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(54) Process for covering bodies with diamond patterns

(57) Processes for diamond covering bodies of substantially spherical or anyhow prismatic shape being used in jewelry, of the type which does not require removal of material are described. The single object is deposited within a seat which acts as a container and is successively subjected to a punching action. The process is characterized by the fact that the single object is automatically positioned at each punching action with a different portion of the surface of the object to be diamond covered.

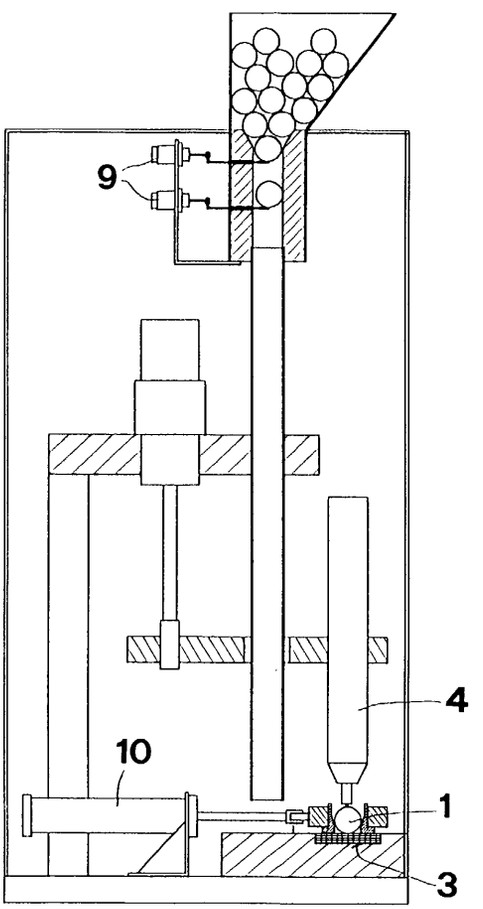

FIG. 10

EP 1 238 823 A2

Description

Field of The Invention

[0001] The present invention relates to processes for diamond covering bodies substantially spherical, such as small balls, polyhedral, anyhow prismatic, such as bars, tubes, straps, chains and similar articles being used in the jewelry field and machines being used for these processes.

Background of The Prior Art

[0002] It is known that one of the procedures used for increasing the aesthetic appearance of an object in the jewelry field is the procedure called diamond covering with which one gives to the surface of the object a play of lights which contribute in a determinating manner to define the appearance of the jewelry article, no matter whether it is a bracelet, a necklace, a pin or other items.

[0003] The operation of diamond covering is carried out by means of machines which are provided with diamond edged tools, which are provided with diamond edged tools, which, removing some material from the surface of the object, create a plurality of faces having a mirror-like shine, which, being differently oriented create the desired bright aesthetic effect.

[0004] The operation of diamond covering results particularly simple if it is carried out on chain assemblies in which one removes up to 30% of the section of the thread which constitutes the single ring of the chain, generating a plurality of planar or convex surfaces while, on the contrary, this operation turns out to be complex when it is necessary to diamond cover surfaces of objects which are essentially spherical, anyhow prismatic, particularly when they are of small dimensions.

Summary of The Invention

[0005] An object of the present invention is to provide automatic processes for diamond covering objects essentially spherical, anyhow prismatic, such as small balls, microfused pieces, printed, drawn, linked together objects and similar objects, used for the creation of articles in the jewelry field which are simpler than the known processes.

[0006] Another object of the invention is to provide an automatic process for diamond covering these articles which achieves the diamond covering of the surfaces without the removal of material so that it is not necessary to use removing tools.

[0007] Still another object is to provide a process for diamond covering in which the effect of the plays of light results stronger and aesthetically more effective that the known processes.

[0008] Still another object of the invention is to provide an automatic process which ensures a perfect and total diamond covering of the surface of the object being worked without the necessity of regulations or controls, on the part of the operator during the working phase.

[0009] Still another object of the invention is to provide a machine for diamond covering, essentially spherical, anyhow prismatic objects which functions with the automatic processes of the invention.

