

[54] **SABOT PROJECTILE**
 [75] Inventor: **Walter Engel, Dubendorf, Switzerland**
 [73] Assignee: **Werkzeugmaschinenfabrik Oerlikon-Bührle AG, Zurich, Switzerland**

[22] Filed: **Nov. 15, 1973**

[21] Appl. No.: **416,208**

Related U.S. Application Data

[62] Division of Ser. No. 231,867, March 6, 1972, Pat. No. 3,837,057.

[52] U.S. Cl. **102/93**
 [51] Int. Cl.² **F42B 13/16**
 [58] Field of Search **102/93**

[56] References Cited

UNITED STATES PATENTS

2,994,274 7/1961 Dunlap 102/93

3,000,316	9/1961	Dunlap et al.	102/93
3,055,268	9/1962	Rosenthal	102/93 X
3,359,905	12/1967	Engel	102/93
3,447,466	6/1969	Engel	102/93
3,496,869	2/1970	Engel	102/93
3,551,972	1/1971	Engel	102/93

Primary Examiner—Stephen C. Bentley

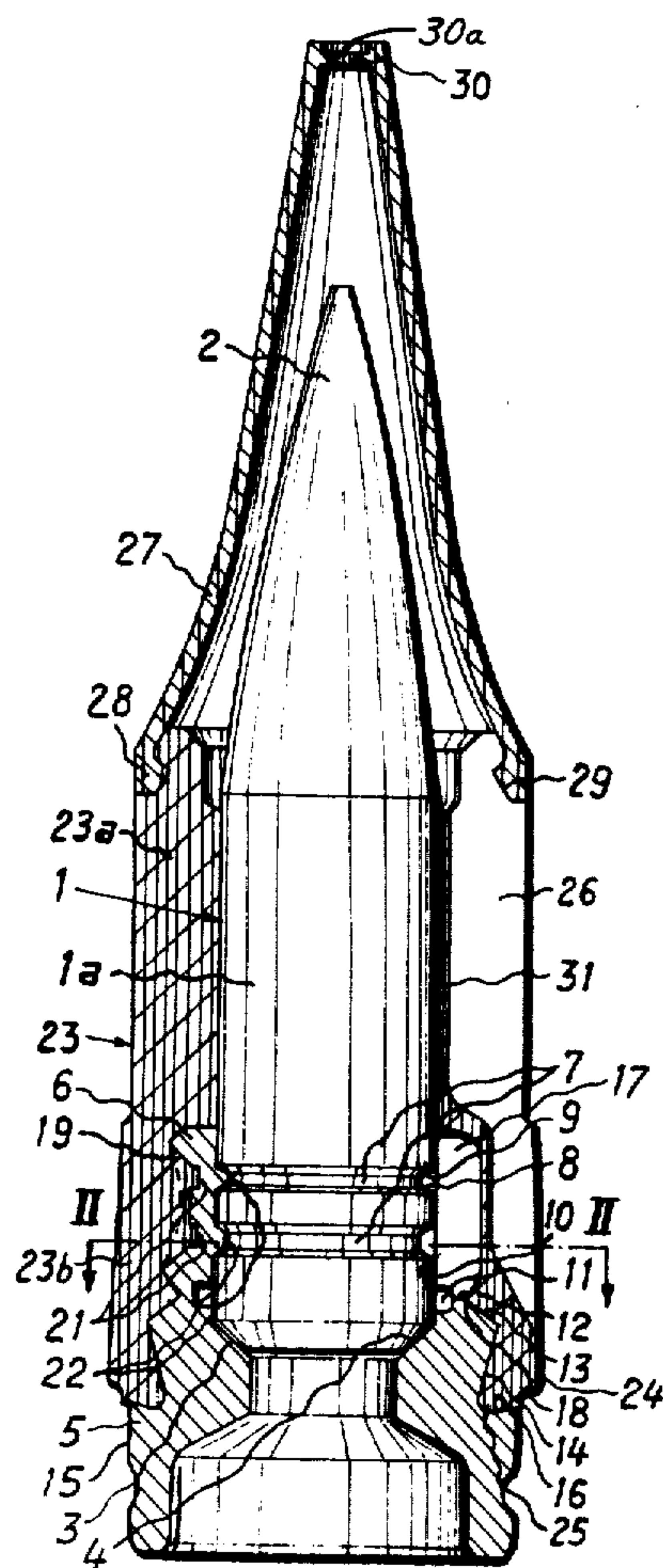
Assistant Examiner—C. T. Jordan

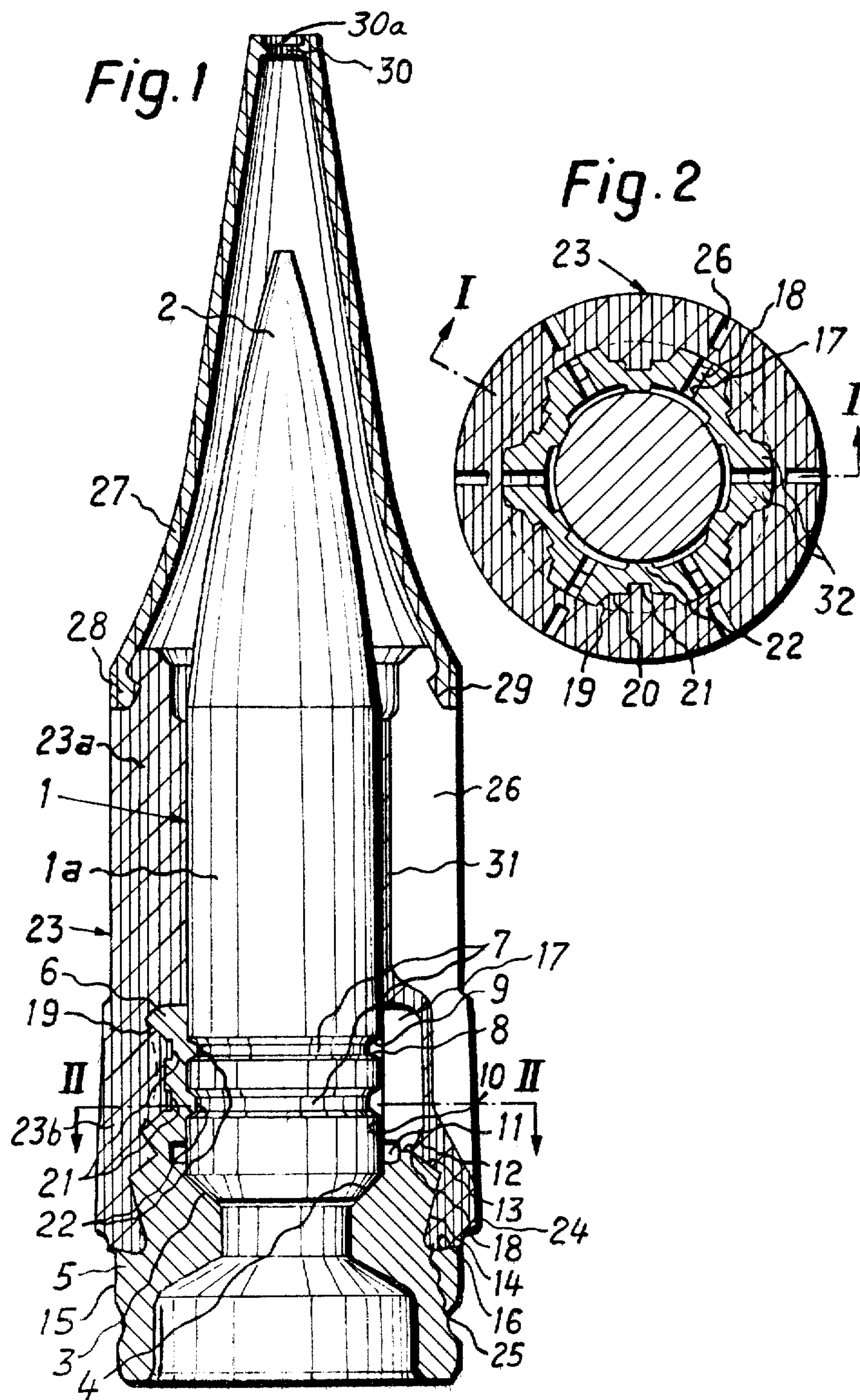
Attorney, Agent, or Firm—Werner W. Kleeman

[57] ABSTRACT

A sabot projectile comprising a projectile body having at least one peripheral groove and a sabot incorporating a sabot rear part having a substantially sleeve-shaped extension, arranged at its front end. The extension is sub-divided into segments by means of substantially axially extending slots, and such segments possess radially inwardly directed projections or tabs which are pressed into such peripheral groove.

