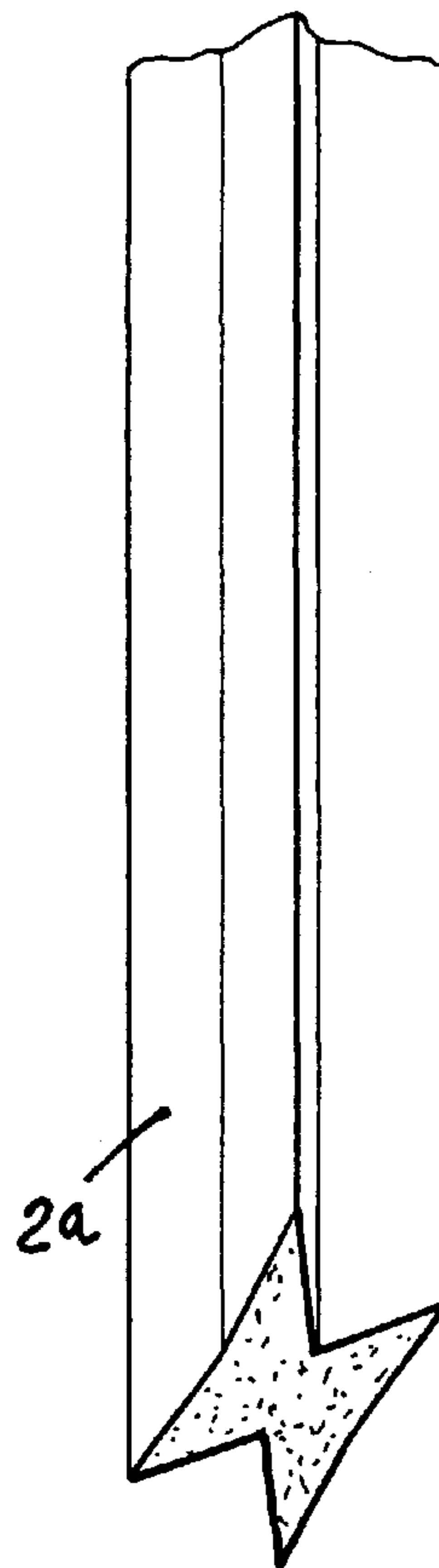




(86) Date de dépôt PCT/PCT Filing Date: 2000/11/30
 (87) Date publication PCT/PCT Publication Date: 2001/08/23
 (85) Entrée phase nationale/National Entry: 2002/08/14
 (86) N° demande PCT/PCT Application No.: IT 2000/000492
 (87) N° publication PCT/PCT Publication No.: 2001/060201
 (30) Priorité/Priority: 2000/02/18 (MI2000A000302) IT

(51) Cl.Int.⁷/Int.Cl.⁷ A46D 1/00
 (71) Demandeur/Applicant:
 FAVAGROSSA EDOARDO S.R.L., IT
 (72) Inventeur/Inventor:
 FAVAGROSSA, FRANCESCO, IT
 (74) Agent: FINLAYSON & SINGLEHURST

(54) Titre : BROSSE POUR SYSTEMES DE NETTOYAGE AUTOMATIQUE DE VEHICULES A MOTEUR
 (54) Title: BRUSH FOR AUTOMATIC MOTOR VEHICLE WASHING SYSTEMS



(57) Abrégé/Abstract:

The present invention relates to a brush which has been specifically designed for automatic motor vehicle washing systems, which comprises a bristle supporting layer (1) which can be wound about a shaft. The main feature of the invention is that the bristles (2) are made by extruding a closed cell foamed plastics material.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
23 August 2001 (23.08.2001)