[0010] The automatic process of diamond covering of the invention requires in the first step, that a single object be deposited, always automatically, in a seat as a container, then, the same object is subjected to a punching action by means of a punching apparatus, of known construction, so that on the surface of the same object there is generated a plurality of microcavities which are differently oriented, thus magnifying the plays of the light with significant aesthetic effects.

[0011] The novel feature of the invention resides mainly in the fact that the single object positions itself, automatically, to each successive action of punching with a different portion of its surface with respect to the top of the punching tool, up to the complete treatment of the entire surface to be diamond covered.

[0012] In the first type of automatic process, suitable for diamond covering objects which are spherical, essentially spherical or polyhedral, of reduced dimensions, the the continuous and different positioning of the object, referred to hereinbelow as "pallina", small ball, occurs automatically due to the fact that the ball is immersed in a turbulent flux of compressed air and the base of the seat for containing the ball is advantageously made of a material which has a certain amount of elasticity, which may be very small. In this manner the object is connected to a mechanism which puts the object in motion in a manner that the object is positioned, for every successive action of punching, with a different portion of surface to be diamond covered.

[0013] With this constructive manner during the punching action, the ball is pushed upwardly so that it continuously hits the top of the tool due to the combination of two actions applied on the ball, the action of the turbulent motion of the compressed air and the action of the elastic reaction of the base against which the same ball is pushed after each punching because it is pushed downwardly by the vibrating alternating motion of the same top of the tool.

[0014] During the micro motion of upwardly and downwardly within the seat of containing the ball, this ball rotates on itself, due to the two combined effects, in a casual manner so that the ball offers to the tool always a different and new surface to be punched, so that after a certain number of punchings, set forth by the operator, the entire surface is completely diamond covered.

[0015] According to a second type of automatic process, suitable for diamond covering prismatic articles such as tubes, bars, straps and similar articles, with a circular section, anyhow polygonal, it is possible to use an apparatus without the flux of air, because in this case it is not the object which bounces back and continuously hits the tool, but it is the tool which comes closer and farther from the object while the object remains contained on the seat and eventually and advantageously it is resting on a base which has some elasticity. In this manner the object is connected to a mechanism which puts the object in motion in a manner that the object is positioned, for every successive action of punching, with a different portion to be of surface to be diamond covered.

[0016] The machine for diamond covering objects which have a shape essentially spherical and anyhow prismatic and functioning according to the processes described hereinabove, comprises the group for feeding the objects to be diamond covered, the group with the seat for containing each object during the diamond covering and the group for supporting the puncher.

[0017] The characteristics of the processes of this invention and the machine functioning for the processes will be better understood by reference to possible embodiments provided as non-limiting illustration by referece to the drawings, of which

Figs. 1-4 and 5-8	show successive phases of two different manner of operation, always automatic, using objects which are essentially spherical or polyhedral;
Figs. 9-11	are elevational views of three different phases of operation of the machine functioning according to the processes of Figs. 1-8;
Fig. 12	shows schematically the automatic process of of diamond covering of prismatic filiform objects with a section essentially circular or polyhedral;
Fig. 13	shows schematically the automatic process of diamond covering of straps;
Fig. 14	shows schematically the automatic process of diamond covering the external surface of annular objects;

[0018] As shown in Fig. 1, the ball (1) to be diamond covered is placed in the interior of seat (2) for containment and rests on base (3) made of a material which has some elasticity, even minimal amount.

[0019] Fig. 2 shows the punching apparatus (4) which through nozzles (5) sends to seat (2) a flux of compressed air which raises the ball from the base so that it hits against tool (6) so that this tool cuts into the surface of the ball.

[0020] The tool (6) has a motion vibrating alternatively so that the ball in the contact receives a push downwardly which deforms due to compression the base (3) as shown in Fig. 3.

[0021] As a consequence the ball (1) is again pushed upwardly by the elastic base moving in a casual manner vertically and rotating on itself prior to coming in contact with the tool (6) (see Fig. 4).

[0022] The working phases described hereinabove are repeated up to the complete diamond covering of the surface of ball (1).

[0023] As shown in Figs. 5-8, also when the process does not use the flux of compressed air, the ball (1) is placed in the interior of seat (2) where it is contained and rests on base (3) made of a material having a certain amount of elasticity (see Fig. 5).