5 Claims, 2 Drawing Figures





SABOT PROJECTILE

CROSS-REFERENCE TO RELATED CASE:

This is a divisional application of my copending, commonly assigned U.S. application Ser. No. 231,867, filed Mar. 6, 1972 now U.S. Pat. No. 3,837,057.

BACKGROUND OF THE INVENTION

The present invention relates to a new and improved construction of sabot projectile embodying a projectile body having at least one peripheral groove and with a sabot rear part containing a sleeve-shaped extension arranged at its front end and which is sub-divided by axially extending slots into segments.

With a known sabot projectile of this general type a ring consisting of a number of segments is arranged in a peripheral groove, this ring bearing upon a rear flank of the groove. The ring protrudes outwardly past the diameter of the projectile body and forms the bearing support for a forwardly projecting sleeve formed from a number of segments. A sleeve-shaped projection or extension of the rear part surrounds the aforementioned sleeve. The extension is provided with axially extending slots and is inwardly flanged at its front end, thereby preventing forward displacement of the sleeve. Upon introducing a cartridge containing such type projectile into the cartridge chamber of an automatic weapon the forces acting at the projectile body are transmitted via the ring, the sleeve and the sleeve-shaped projection to the sabot. The rear part preferably consists of an aluminum alloy, for instance Perunal, which characterizes itself on the one hand by lower weight and on the other hand by high mechanical strength, something which is important because of the larger inertia forces acting during firing.

SUMMARY OF THE INVENTION

It is a primary object of the present invention to provide a projectile formed of fewer parts and therefore less expensive to manufacture, and by means of which there is ensured for positive separation of the sabot rear part from the projectile body after leaving the weapon bore or barrel.

A further object of the present invention relates to an improved sabot projectile having novel means for connecting the projectile body with the sabot.

Still a further significant object of the present invention relates to sabot projectiles which are less complicated in design and more economical to manufacture.

Now, in order to implement these and still further objects of the invention, which will become more readily apparent as the description proceeds, the inventive sabot projectile is generally manifested by the features that the segments of the sleeve-shaped extension of the sabot rear part embody radially inwardly directed projections or dogs which engage in the aforementioned peripheral groove.

In its more specific aspects there is disclosed a sabot projectile comprising a sabot rear part and a sleeve-shaped extension connected via a reference rupture location with the sabot rear part, said sleeve-shaped extension being subdivided into segments by slots uniformly distributed about the periphery of the extension. Each segment is provided at its outside surface with a blindhole bore having a base or bottom surface by means of which a thin-walled zone is formed at each segment, and a punched-out or stamped recess is pro-

vided at the base surface of each segment. Opposite each such recess there is formed a radially inwardly directed projection. A projectile body is mounted at the sabot rear part, said projectile body having a peripheral groove at its rear part which extends into the sleeve-shaped extension and into which groove there extends the aforesaid projections.

BRIEF DESCRIPTION OF THE DRAWING

The invention will be better understood and objects other than those set forth above, will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawing wherein:

FIG. 1 is a longitudinal sectional view of sabot projectile designed according to the teachings of the present invention, and taken substantially along the line I—I of FIG. 2; and

FIG. 2 is a cross-sectional view of the sabot projectile of FIG. 1, taken substantially along the line II—II thereof.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Describing now the drawing, the projectile or core body 1 illustrated in FIG. 1 is preferably formed from a heavy metal, has an essentially cylindrical configuration and possesses an ogive 2. The rear portion of the projectile body 1 bears by means of a forwardly widening conical surface 3 upon a similarly constructed bore surface 4 of a sabot rear part 5. The projectile body 1 is provided at its rear portion with two peripheral or circumferential grooves 7. The flanks of the peripheral grooves 7 constitute parts of conical surfaces. The rear conical surface 8 opens towards the rear and the front conical surface 9 towards the front. The aperture angle or angle of opening of the rear conical surface 8 is greater than that of the front surface 9 and only slightly less than 180°.

