reference is had first to the form of the invention which will be herein identified as Figures 1 to 3, inclusive. With reference to these figures, and utilizing corresponding reference numerals and properly placed lead lines, the aforementioned rectangular frame is denoted generally by the numeral 12, and it may be of any appropriate construction. It includes spaced parallel, longitudinal side members 13 and 14 whose inner longitudinal sides or surfaces are provided with appropriate guide grooves

15—15 for the edge portions of the relatively slidable cutter blade **16**. This slides back and forth between the respective side members and toward and from the transverse end members **17** and **18**, and has an appropriate beveled or equivalent cutting edge **19**. The relatively stationary cutter blade is denoted at **20** and has an arcuate toothed or serrated edge **21**. Appropriate fasteners **22** are employed to secure this blade between the coacting members of the frame. Secured intermediate its ends to the transverse end member is a cylinder-barrel **23**, one end portion of which is screw threaded at **24** and spaced away from the end member **17**. The other end portion **25** projects into the space of the frame, as best shown perhaps in Figure 1. This cylinder is provided intermediate its ends and on one side with an orifice or a vent **26**. On the other side, it is provided with a exteriorly arranged by-pass pipe or tube **27** having its ends **28** and **29** located one to the right of the port **26** and the other to the left thereof. The piston rod **30** is reciprocable in this cylinder and has an appropriately constructed piston **31** which is preferably a so-called O-ring and which is provided with appropriate packing rings **32**. There is a similar O-ring **33** at the other end, as shown in Figure 2, which is provided with similar packing rings **34** and which is anchored in the inner end portion of the cylinder and serves as a bearing or suitably packed guide bushing for that end portion of the piston rod **35** which projects therethrough and is operable therebeyond. This end portion is screw threaded as at **36** and is threadedly connected with a yoke **37** which is, in turn, fastened at **30** on the cooperating end of the blade, a locking nut being provided at **39**.

The cartridge containing and firing means, here broadly referred to as a pistol-like gun, is denoted generally by the numeral **40**. It has a suitable stock **41** with a pistol grip **42**, a guard **43**, a trigger **44**, a barrel **45** in which the cartridge **46** is placed for firing, the barrel having an integrally screw threaded end portion **47** which is coupled to the screw threaded end of the cylinder barrel **23**, all as best shown in Figure 2. This lines up the "gun" with the piston equipped cylinder for appropriate operative association. The cartridges are carried in a readily applicable and removable so-called clip **48** which is appropriately mounted. The conventional type sliding bolt is denoted at **49**. As before stated, any appropriate cartridge firing gun for generating the desired explosive forces and power may be utilized, and hence, removably mounted on the threaded end of the cylinder **23**. When the gun is fired, it serves to drive the piston **31** from right to left in the drawings, which imparts the desired sliding and driving motion to the movable cutter blade **16**. The exhaust vent **26** permits the return of the piston to its starting or ready-to-shoot position. The principle of action here is as follows: When the cartridge is fired, the piston travels to by-pass **28**. The gases created by cartridge rush through opening **28** and out **29** and thus build up the needed pressure to create a stop in addition to normal pressure created. The piston carries the knife through the entire cutting stroke before exhaust escapes first through **28** and the remainder to atmosphere through port **26**. The complete shearing step is completed before compression becomes effective.

In the form of the invention depicted in Figures 4, 5, 6 and 7, an embodiment distinguishing only slightly from that identified as Figures 1 to 3, inclusive, is characterized by a rectangular frame **50** with the movable blade **51** having a V-shaped cutting edge **52** and with its edge portions slidable in guide grooves **53—53** in the longitudinal side members **54—54**. The fixed blade **55** has a similar cutting edge **56**, and this blade is fixedly mounted between the side members and the transverse end member **57**. The opposite transverse end member **58** carries a cylinder-barrel **59**, the left hand end **60** of which projects into the space of the frame. Here, the piston **61** comprises a rod **62** connected to a piston head **63** with packing rings **64**, all as already described. There is a similar bushing and guide at **65** with packing rings **66**. The piston rod is connected with a fork or yoke **67** by way of a threaded end **68** and a lock nut **69**. On the threaded end **70** of the cylinder is the screw threaded connector **71** of the aforementioned cartridge containing and firing gun or piston **40**. The details here are the same as already described, and the same numbers already used are applied for convenience. Thus, the gun is fired and the piston in the cylinder is operated in the same way to drive or operate the sliding cutter blade **51**. The difference here is that the aforementioned by-pass **27** is omitted. However, the vent **26A** is retained. The check or cushioning devices are different here, in that I utilize a pair of auxiliary spaced parallel cylinders **72** and **73**. These have threaded ends **74—74** screwed into sockets provided therefor in the frame end member **58**. There is a screw cap **75** on the opposite end of each cylinder. The numerals **76** designate vents. The pistons are small pistons and the head of each is denoted at **77**, and the rod at **78**, and the rod extends through the screw cap **74** where it is threaded into a socket **79** provided therefor in the cooperating end of the sliding cutter blade **51**.