[0024] At the beginning of each punching action, the puncher (4) is lowered and the tip provides to cut into the surface of ball (1) generating in the meantime a push which deforms slightly due to compression base (3) (see Fig. 6).

[0025] Afterwards the puncher (4) rises and the ball (1), remaining free, is pushed upwardly by the elastic base (3), moving in a casual manner vertically and rotating on itself (in Fig. 7).

[0026] Finally the ball (1) falls into seat (2) positioning itself in a different manner such that, when the puncher (4) lowers itself a punching occurs in a new portion of the surface (see Fig. 7).

[0027] The working phases described hereinabove are repeated until the surface of the ball (1) is completely diamond covered.

[0028] As shown in Fig. 9, the machine which is used to carry out the processes described hereinabove comprise a storehouse (7) of balls (1) to be diamond covered which, through conduit (8) provided with pneumatic bulkheads (9) through conduit (8) provided with pneumatic bulkheads (9) are deposited singularly in container (10). This container is capable of undergoing a displacement due to the action of pneumatic cylinder (11) so as to position the ball (1) corresponding to the position of the puncher (4) and above the elastic base (3).

[0029] After the action of punching of the entire surface ends, the container (10) is further displaced to unload the balls with the diamond covering into the collector (11).

[0030] For the purpose of diamond covering prismatic bodies having an essentially circular section such as bars,

threads or tubes, as shown in Fig. 12, the machine which functions according to the general working principle of this invention, provides that the body (1.A) located within seat (20), is placed in motion in order to offer always a new portion of the surface to the punching apparatus (4) due to the action of two wheels (30) disposed with the rotation axes arranged reciprocally which do not belong to the same plane so that the object (1.A) receives a motion which is a combination of axial advance (arrow x) and axial rotation (arrow y).

[0031] Analogously, in order to diamond cover the surface of prismatic bodies having a substantially planar section as shown in Fig. 13, such as straps, ribbons and similar objects. The machine functioning according to the general working principle of this invention provides that body (1.B), located within seat (20) offer always a new portion of the surface to the puncher (4) due to the combined action of the axial displacement of the object (see arrow H) which is provided by the pulling wheels (60) associated with the spacial displacement of the apparatus (see dredge K of the apparatus).

[0032] Finally, in order to diamond cover the surface of annular bodies, eventually hollow in the interior, such - as rings, bracelets and similar objects, the machine, as shown in Fig. 14, functioning according to the general working principle of this invention, provides that body (1.C) is mounted on a hub (70) and is put in motion in order to offer always a new portion of the surface to the punching apparatus (4), due to a combined motion of axial advance according to arrow W combined with axial rotation according to arrow Z of hub (20).

[0033] According to the last embodiment there is provided that the fitting between hub (70) and the annular body (1.C) with crown (71) be of material which has a certain amount of elasticity, even very small.

[0034] Obviously changes of the machine different from the described machine are possible without departing from the following claims.

Claims

1. Automatic processes for diamond covering essentially spherical objects such as small balls, polyhedral objects, anyhow prismatic such as bars, tubes, straps, chains and similar objects for use in the jewelry field of the type which avoids the removal of any material, in which a single object is deposited within a seat as a container and afterwards the same object is subjected to a punching action whereby a plurality of microcavities is generated on the surface of said object whereby the surfaces of each cavity are differently oriented thus increasing the plays of light, **characterized by** the fact that a single object is positioned automatically at each punching action with a different portion of its surface up to a complete treatment of the entire surface being diamond covered.

2. A process according to claim 1 **characterized by** the fact that the different automatic positioning of said object in the seat prior to each punching action occurs due to fact that said object is immersed in a turbulent flux of compressed air.

3. A process according to claim 1 **characterized by** the fact that the different automatic positioning of said object in the seat prior to each punching action occurs due to the fact that the base of the seat which contains said object is made of a material which has a certain amount of elasticity, even a minimum amount.

4. A process according to claims 1, 2 and 3 **characterized by** the fact that during the punching action, the object to be diamond covered which has a spherical or anyhow a polyhedral shape so that it may be called with the generic term "palline", a small ball, said ball is pushed upwardly in order to continuously bounce against the punching tool because of the combined effect of two actions, one action due to the turbulent motion of the compressed air and another action due to the reaction of the base which is slightly elastic and said ball after each punching is pushed downwardly by the vibrating motion of the top of said punching tool.