PCT

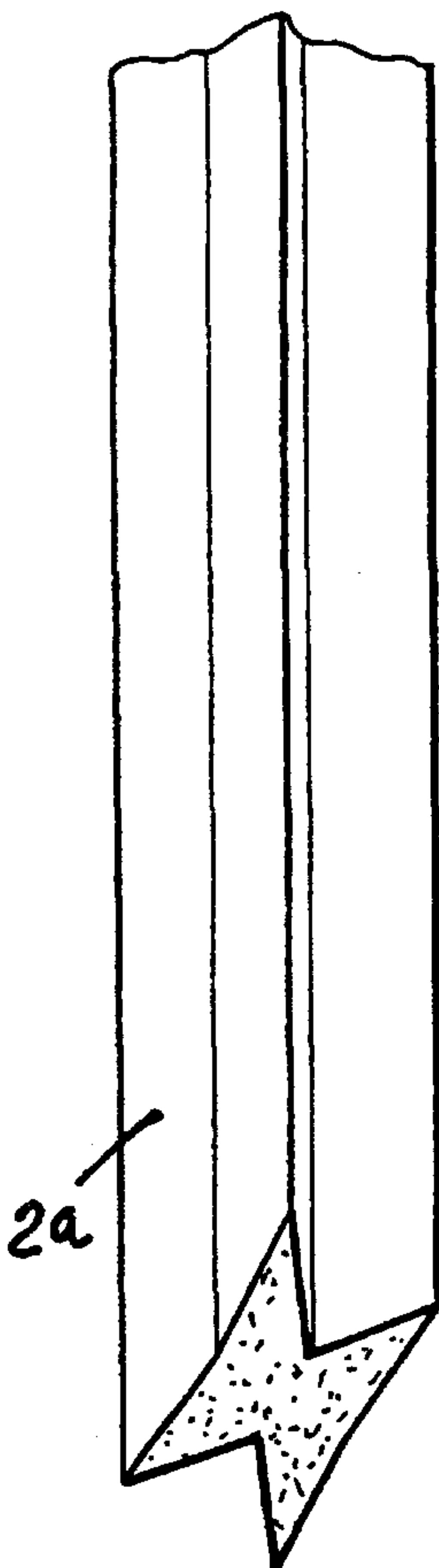
(10) International Publication Number
WO 01/60201 A1

- (51) International Patent Classification⁷: A46D 1/00
- (21) International Application Number: PCT/IT00/00492
- (22) International Filing Date:
30 November 2000 (30.11.2000)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
MI2000A000302 18 February 2000 (18.02.2000) IT
- (71) Applicant (*for all designated States except US*): FAVAGROSSA EDOARDO S.R.L. [IT/IT]; Via Lepanto, 51, I-26040 Roncadello di Casalmaggiore (IT).
- (72) Inventor; and
(75) Inventor/Applicant (*for US only*): FAVAGROSSA, Francesco [IT/IT]; Via Teatro, 12, I-46018 Sabbioneta (IT).
- (74) Agent: CICOGNA, Franco; Ufficio Internazionale Brevetti Dott. Prof. Franco Cicogna, Via Visconti di Modrone, 14/A, I-20122 Milano (IT).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian

[Continued on next page]

(54) Title: BRUSH FOR AUTOMATIC MOTOR VEHICLE WASHING SYSTEMS

(57) Abstract: The present invention relates to a brush which has been specifically designed for automatic motor vehicle washing systems, which comprises a bristle supporting layer (1) which can be wound about a shaft. The main feature of the invention is that the bristles (2) are made by extruding a closed cell foamed plastics material.



WO 01/60201 A1

WO 01/60201 A1

patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

— *with international search report*

BRUSH FOR AUTOMATIC MOTOR VEHICLE WASHING SYSTEMS**BACKGROUND OF THE INVENTION**

The present invention relates to a brush which has been specifically designed for automatic
5 motor vehicle washing systems.

As is known, brushes which are conventionally used in automatic motor vehicle washing systems and the like usually comprise a shaft on which a layer supporting a plurality of variously
10 distributed bristles is applied.

The brush bristles are usually made by plastics material extruding elements having a comparatively high weight; thus, it frequently occurs that the kinetic energy assumed by the rotary bristles
15 practically generates a plurality of micro-impacts between the washing brush and the motor vehicle body.

Consequently, plastic material particles can be deposited on the motor vehicle body from the brush bristles.

20 Moreover, prior washing brushes can be difficultly driven to a proper contact of the bristles with the motor vehicle bodies.

For solving the above mentioned problem, there are at present provided sensors which, as the
25 brush driving motor current increases, cause the brush shafts to be displaced so as to follow the configuration of the motor vehicle body being washed.

However, the above mentioned solution can cause very abrupt displacements of the washing brushes
30 because the high kinetic energy of the bristle mass,

with a consequent difficult washing.

