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Preda et al.

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[54] **AUTOMATIC CHOKE FOR HUNTING RIFLES**

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[52] **U.S. Cl.** **42/79**
[51] **Int. Cl.** **F41c 21/00**
[58] **Field of Search** 42/79

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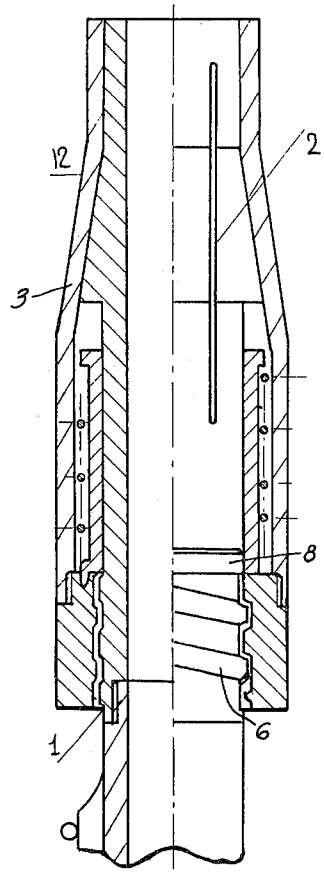
[57] **ABSTRACT**

An automatic choke for buckshot rifles, comprises a tubular element that can be screwed to the extremity of the rifle barrel, said element being equipped with longitudinal slots spaced equidistant from one another, its median part having a longitudinal truncated cone cross-section, thus permitting, as a result of a back-sliding of an external sleeve, caused by the thrust of a coil spring, a reduction of the diameter of said tubular element; the degree of back-sliding of the external sleeve being determined by a system of notches accommodated in the terminal part of the external sleeve, operated by a release tooth fastened to the tubular internal element, said release taking place on account of the recoil of the barrel at each discharge. It is also possible to use instead of the recoil forces the counter forces generated at the moment when the movable barrel reaches the end of its stroke.