5. The process according to claim 4 **characterized by** the fact that during the micromotion of upwardly and downwardly of the ball within the seat containing the ball, said ball rotates on itself in casual manner whereby said ball offers to the punching tool a different and new surface to be punched whereby after a determined number of punching established by the operator the entire surface is completely diamond covered.

6. The process according to claims 1 and 3 **characterized by** the fact that during the punching action the ball remains still and the pushing force of the tool on the surface of the ball which is necessary to generate the microcavity pushes the ball against the base and the base undergoes a micrometric deformation.

7. The process according to claim 6 **characterized by** the fact that at the end of each punching action, when the tool moves away from the surface of the ball, the ball remaining free is projected upwardly by the push generated by

the elastic action of the deformed base whereby during the motions upwardly and downwardly, the ball rotates on itself whereby the ball is deposited again on the base in a position different from the preceding one thus offering to the tool a new portion of surface to be punched.

8. The process according to one or more of the preceding claims'**characterized by** the fact that the degree of rotation of said object on itself is casual and different in each action whereby after a certain number of punching, established by the operator, the entire surface is completely diamond covered.

9. A machine for diamond covering bodies which have a spherical or anyhow polyhedral shape which may be called with the generic term "palline", small balls, and functioning according to the process described in one or more of the preceding claims **characterized by** the fact that it comprises a storehouse (7) for balls (1) to be diamond covered, conduit (8) provided with pneumatic bulkheads (9) whereby the balls are deposited singularly within seat (2), said seat being capable of undergoing a displacement due to the action of a pneumatic cylinder (10) whereby each ball (1) is positioned corresponding to puncher (4) and above the elastic base (3) and after the punching operation of the entire surface of the ball has ended, the seat is displaced further to unload the ball into collector (11).

10. The machine for diamond covering bodies having a prismatic shape with a substantially circular section as bars, threads, tubes and similar bodies, functioning to carry out the processes according to claim 1, **characterized by** the fact that body (1.A) located within seat (20) is placed in motion in order to offer always a new portion of the surface of said body to the puncher (4) due to the action of two wheels (30) disposed with the axes of rotation arranged reciprocally which do not belong to the same plane whereby said object (1) has a combined motion of axial advance associated with axial rotation.

11. The machine for diamond covering bodies which have a prismatic shape having a substantially planar section such as straps, ribbons, chains and similar articles, functioning according to the processes described in claim 1, **characterized by** the fact that body (1.B) located within seat (20) offers always a new portion of the surface of the body to the puncher (4) due to the combined action of the axial displacement of said body due to the pulling wheels (60) associated with the special displacement of said puncher.

12. The machine for diamond covering bodies which have an annular shape, eventually hollow, such as rings, bracelets and similar articles, functioning according to the processes described in claim 1, **characterized by** the fact that body (1.C) is mounted on a hub (70) and is placed in motion in order to offer always a new portion of the surface of said body to the punching apparatus (4) due to a combined motion of axial advance associated with axial rotation of said hub (70).

13. The machine for diamond covering bodies which have an annular or toroidal shape, according to claim 12, **characterized by** the fact that the insertion between hub (70) and the annular object (1.C) is made with a material having a certain amount of elasticity, even of minimum value.

14. The machine according to one or more of claims 9-13, **characterized by** the fact that the seat containing the object to be diamond covered is made of a material, for instance PVC or similar material which has a significant hardness value but does not harm the diamond covered surface of the body which moves in the interior of said container.