Moreover, the high kinetic energy bristles tend to roll themselves about the projecting portions of the motor vehicle, such as rear mirrors, antennas
5 and the like, with a consequent breaking of the bristles engaging in the mentioned projecting portions of the motor vehicle.

The document US-A-6001448 discloses a brush for automatic motor vehicle washing systems the bristles of which are made of an extruded closed roll plastics material

SUMMARY OF THE INVENTION

10

Accordingly, the aim of the present invention is to overcome the above mentioned drawbacks, by providing a washing brush, specifically designed for automatic motor vehicle washing systems,
15 adapted to provide a very soft contact of the brush bristles and the surface of the body of the motor vehicle being washed, so as to prevent any damages to the motor vehicle body from occurring.

Within the scope of the above mentioned aim,
20 a main object of the present invention is to provide a washing brush including a very low weight bristles, thereby preventing any plastics material bristle particles from depositing on the motor vehicle body.

Another object of the present invention is
25 to provide such a washing brush the bristles of which, due to their small weight, have a greatly reduced kinetic energy, to prevent said bristles from being wound and/or engaged on projecting portions of the motor vehicle being washed.

30 Yet another object of the present invention is to provide such a brush which is very reliable and safe in operation.

According to one aspect of the present invention, the above mentioned aim and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by a brush for automatic motor vehicle washing systems, ^{according to the main claim} ~~comprising a~~ bristle supporting layer which can be wound about a shaft, characterized in that the brush bristles are made of an extruded closed cell foamed plastics material.

10

BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the present invention will become more apparent hereinafter from the following detailed disclosure of a preferred, though not exclusive, embodiment of a washing brush which has been specifically designed for automatic motor vehicle washing systems, which is illustrated, by way of an indicative, but not limitative, example in the figures of the accompanying drawings, where:

15

20

Figure 1 is a schematic view illustrating the bristle supporting layer included in the washing brush according to the present invention;

25

Figure 2 is a schematic view illustrating bristles having an opposite double trapezium configuration;

Figure 3 illustrates bristles of square configuration;

30

Figure 4 illustrates bristles of rectangular configuration;

Figure 5 illustrates bristles of circular

configuration; and

Figure 6 illustrates bristles having an oval configuration.

5 **DESCRIPTION OF THE PREFERRED EMBODIMENT**

With reference to the number references of the above mentioned figures, the washing brush, specifically designed for automatic motor vehicle systems, according to the present invention, comprises 10 a bristles supporting layer 1 which is advantageously constituted by a strip which can be bent or folded on itself so as to connect its end portions, about a shaft.

15 Thus, by adjoining a plurality of wound strips, a washing brush can be easily made.

As shown, from the supporting layer 1 extend a plurality of bristles, indicated by the reference number 2.

20 The main feature of these bristles is that are made by extruding a closed cell plastics material, such as foamed polyethylene or polypropylene.

The use of a foamed plastics material allows to greatly reduce the weight of the bristles, thereby 25 providing optimum results both with respect to the impact of the bristles on the body of a motor vehicle and with respect to the sensors for automatically sensing the movements of the washing brushes.

In fact, since the closed cell bristles have 30 a small weight, they will not absorb water and, accordingly, as they contact a motor vehicle body, they will drive in a very soft manner the brush shaft

controlling sensors, thereby properly controlling the vertical and horizontal displacements of the brushes, to provide an optimum washing and overall managing of the washing system.

5 Advantageously, said bristles are ^{TR}excluded by using foaming agents, which are supplied to the extruder and mixed with the plastics material in a rate from 1 to 4% by weight.

10 In this connection it should be pointed out that, as a foaming agent, it would be possible to use a modified azodicarbonamide, dispersed in high fluidity polyethylene.

15 Thus, by using as a foaming agent a modified azodicarbonamide, it is possible to obtain a controlled foaming thereof, so as not to negatively affect the mechanical properties of the extruded plastics materials and its surface aspect.

 If a modified azodicarbonamide is used, then it will be used in a rate of 1.5% to 2% by weight.

20 The optimum foaming temperature varies from 160°C to 190°C and will depend on the used polymer type, as well as on the extruder type and the extruding temperature profile thereof.

25 The best results have been achieved by using the following temperature profile or pattern:

140°C : feeding region;

175°-180°C : central region of the extruder;

160°C : head portion of the extruder.