17 Claims, 10 Drawing Figures



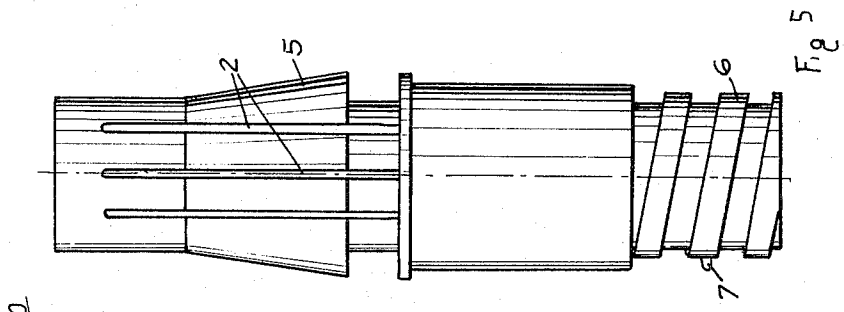


Fig 5

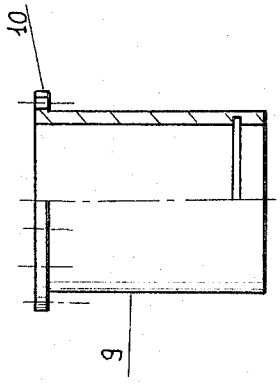


Fig 3

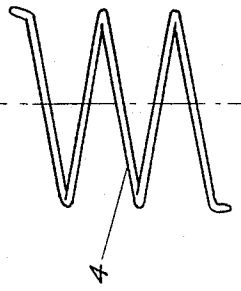


Fig 4

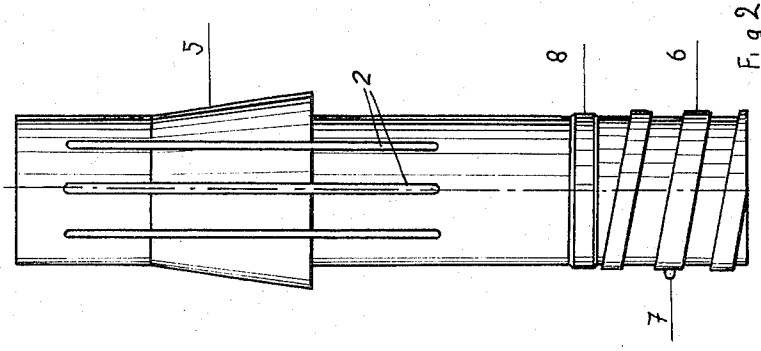


Fig 2

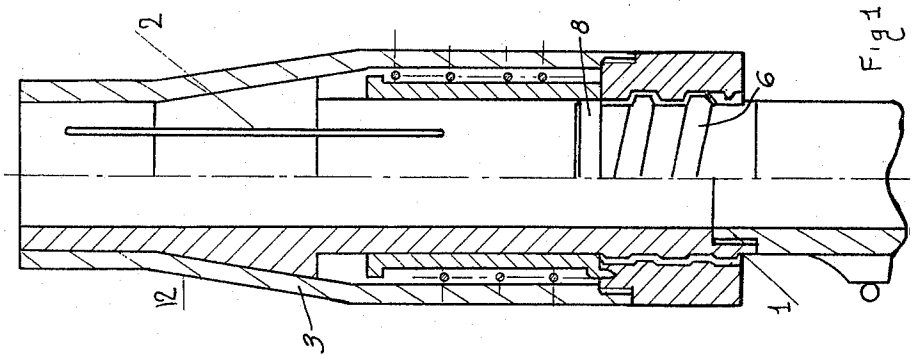


Fig 1

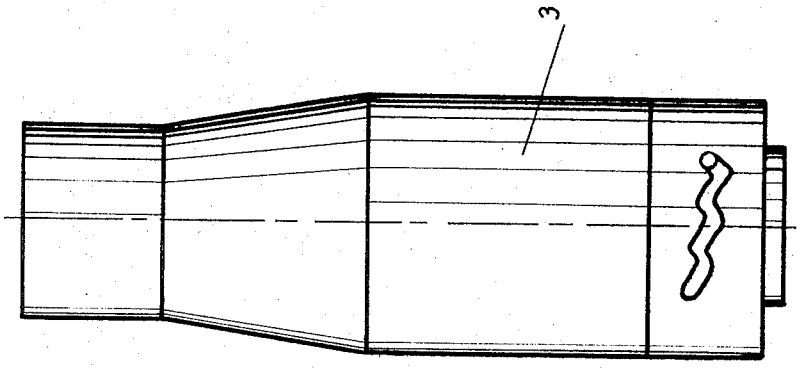


Fig 8

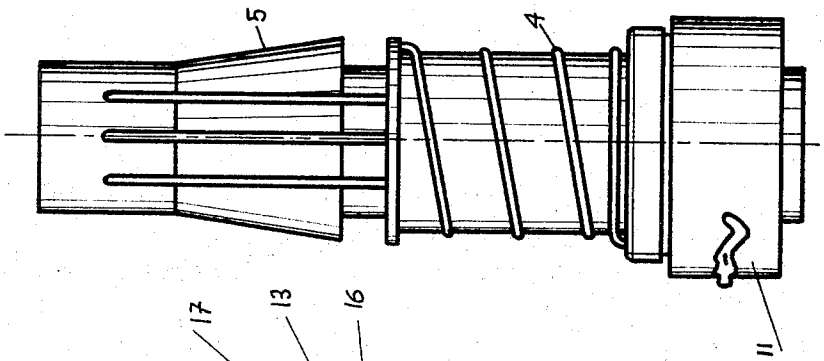


Fig 7

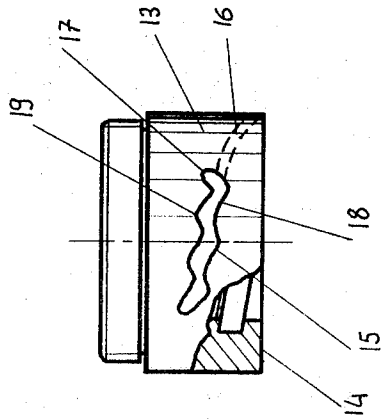


Fig 6

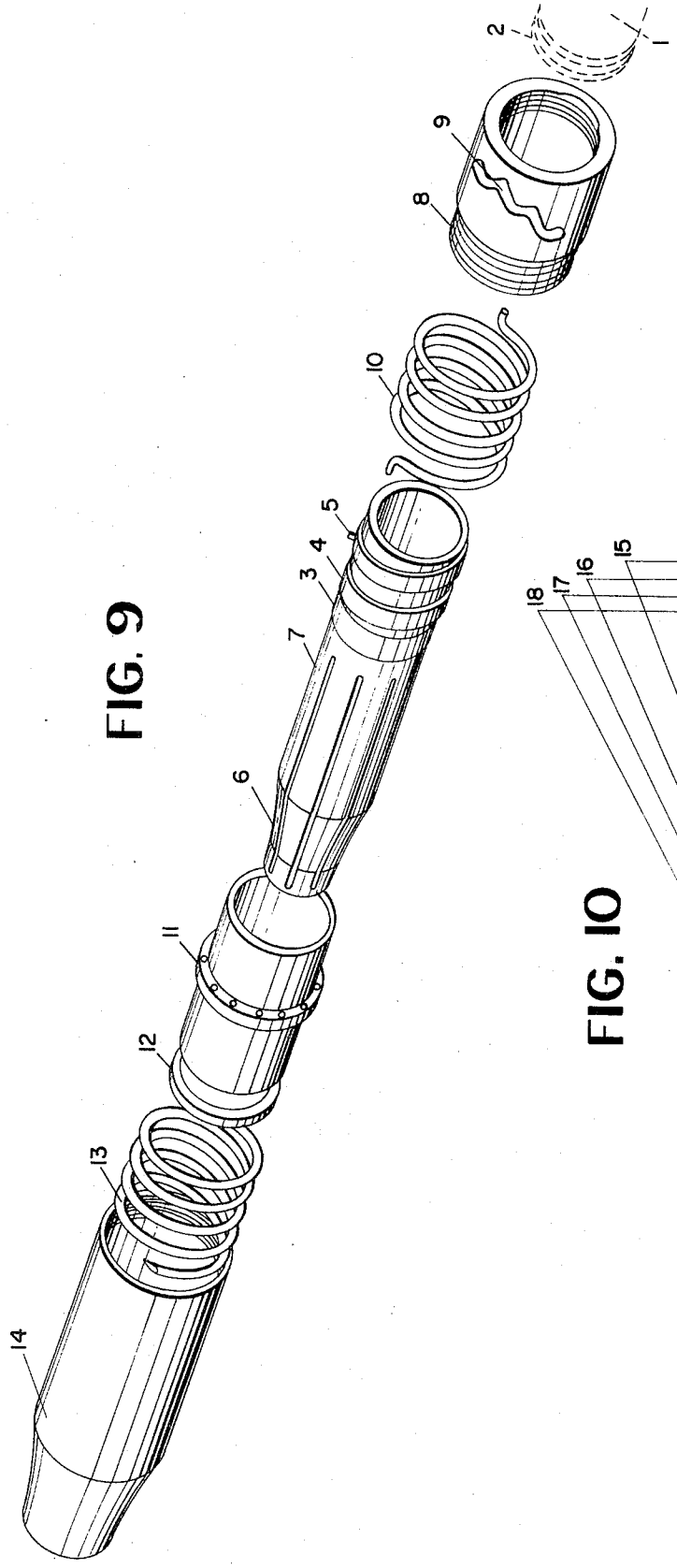


FIG. 9

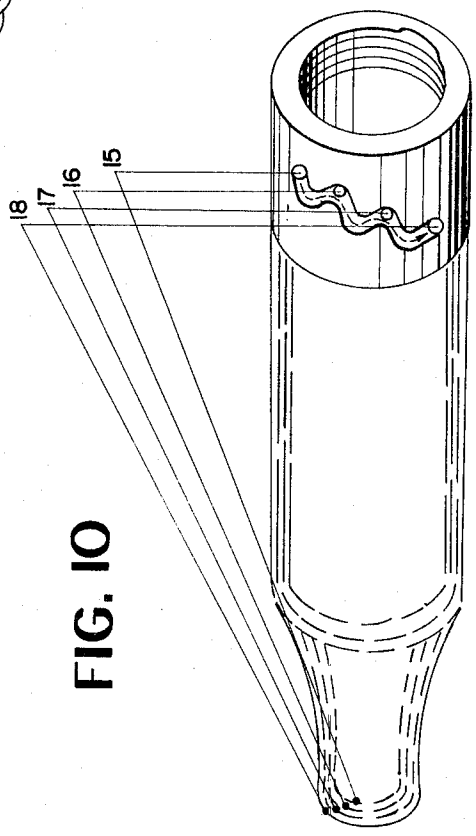


FIG. 10

AUTOMATIC CHOKE FOR HUNTING RIFLES

This invention relates to special types of automatic converters of the nozzel of the barrel of automatic hunting rifles making use of buckshot amnunition.

In the art there has already been recognized the importance of a similar device which, applied to the barrel muzzle of the automatic rifle, would eliminate its traditional drawback, i.e., the fact that only one barrel, and therefore a single choke action, is available for a considerable firing power in rapid succession (four, five, or more rounds).

The present invention provides a new and exclusive design system of a nozzle at every discharge which, by taking advantage of the energy provided by the recoil, causes a progressive choking action.

Such a system, of easy realization on account of its extreme simplicity, consists of three main parts:

A fixed internal part, applied by screwing it to the appropriately threaded barrel of the rifle;

a movable external part axially sliding as a sleeve over said internal part; and

a median part, i.e., a spring causing the movement of the movable external part.

However, the present invention also includes a different construction wherein instead of the recoil forces the counter forces are used which are generated at the moment when the movable barrel reaches the end of its stroke. In this version, upon recoiling of the barrel due to the explosion recoil, the entire choking device slides back at the same time. Thus, the pivot inserted into the notches in the rest phase finds itself compressed by the spring in the position opposite to that of the notch with respect to the one it occupies in the device provided for fixed-barrel rifles, and it will be able to leave this position only by moving upward, which is impossible during the recoiling phase of the barrel. Therefore, the release phase of the spring will not take place with the help of the recoil forces but with counter-forces, i.e., the moment the mobile barrel returns to its normal position. The latter forces applied to the tube carrying the release element will be greater than those applied to the external sleeve in any event on account of the different mass of the two bodies provided with the same acceleration and therefore, by the forward movement of the sleeve, the pivot, integral with the tube, will leave its own seat, thus allowing the previously loaded spring system to slide back the sleeve by choking the tube constituting the terminal element of the rifle barrel.

Consequently this construction of the present invention includes one spring mounted between the ring and the base of the sleeve (the external bushing with notches) exclusively torsion-loaded, a washer onto which there rests a second spring that is exclusively compression-loaded, and the upper sleeve that will be screw-mounted at its lower base provided with notches serving as a guide to the release tooth integral with the tube on which there is furthermore provided a wide-pitch thread that assists the tooth to withstand the recoil shock.

The invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawings showing by way of example only, preferred embodiments of the inventive idea.

In the drawings:

FIG. 1 is a section through a device of the present invention.

FIG. 2 is a side view.

FIG. 3 shows the spring-clamp ring.

FIG. 4 shows the spring.

FIG. 5 shows the tube with the clamp ring applied.

FIG. 6 shows the outer bushing with notches (or terminal portion of the sleeve).