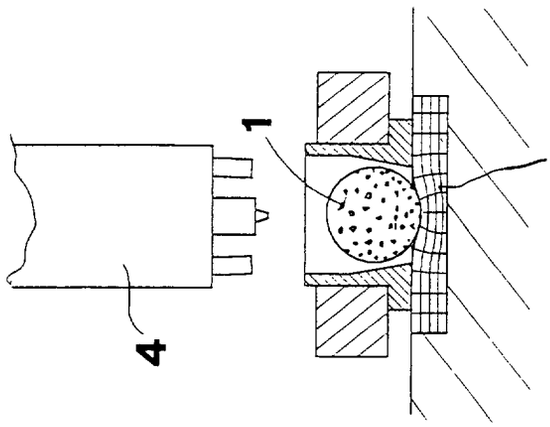

FIG. 3

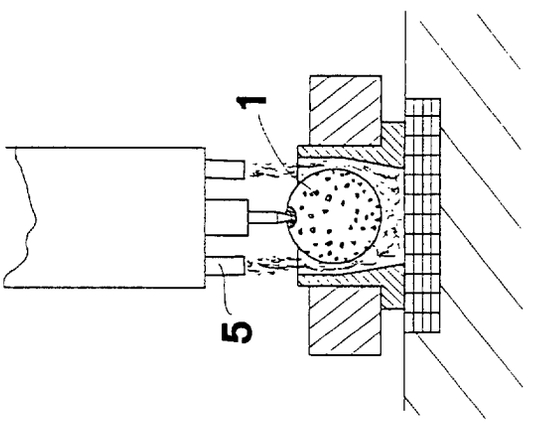

FIG. 2

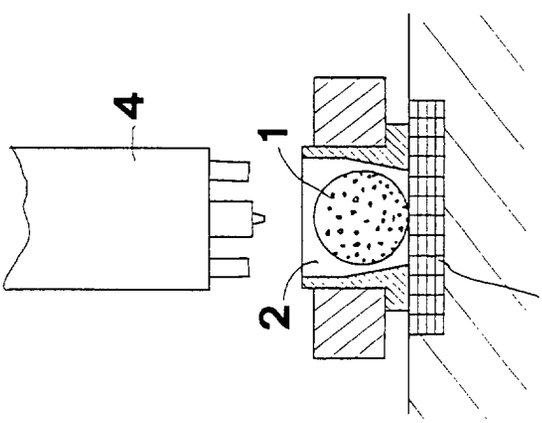

FIG. 1

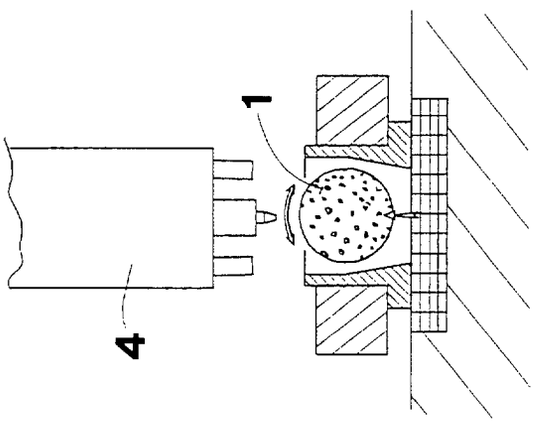