The sabot rear part 5 possesses a sleeve-shaped extension or projection 6 into which protrudes the rear part of the projectile or core body 1. This sabot rear part 5 is preferably formed from an aluminum alloy, for instance Perunal. Sabot rear part 5 possesses a ring-shaped groove 11 machined at the region of a central bore 10 and an externally cut peripheral groove 12. The flanks of groove 12 are located at intersecting cone surfaces. A rear groove flank 13 is intersected by a further rearwardly extending and forwardly opening conical surface 14, the diameter of the line of intersection of both surfaces 13 and 14 being less than the outside diameter of the rear end 15 of the sabot rear part 5. Furthermore, the conical surface 14 intersects a forwardly opening conical surface 16 which intersects the jacket surface of the sabot rear part end 15, as shown.

Now from the end face six axially extending slots 17 arranged at regular angular intervals extend into the extension 6 of the sabot rear part 5 up to the location of a plane 18 which is perpendicular to the projectile axis, so that extension 6 is subdivided into six segments 32. Plane 18 is disposed rearwardly of the peripheral grooves 7 of the projectile body 1 and contains the cutting line or point of intersection of the flanks of the groove 12 and the plane of symmetry of the groove 11. The segments 32 of the sabot rear part 5 are provided at the outside with conical blind bores or boreholes 19 having flat or planar base surfaces. At these planar base

surfaces, which are disposed perpendicular to the radially directed axis of the blind boreholes 19, there are impressed two recesses 21 by means of a punch having a substantially square or quadratic cross-section. The recesses 21 are thus located at thin-wall zones 20 of the sabot rear part 5 which are bounded by thicker reinforcement locations or portions. The material displaced by the punch forms projections or tabs 22 which protrude into the peripheral grooves 7 of the projectile body 1.

The cylindrical part 1a of the projectile or core body 1 which is not inserted into the extension 6 of the sabot rear part 5 is enclosed by a jacket 23 which extends up to a point forward of the rear end of the ogive 2. Jacket 23 is preferably formed, as by injection molding, from a thermoplastic material designated as nylon 6.6, and is a material known in the art. The front portion 23a of the jacket 23 is cylindrical, whereas the rear portion 23b has the form of a truncated cone which tapers slightly from the rear towards the front. The diameter of the front edge of the truncated cone portion 23b is greater than the diameter of the cylindrical jacket portion 23a so that the rear part of the jacket 23 forms a collar-shaped widened portion 24 of such jacket. This widened portion 24 forms the guide or driving band, which upon passing through the gun or weapon bore, transmits spin or rotational movement to the jacket 23. The rearmost portion of the jacket 23 contacting the surfaces 14 and 16 of the sabot rear part 5 forms a ring 25 of substantially tongue-shaped cross-section. The jacket 23 also engages with the blind boreholes 19 and the recesses 21 of the sabot rear part 5. As clearly evident from the drawing radially directed grooves 26 are cut from the outside up to the location of webs 31 at the jacket 23. The grooves 26 extend rearwardly up to the height of the groove 12 of the sabot rear part 5. The plane of symmetry of the grooves 26 coincide with those of the slots 17 of the sabot rear part 5.

A hood member 27 formed of plastic and extending forwardly of the jacket 23 is constructed in the form of a hollow body which is tapered or conically formed at its front part and widens rearwardly to the diameter of the jacket 23. Hood member 27 terminates forwardly of the ogive or tip 2 of the projectile body 1, encloses the ogive and is spaced therefrom, and is connected with the jacket 23 in such a way that an inwardly projecting flange 28 which bounds such hood member towards the rear engages with a groove 29 cut throughout the entire periphery of the jacket 23. The hood member 27 is sealed at its front end by a thin cover member 30 extending transversely with respect to the lengthwise axis of the hood member 27 and formed integral with the remaining part of the hood member 27. The circular shaped junction location 30a of this cover member 30 forms an intended rupture location.