30 The above mentioned temperature can be varied in a rate of ± 15%.

 It should be pointed out that the active portion of the mentioned modified azodicarbonamide

will be decomposed with the evolvement of inert gases, which do not change the properties of the other used additive materials.

In particular, this product is not sensitive
5 to heat and moisture and can be stored for about 8-10 months.

The density which is usually obtained for the bristles is conventionally included in the 300 - 700 Kg/m³ range.

10 The bristles can have any desired shape or pattern, depending on their intended applications.

Thus, it would be possible to provide bristles 2a having a double trapezium shape cross section.

15 Moreover, it is also possible to provide bristles having any desired cross section shapes, as hereinbelow disclosed.

By way of an example, it would be possible to provide bristles 2b of square configuration,
20 bristles 2c of rectangular configuration or cross-section, bristles 2d of circular cross section and bristles 2e of oval cross section.

From the above disclosure it should be apparent that the invention fully achieves the
25 intended aim and objects.

In particular, the fact is to be pointed out that a bristle has been provided which, having a small density, is susceptible to greatly reduce the impact occurring as the bristles impinges against a motor
30 vehicle body, thereby preventing any bristle plastic particles from depositing on said motor vehicle body, thereby providing a very improved washing result.

The invention, as disclosed, is susceptible to several modifications and variations, all of which will come within the scope of the ~~inventive idea~~ ^{appended claims}.

~~Moreover, all of the constructional details~~
5 can be replaced by other technically equivalent elements.

In practicing the invention, the constructional details, as well as the contingent size ~~and shapes, can be any, depending on requirements.~~

CLAIMS

1 A brush for automatic motor vehicle washing systems, comprising a bristle supporting layer (1) which can be wound about a shaft, the brush bristles (2) being made of an extruded closed cell foamed plastics material, characterized in that said closed cell foamed plastics material is made by foaming polyethylene or polypropilene by using, as a foaming agent, a modified azodicarbonamide, dispersed in high fluidity polyethylene, and in a rate from 1.5% to 2% based on the cell foamed plastics material, at a foaming temperature from 160°C to 190°C in an extruder having the following temperature pattern:
140°C at the feeding region of said extruder;
175°-180°C at the central region of said extruder; and
160°C at the head of said extruder;
said temperatures varying within ± 15%.

2. A brush, according to Claim 1, characterized in that said foamed plastics material bristles (2) have a density from 300 to 700 kg/m³.

3. A brush, according to Claim 1, characterized in that said foamed plastics material bristles have a density of 500 kg/m³.

4. A brush, according to Claim 1,

characterized in that said bristles have an opposite double trapezium shaped cross section.