FIG. 4

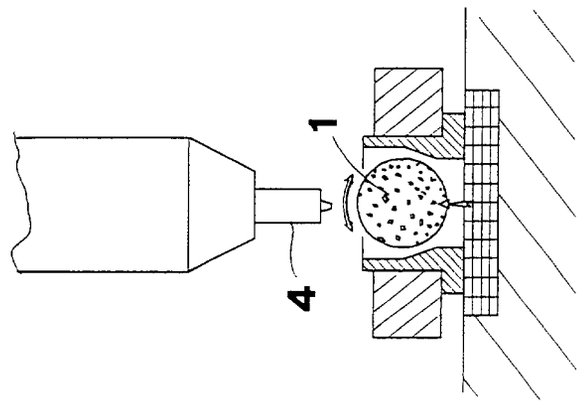

FIG. 7

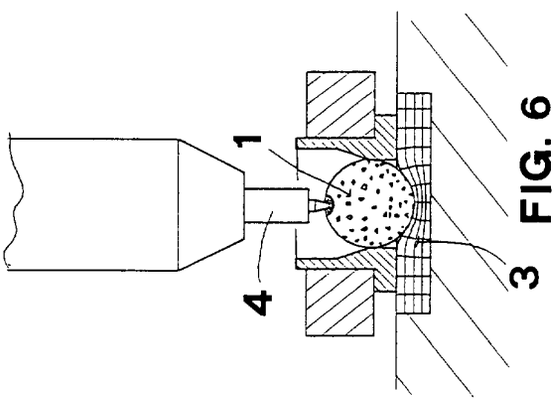

FIG. 6

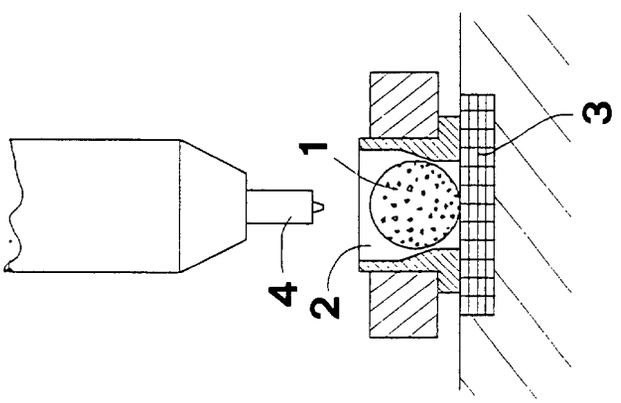

FIG. 5