FIG. 7 shows the tube with spring-clamp ring, spring, and bushing applied.

FIG. 8 shows the complete sleeve device screwed to the bushing.

FIG. 9 is a perspective view of the separate parts of the device constituting another embodiment of the present invention.

FIG. 10 is a perspective view of the bushing of the device of FIG. 9.

The embodiment of the present invention shown in FIGS. 1 to 8 includes an inside element consisting of a tube having an inside diameter identical to that of the barrel 1 to which it is to be applied by screwing it externally so as to form a natural prolongation of the barrel itself.

This tube is deformable since it is rendered elastic by means of a suitable series of longitudinal slots 2 cut in its medial part. This system for varying the diameter of this terminal part of the barrel makes it possible to achieve the so-called classic "choke effect," which requires, behind the narrowing of the section, a subsequent cylindrical portion; this being a universally preferred effect adopted in the standard nozzle of the barrel on account of the ballistic advantages inherent with regard to the so-called "conical type" where the cylindrical part is missing.

The variation of the inside diameter of the tube according to the present invention is obtained by the moving of the mobile part 3 toward its base, in other words, the external sleeve 3 moves as a result of the thrust of spring 4. It exactly matches with its internal surface the external surface of the tube which will have a truncated cone shape in its median part 5. At every recoiling, the friction between the two surfaces will force the elastic surface to shrink, thereby causing a reduction in its inside diameter.

Internal parts of this device include the following elements:

An internal threading in the part joined to the muzzle of the barrel;

an external threading along its lower portion, consisting of a wide thread having a long pitch 6. (In practice, the desired result can be obtained with a thread of a width of about 3 mm and a pitch of 14);

a small cylindrical stop tooth 7 fixed at a suitable point of the thread;

a thread at its lower median portion 8 onto which it is to be screwed; and

a spring clamp ring 9.

The middle portion of the device consists, as stated above, of a coil spring 4 designed to slide into the tube and whose upper extremity is to be fastened into the suitable seat of the spring clamp ring 10, integral with the tube and therefore with the fixed part of the device, while its lower portion is to be fixed to the terminal zone of the sliding, external bushing 11 and therefore into the mobile portion of the device. Once the spring has been loaded, it will tend to stretch, finding its bearing point in the fixed part of the device, and will therefore move the sleeve which, as stated above, will determine the desired narrowing of the tube.

For manufacturing considerations and easy handling, a mobile external portion of the device consists of two elements which, screwed into one another, become, as an assembled part, a single whole. The first one of these two parts is the sleeve itself, namely, the part which, slid over the tube, will conform with its inner surface to the respective truncated cone shaped external surface of the tube and, by back-sliding, will determine its constriction **12.**

The second part or bushing **13,** displacing itself along with the sleeve itself, serves to smoothen the recoil of the entire part at every discharge.

The spring is the element that will generate the force of such a recoil by imparting at the same time a pressure in axial direction and a torque that will develop itself through the long-pitch external thread **6** of the tube.

To that end, the busing is designed in such a way that its internal surface forms the female thread **14** of the large terminal thread of the tube and will be screwed to the tube. Between the pitches of the thread of the screw and the female screw there is to be left a certain clearance in order to permit the disengagement of the tooth from its various and successive seats (notches).

In the bushing there is provided a narrow oblique slot **15** slanted to conform to the pitch of the internal thread of the bushing and which is to be milled between one pitch and the other one of the thread and to be provided with a set of saw-tooth notches in which, benefiting from the torque imparted by the spring to the sleeve, the release tooth **7** will engage at every discharge. In order to be able to screw the bushing to the tube and cause the release tooth to enter the dead end notched sloth, said tooth being already fixed in the tube, a suitable guide is provided inside the bushing, making it possible to cause the tooth (of suitable dimension) to pass therein as in a receptacle **16.**

The device is operated as follows:

Having manually inserted the release tooth, e.g., into the first notch, at the moment of firing, due to the recoil of the barrel, the tooth will leave the notch without however coming in contact with the blocking notch because it would break, due to the force of the recoiling action. This is made possible through the provision of the internal thread **14** of the bushing, which, in cooperation with the external thread of the tube **6,** forms a powerful buttressing and stop ledge of the movement. At the same time, due to the existence of a certain clearance between the screw and the female screw, the tooth is allowed to leave the notch **17** and to enter the subsequent one without slamming against the blocking notch **18,** in view of the presence of the aforementioned thread-edge, and will slide on the slanted surface of the blocking notch before entering the following notch **19.** Since the latter is higher than the former (it ought to be emphasized that the slot with the notches follows the same pitch of the thread of the bushing, and, therefore, is oblique), the result is that the entire sleeve will recoil toward the base of the device to such an extent as to allow an initial narrowing of the tube. And the action proceeds in this manner until reaching the last notch, which will correspond to the maximum recoiling point of the sleeve, and therefore to the maximum narrowing of the elastic part of the tube, hence to the maximum choking ratio, i.e., 10/10.

It is apparent that numerous changes may be made in the described embodiment within the scope of the appended claims.

For example:

The tube can be designed without the cylindrical and rigid terminal portion and can have instead open-ended longitudinal segments basically producing likewise a kind of "conical type" choke.

The saw-tooth notches of the bushing can have a different alignment and can be spaced from one another so as to avoid the gradual loss of force of the spring in its torque.

The entire system can be reversed, thereby obtaining a narrowing of the tube by means of an inverse motion of the external sleeve, in other words, a wider distance, rather than proximity, of the latter from the base of the device. It is obvious that, in that case, the slant of the toothed slot will be reversed and the truncated cone accommodated in the tube will likewise be reversed, just as the spring will have to extend in opposite direction.

It is also possible to vary solely the slant of the notched slot in opposite direction, with the result that, as the device is actuated, by increasing the choke ration, the spring, instead of extending, will gradually compress itslef, acting in this manner as a simple shock-absorber of the recoil of the firearm.

In the embodiment of the present invention shown in FIGS. **9** and **10** the numeral **1'** represents the rifle barrel, **2'** is the external thread milled onto samed, **3'** is the tube, **4'** is the wide-pitch thread, **5'** is the release tooth, **6'** is the truncated cone profile of the choke, **7'** are the slots arranged to improve the elasticity of the tube, **8'** is the lower part of the sleeve, **9'** are the sliding notches of the tooth **5'**, **10'** is the torsion spring, **11'** is the spring-clamp ring, **12'** is a washer, **13'** is a compression spring, **14'** is the upper part of the sleeve.

FIG. **10** shows the outline of the notches and the distance to be covered by the release tooth to release the spring and to permit the sliding back of the sleeve over the tube with a resultant choking of the latter. Numeral **15'** represents the rest position of the tooth **5'** corresponding to the still undeformed barrel. It is to be noted that said position, wherein the tooth touches the lower portion of the notch is, in the same contact condition where it was situated in the upper portion. **16'** is the position of the tooth in its first choking phase followed by a resultant recoiling of the sleeve. **17'** is the position of the tooth in the second choking phase with a subsequent recoiling of the sleeve with respect to the tube, and **18'** is the position of the tooth in the maximum choking phase with the sleeve being at the same level of the tube, the said situation referring of course to a three-step choking operation.

It is apparent that numerous changes can be also made in this construction within the scope of the appended claims.

What is claimed is:

1. A progressive automatic choke for a buckshot rifle having a rifle barrel, said choke comprising a tubular element screwed to the extremity of the rifle barrel and having longitudinal slots spaced at equal distances from one another and also having a median part with a longitudinal truncated cross section, a release tooth carried by said tubular element, a slidable external sleeve having a plurality of notches in its terminal part, said release tooth engaging said notches to determine the extent of back sliding of said sleeve, and a coil spring en-

gaging said sleeve and causing the back sliding of said sleeve, said back sliding causing a reduction of the diameter of said tubular element, said release tooth operating by the recoil of the barrel at each discharge.