The mode of functioning should be apparent from the described construction of the inventive sabot projectile and is as follows: When a cartridge delivered to the breech-block of an automatic weapon comes to a sudden stop at the cartridge chamber at the end of the loading operation, then the projectile or core body 1, owing to its forwardly directed inertia, comes to rest with its rear groove flanks 8 defining support or bearing locations via the projections, dogs or tabs 22 at the sabot rear part 5.

At the beginning of the movement of the projectile, following ignition of the propellant charge, the lands of the gun bore not illustrated in the drawing, cut into the

driving or guide band 24 so that the jacket 23 is placed into rotation or spin. At the same time the rear part of the driving band 24 disposed at the height of the conical surface 14 of the sabot rear part 5 is subjected to deformation in radial direction. Under the action of the force brought about by this deformation and exerted by the conical surface 14 upon the jacket 23 there is produced a frictional force by means of which there is transmitted the spin of the jacket 23 to the sabot rear part 5. During acceleration of the projectile the projectile body 1 is pressed against the support formed by the support surface 4 of the sabot rear part 5 and owing to the thus engaging frictional force is likewise placed into spin.

By virtue of the pressure head acting during firing upon the cover member 30 of the hood member 27 within the weapon barrel such cover member is separated along the intended fracture or rupture line 30a from the hood member 27 and thrown rearwardly, so that now the pressure also acts at the inside of the hood member 27. With increasing spinning speed the hood member 27 is destructed or torn apart by the centrifugal forces acting on it so that the fractured pieces bearing against the wall of the gun bore are forwardly displaced by the jacket 23. After the projectile has left the gun bore the jacket 23, under the action of the centrifugal force, disintegrates into outwardly moving segments, disintegration or break-up of the jacket occurring along the intended rupture locations formed by the grooves 26 bounded by the webs 31. The segments detach from the rearmost part 25 of the jacket 23 anchored at the sabot rear part 5. Thereafter, the segments 32 of the extension 6 of the sabot rear part 5, and which segments are bounded by the slots 17, are outwardly rocked or pivoted by the centrifugal forces at their intended rupture locations located at the groove 11 and the transverse plane 18, and torn away along such intended rupture locations. In this regard detachment of the segments 32 with the projections or tabs 22 from the projectile or core body 1 is aided by the inclination of the flanks 8 and 9 of its grooves 7. The projectile body 1 now is completely free and moves independently of the rear part 5 forwardly thereof, since there acts upon the projectile body 1 a smaller air resistance than at the rear part 5.

While there is shown and described present preferred embodiments of the invention, it is to be distinctly understood that the invention is not limited thereto, but may be otherwise variously embodied and practiced within the scope of the following claims.

What is claimed is:

1. A sabot projectile comprising a sabot rear part having a substantially sleeve-shaped extension, said sleeve-shaped extension being subdivided into a plurality of segments by slots uniformly distributed about the periphery of the sleeve-shaped extension, each segment being provided at its outside surface with a blindhole bore having a base surface by means of which there is formed a thin-walled zone at each segment, and a stamped recess provided at the base surface of each segment wherein opposite each such recess there is formed a radially inwardly directed projection, a projectile body mounted at the sabot rear part, said projectile body having a peripheral groove at its rear portion which extends into the sleeve-shaped extension, said radially inwardly directed projections engaging with said peripheral groove of said projectile body.

5

- 2. The sabot projectile as defined in claim 1, wherein the base surface of each blindhole bore is substantially flat.
- 3. The sabot projectile as defined in claim 1, wherein the peripheral groove incorporates flank means forming portions of conical surfaces, said conical surfaces defining a front conical surface and a rear conical surface, the angle of opening of the front conical surface being smaller than the angle of opening of the rear conical surface.

6

- 4. The sabot projectile as defined in claim 1, wherein the sleeve-shaped extension is connected with the sabot rear part by means of a reference rupture location which possesses an external groove, an inner groove arranged opposite said external groove.
- 5. The sabot projectile as defined in claim 1, wherein said projections are angularly spaced about the peripheral groove.

* * * * *

15

20

25

30

35

40

45

50

55

60

65