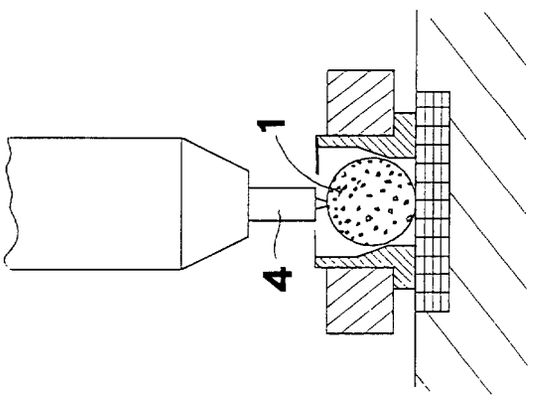

FIG. 8

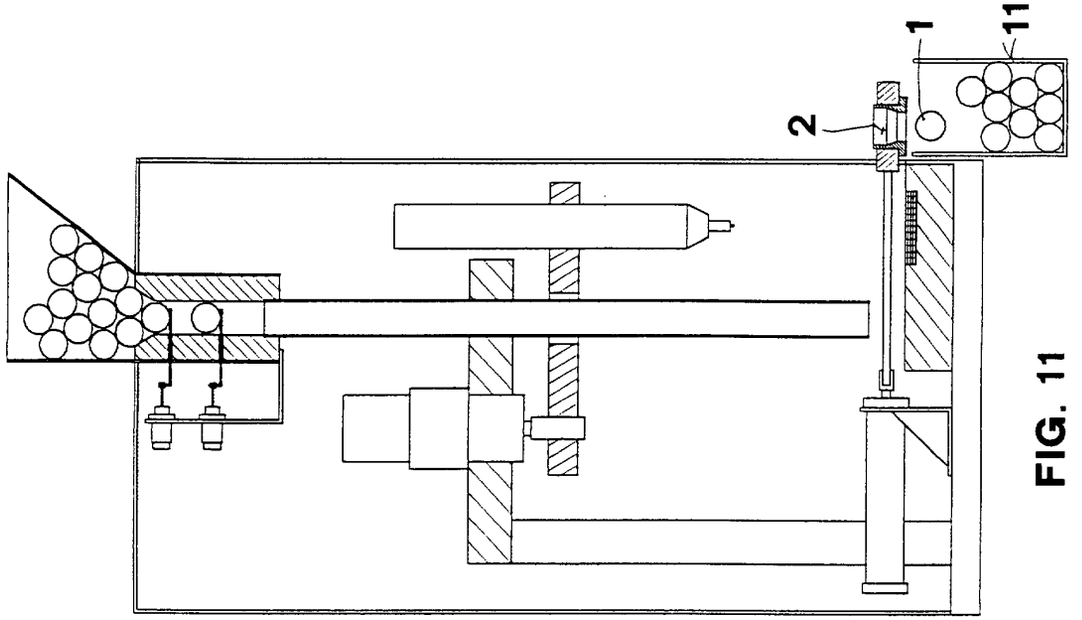

FIG. 11

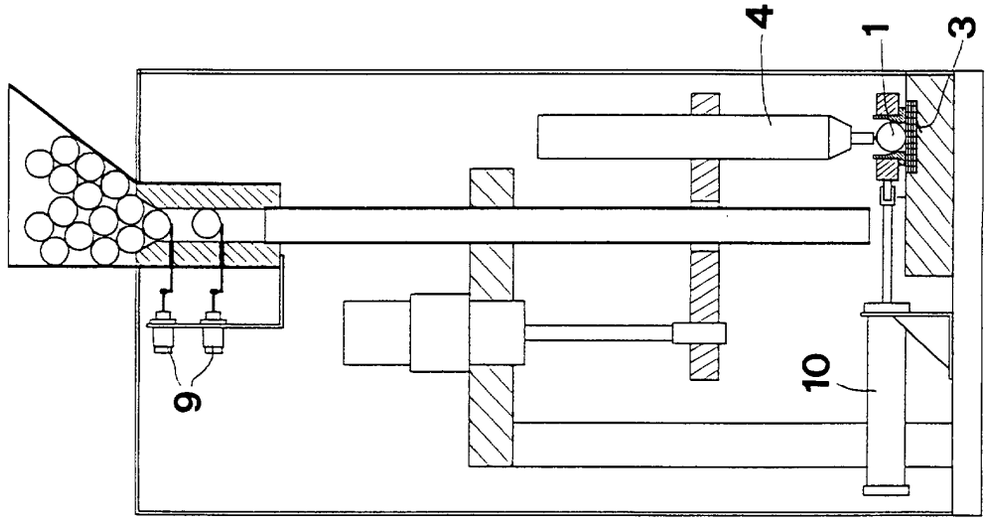

FIG. 10

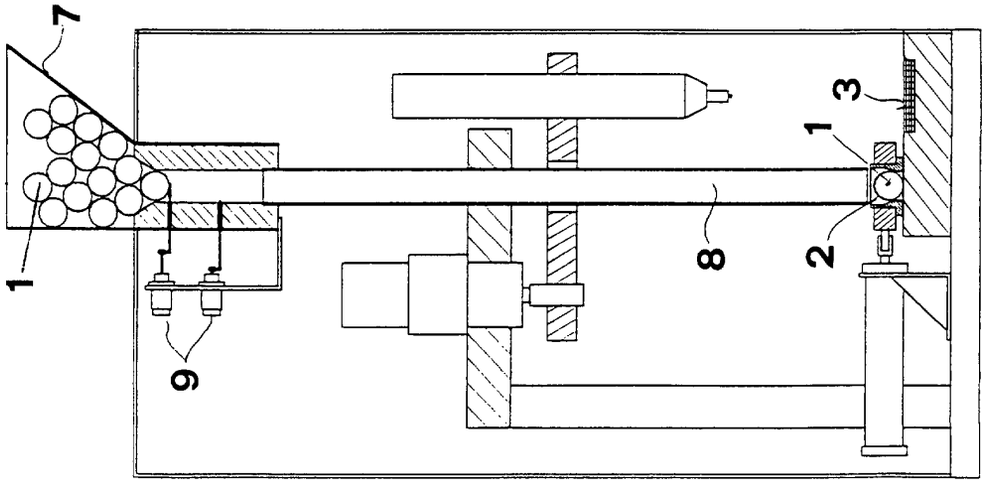