In the form of the invention just described, the operation is the same as that already described in reference to Figures 1 to 3, except that the cushioning means, as is evident, is different and operates in a slightly different manner. That is to say, as the piston is forcibly driven in the cylinder **59** when the cartridge in the gun is fired, the cutter blade **51** slides from right to left in the drawings. In so doing, the auxiliary or smaller pistons operate in their auxiliary cushioning cylinders **72** and **73**. That is to say, these pistons travel likewise right to left and the air which is trapped therein to the left of each piston is compressed in the left hand end of the cylinder and sufficient of a "cushion" is built up to check the stroke of the main piston **61** and consequently the travel action of the cutter blade **51**.

Taking up now the final or third embodiment or form of the invention, this is, as before stated, covered in Figures 8, 9 and 10. With reference to these figures, the frame is denoted by the numeral **80** and comprises suitably constructed longitudinal members **81** and **82** with a transverse end member at the right, as at **83**, and at which end of the structure, the fixed blade **84** is secured. This has a toothed cutting edge **85**. The movable blade is operable in guideways **86**, said blade being denoted generally by the numeral **87** and having an appropriate cutting edge **88** movable toward and from the cutting edge **85**. This blade also has oppositely disposed outstanding lugs **89–89** operable in slots provided therefor in the side members of the frame which have piston rods **90—90** affixed thereto at corresponding ends. The piston rods carry piston heads **91—91** operable in the cushioning cylinders **92—92** formed integrally with the exterior surfaces of the side members of the frame. Here again, these cushioning cylinders have vents **93—93**. Appropriate bushings are threaded, at **94**, in the opposite ends of the cylinders. Thus, the stop action here is the same in that the trapped air which is compressed and trapped in the respective cylinders acts on the pistons to limit the travel of the movable blade **87** in a direction from left to right. The principal novelty in this form of the invention has to do with the cartridge-powered means and especially the means for transmitting motion therefrom to the blade. To this end, it will be seen that the left hand end of the cutter blade has a beveled surface, as at **95**, to accommodate idling rollers **96** on the correspondingly beveled side or surface **97** of the wedge-shaped block or cam **98**. On an opposite lengthwise edge, this block is also provided with idling antifriction rollers **99** which operate in a guideway or groove **100** provided therefor in the transverse end member **101** of the

frame. The frame is fashioned into a sort of a special cam or wedge accommodating chamber, as at **102**. This has a screw threaded hole or socket **103** in one end portion into which the threaded end **104** is screwed, in the manner shown. The cylinder is denoted at **105** and is provided intermediate its ends with a vacuum releasing vent **106**. The piston **107** has a rod **108** connected with the wedge or cam at one end and operating through a suitably packed stuffing box or bushing **109** in the cylinder. The piston head itself is denoted at **110**, and this is operable in the end of the cylinder in the manner shown and the cylinder is screw threaded at **111** to accommodate the coacting connector portion **112** of the "gun" **113**.

It will be obvious from the form of the invention just described that when the gun is fired, the piston is operable in its cylinder **105** in the usual way, and the piston, in turn, serves to drive or impel the wedge-shaped cam block **98** in an obvious manner. In so doing, the idling rollers **96** on the cam edge **98** engage the cam edge **95** of the sliding blade **87**, and hence, the blade is slid in a direction from left to right in Figure 8, in an obvious manner. Here, the buffer and cushioning cylinders **92—92** and their cooperating pistons come into effect to satisfactorily "check" the stroke of the cutter blade, this in a substantially obvious manner.

It is believed that the detailed description, when studied in conjunction with the various views of the drawings, will enable the reader to comprehend the nature of the several embodiments of the invention, their similarities and dissimilarities, the operation of each, and the features and advantages. In these circumstances, a more explicit explanation is thought to be unnecessary.

What is claimed as new is as follows:

1. A power operated cow dehorner comprising a portable frame, a pair of cooperating cutter blades supported for operation in said frame, adjacent ends of said blades having overlapping cutting edges which, as they overlap, bring about the intended and desired horn shearing result, at least one of said blades being propelled and slidable at high speed toward the other blade, gas powered force producing means mounted on said frame and embodying a stationary cylinder, a piston reciprocable in said cylinder, a cartridge containing and firing gun mounted on said cylinder, said piston embodying a rod connected with said slidable blade, and means limitary in construction and functioning form which serves to limit the travel of the piston in one direction and consequently the corresponding travel distance of the sliding cutter blade and which also serves to check and bring said blade to a stop and to thus prevent damage to the cutting edge of the blade, said piston embodying a readily applicable and removable head mounted on a rod, said head provided with packing rings, and a guide for said rod fixedly mounted in one end of said cylinder.