5. A brush, according to Claim 1, characterized in that said bristles have a square-shape cross section.

6. A brush, according to Claim 1, characterized in that said bristles have a rectangular-shape cross section.

7. A brush, according to Claim 1, characterized in that said bristles have a circular shape cross-section.

8. A brush, according to Claim 1, characterized in that said bristles have an oval shape cross-section.

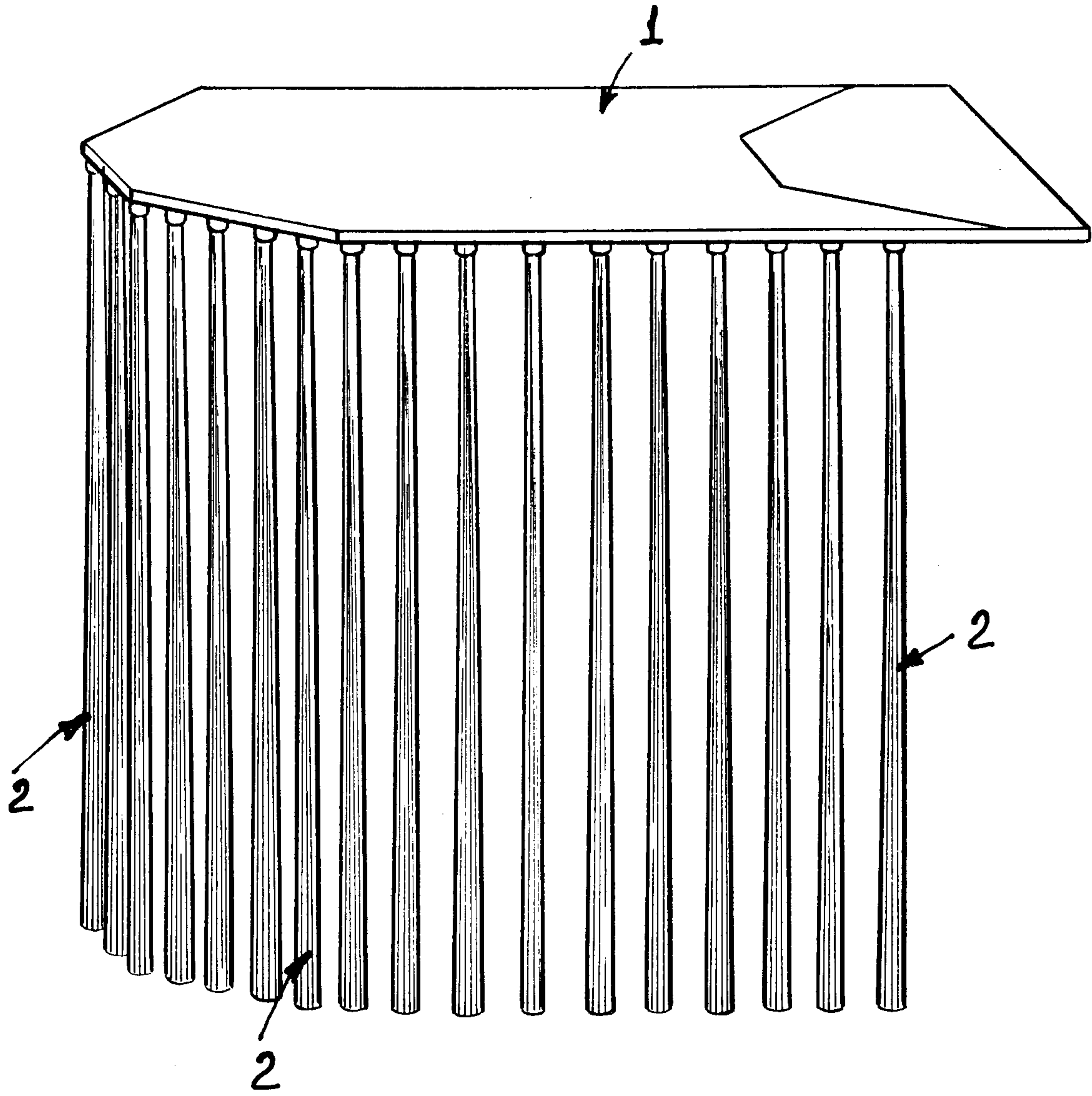


FIG. 1