FIG. 9

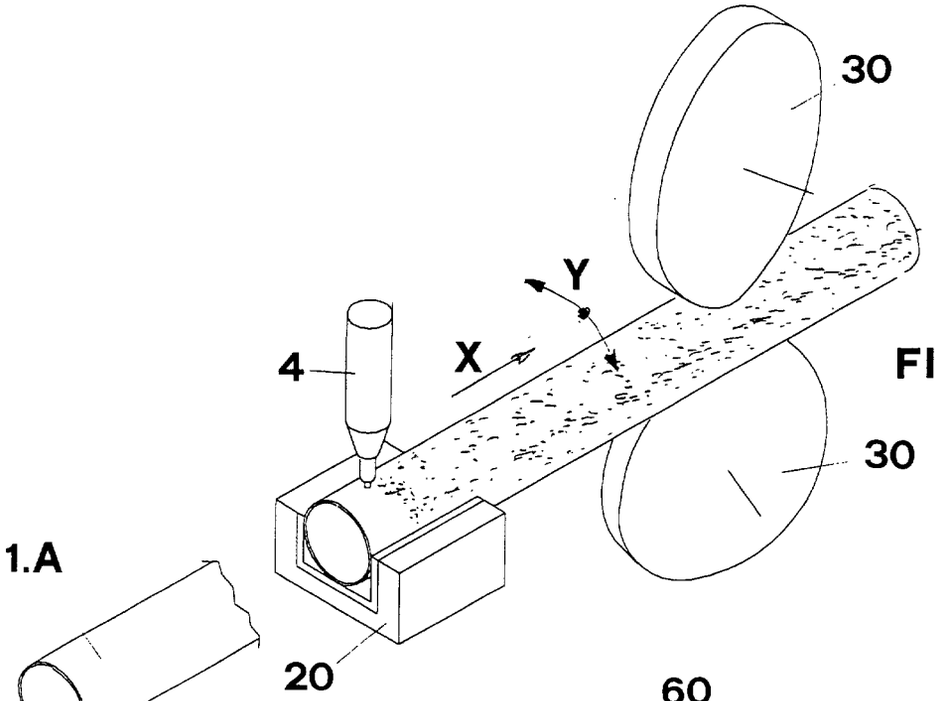

FIG. 12

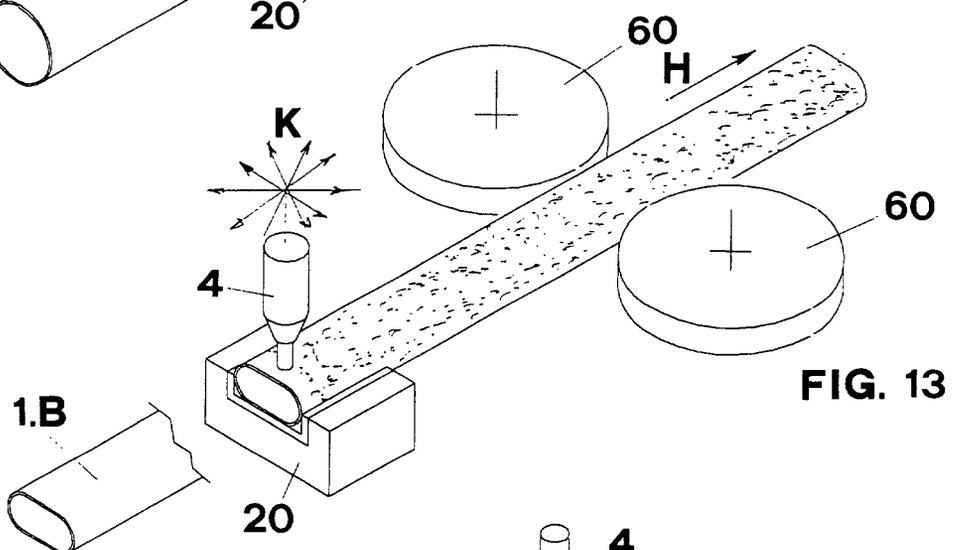

FIG. 13

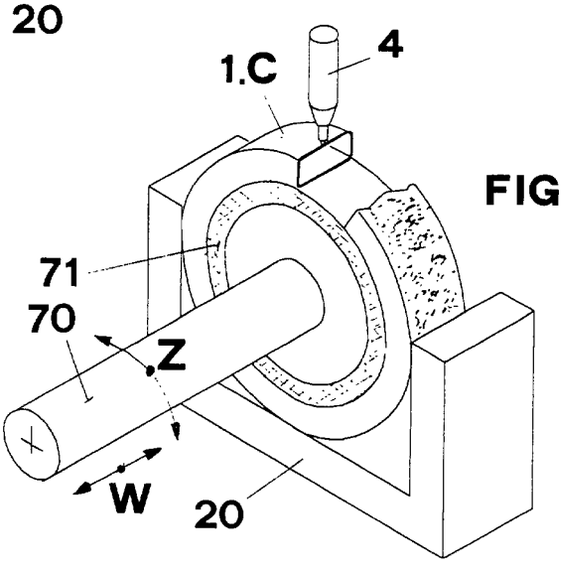

FIG. 14