2. An automatic choke according to claim 1, comprising a tubular element which can be screwed to the barrel, whose inside diameter is identical to that of the barrel itself and whose longitudinal part has a truncated cone configuration in its median portion, a plurality of slots extending longitudinally in the median portion of the same element which render said portion elastic by leaving undeformable and therefore cylindrical, the extreme part of said tubular element.

3. An automatic choke according to claim 2 wherein the tube screwed to the barrel of the gun has an external thread in its lower zone with a long pitch and with a wide and flat turn.

4. An automatic choke according to claim 3 wherein the tube screwed to the rifle barrel comprises a projecting blocking tooth fastened on said thread turn.

5. An automatic choke according to claim 4, wherein the tube screwed to the barrel of the rifle has a thread in its median-to-lower external portion and a spring-clamp ring screw-mounted upon the last-mentioned thread.

6. An automatic choke according to claim 4 wherein the tube screwed into the barrel of the rifle comprises a spring-clamp ring screwed into its median to lower portion and which has in a neck that runs to the median upper part of the tube a plurality of receptacles, corresponding to a plurality of seats for one extremity of the coil spring.

7. An automatic choke according to claim 6, comprising a coil spring to be wound around the tube, which, fastened with one of its extremities in a seat of the spring clamp ring screwed to the tube, and therefore to the fixed part of the device, penetrates with its other extremity and releases its force into the terminal part of the movable part of the sleeve, thereby imparting an axial thrust and a torque which permits a semi-screwing down of the sleeve on the tube, and therefore its recoiling, with a resultant narrowing of the tube on its elastic part through a growing pressure onto its external truncated cone surface.

8. An automatic choke according to claim 7, comprising a bushing which, screw-mounted to the sleeve, becomes integral with same, said bushing having an axially located hole on its upper circumference suitable to house one extremity of said spring; one oblique slot provided with saw-tooth notches suitable for gradually effectuating the movement of the entire mobile part whenever the release tooth fixed to the tube on account of the recoil of the firearm proceeds from notch to notch, while the bushing is half-screwing itself in during its backward motion.

9. An automatic choke according to claim 8, comprising a bushing provided with a wide and flat internal thread that screw-mounts the bushing itself to the terminal part of the tube, leaving a certain clearance between the screw and the female screw of the thread.

10. An automatic choke according to claim 9 comprising a bushing forming a receptacle having on the inside the same pitch as the last-mentioned thread, which, starting out from zero, proceeds until it is aligned with the first notch, and is suitable for permitting the insertion of the release tooth in the coupling of the bushing to the tube.

11. An automatic choke according to claim 8 comprising an external sleeve which carries internally at its base a thread suitable for screwing it to said bushing, said sleeve having a portion of its internal part which conforms to the truncated-cone part of the tube, producing with every back-sliding a relative narrowing of the elastic tube.

12. An automatic choke according to claim 4, wherein its operation is determined by the recoiling force of the rifle to which there is applied a force that permits the disengagement of said tooth from each notch, and as a result of the half-screwing of the sleeve accommodating the saw tooth notches, and therefore of the entire external part, said tooth enters the successive notch with every discharge, thus selecting every choking ratio in view of the fact that, to each individual notch, there corresponds a given pressure of the mobile sleeve on the elastic portion of the tube.

13. An automatic choke according to claim 1, wherein the progressive choke is caused by counterforces generated when the slidable sleeve reaches the end of its stroke.

14. An automatic choke according to claim 13, wherein the release system is appropriately reversed in its rest position and the notch-tooth contact occurs in the lower part of said notch, the release taking place by a sliding upward motion of the tooth with respect to the notch.

15. An automatic choke according to claim 14, comprising two springs with separate torsion and compression functions.

16. An automatic choke according to claim 15, wherein the compression spring rests upon a washer.

17. An automatic choke according to claim 16, wherein a central collar separates the two springs.

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