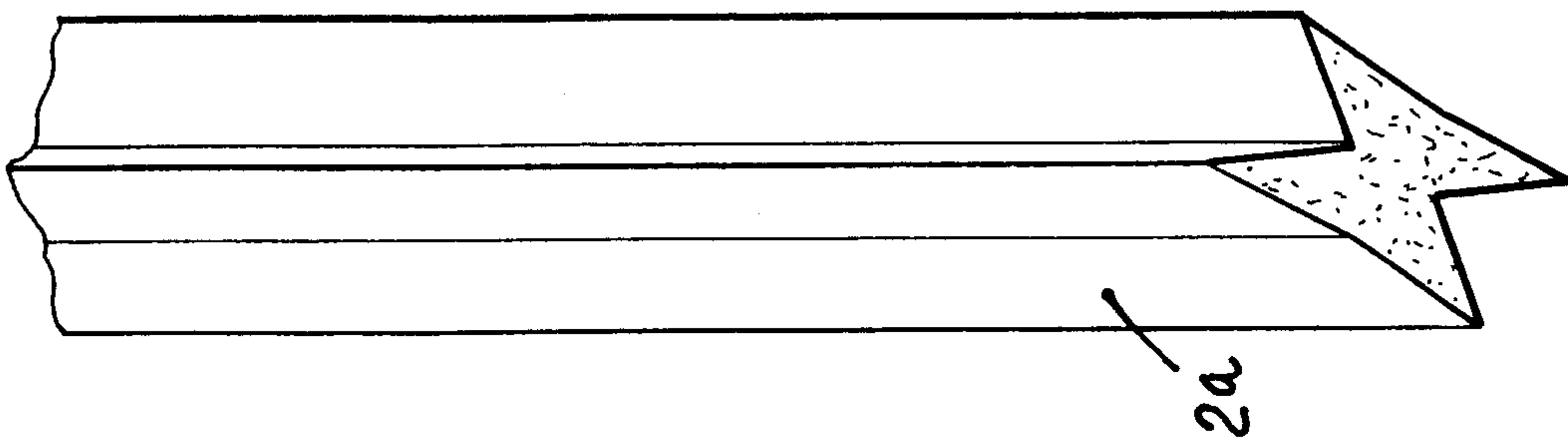


FIG. 2

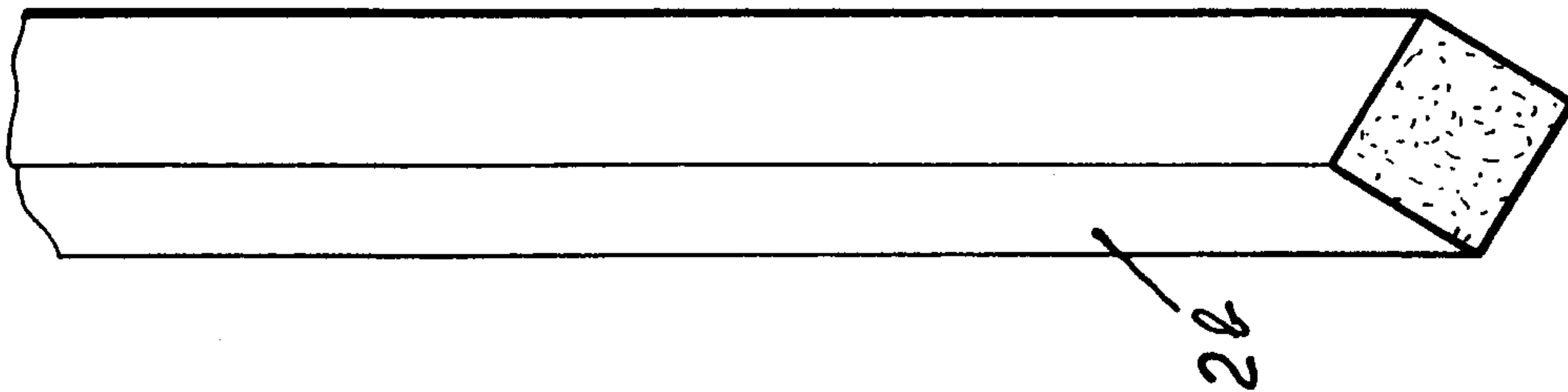


FIG. 3

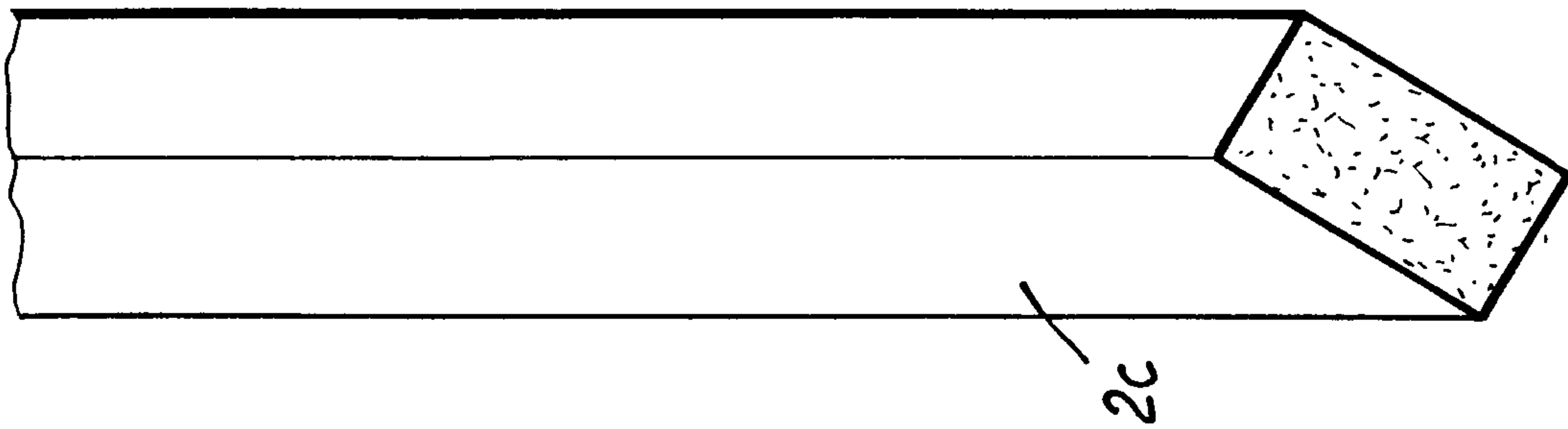


FIG. 4

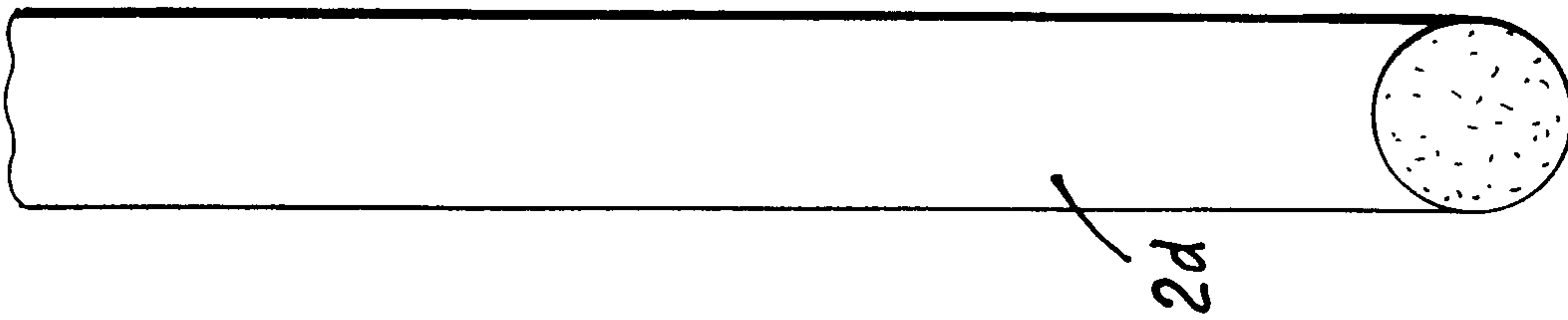


FIG. 5

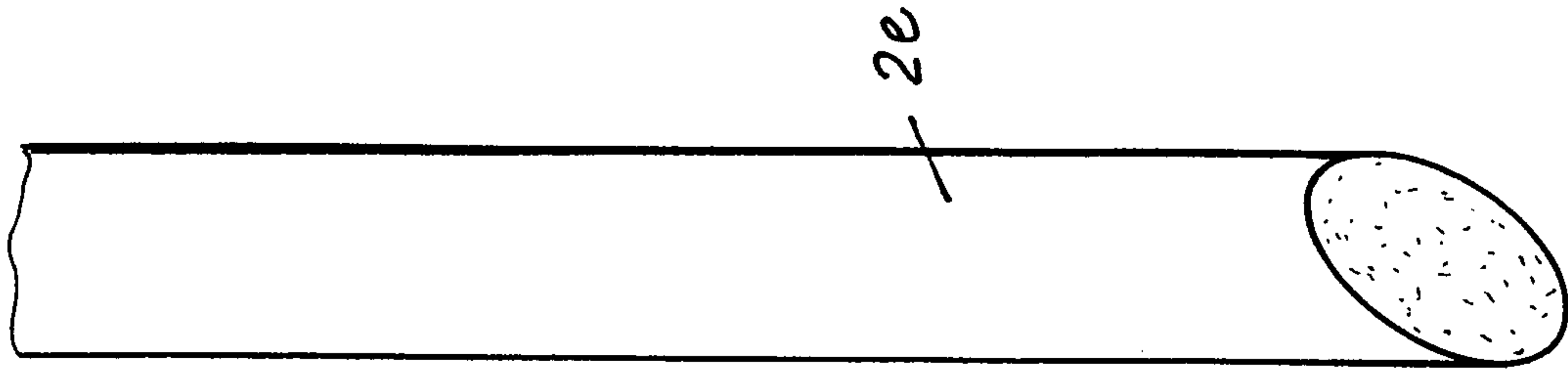


FIG. 6

2a