2. The structure defined in claim 1 and wherein said cylinder is integral intermediate its ends with an end member of the frame and with one end portion of the cylinder projecting into the space of the frame, that is, into a position midway between the side members of the frame.

3. The structure defined in claim 1 and wherein said cylinder is integral intermediate its ends with an end member of the frame and with one end portion of the cylinder projecting into the space of the frame, that is, into a position midway between the side members of the frame, said cylinder being provided intermediate its end of said cylinder.

4. The structure defined in claim 1 and wherein said limitary means embodies a by-pass having end portions connected to intermediate portions of the cylinder so that a portion of the charge entering the intake end of the cylinder may be by-passed around the piston and into an end portion of the cylinder to assist in producing the desired cushioning and piston stroke checking action.

5. The structure defined in claim 1 and wherein said limitary means comprises a pair of auxiliary cylinders fixedly secured at corresponding ends to an end portion of said frame, and individual pistons secured to said slidable blade and operable in their respective auxiliary cylinders.

6. The structure defined in claim 1 and wherein said frame embodies side members connected together by end members, said side members being slotted, auxiliary cylinders fixedly mounted on said side members, pistons slidable in their respective auxiliary cylinders, said cutter blade being provided with outstanding lugs projecting through and beyond the respective slots in the side members and slidable back and forth in said slots, said pistons having rods connected with their respective lugs.

7. A power operated cow dehorner comprising a portable frame, a pair of cooperating cutting blades supported for operation within the marginal limits of said frame, adjacent ends of said blades having overlapping cutting edges which, as they overlap, bring about the intended and desired horn shearing result, at least one of said blades being fixed, the other blade being propelled and slidable at high speed toward and from the fixed blade, gas powered force producing means mounted on said frame and embodying a stationary cylinder, and piston means embodying at least one piston reciprocable in said cylinder and including a complemental piston rod which is connected with said piston and also connected with said slidable blade, a cartridge containing and firing gun mounted on one end of said cylinder, the other end of said cylinder being closed and providing a chamber between itself and the adjacent relatively reciprocable piston and in which chamber cushioning media is compressed in a manner which serves to limit the travel of the piston in one direction and subsequently the corresponding travel distance of the sliding cutter blade and which serves to gradually check and bring said blade to a stop and thus prevent damage to the cutting edge of the blade.

8. A power-operated cow dehorner comprising a portable frame, at least one horn cutting blade mounted for operation on said frame, said blade being movable relative to the frame, said blade being adapted to be powered and forcibly driven at rapid speed, a cylinder rigidly mounted on said frame, said cylinder being closed at one end, a piston mounted for reciprocation in said cylinder and having a complemental piston rod operatively connected with said cutting blade, blank cartridge containing and firing means communicatively mounted on and at the other end of said cylinder and functioning, when the cartridge is fired, to generate explosive gas pressure which is focused and acts upon said piston and serves to bring about the instantaneous high speed actuation of the piston, rod and cutting blade, said cylinder being provided intermediate its ends and on one side with a used gas exhaust port, being provided on an opposite side with a pressurized gas intake port and at a longitudinally spaced point with a complemental discharge port, said ports being progressively valved and closed by the cooperation of the confined piston therewith, and a by-pass for the pressurized gas communicatively connecting said intake and discharge ports and serving to permit gas under pressure to be trapped and compressed in the cylinder between said closed end and the piston advancing toward that end, whereby to utilize the thus trapped gas as a cushioning and check media and limiting the travel of the piston in said cylinder in one direction.

9. A power operated cow dehorner comprising a portable frame, a pair of cooperating cutter blades supported for operation in said frame, adjacent ends of said blades having overlapping cutting edges which, as they overlap, bring about intended and desired horn shearing result, at least one of said blades being designed to be propelled at high-powered gunshot speed toward the other blade, a cylinder fixedly mounted on said frame, said cylinder being closed at one end, a piston mounted for reciproca-

tion in said cylinder, a rod connected at one end with said piston and reciprocable through and beyond the closed end of the piston and connected at its other end with said movable blade, said cylinder having a vent and being further provided on one side intermediate its ends with longitudinally spaced pressurized gas intake and discharge ports, said ports being communicatively connected by way of the cooperating end portions of a pressurized gas by-pass, and a cartridge containing and firing gun operatively and communicatively mounted on the other end of said cylinder in a manner to generate gas which is expelled from the gun into the cylinder to drive the piston and operate the movable cutter blade and which is also

shunted from the cylinder through the intake and discharge ports in a manner to automatically trap gas between the closed end of the cylinder and the advancing end of the piston.

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