

EUROPEAN QUALIFYING EXAMINATION 2004

PAPER A ELECTRICITY / MECHANICS

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Client's Letter

Dear Mr. Advoduck,

In the last few days I have invented a new type of egg shell breaker which is simple yet effective. Unfortunately I had a bad experience with my last invention being copied, and would therefore ask you to file a patent application as soon as possible.

Every Easter a traditional public competition takes place at the market square of Ducktown, where I live. The aim is to find the best way of opening a boiled egg. The many different egg openers developed by the participants are judged by a jury. The three best egg openers of last year's competition were published in the local press. I have cut out the pictures and annexed them to this letter as Fig. 1-3.

My entry for last year's competition is shown in Fig. 1. This is based on a set of old punches which I found at a flea market. Such punches are used by saddlers to stamp holes of different sizes in leather. Basically, these punches are solid bodies comprising a bottom recess 10a. The recess 10a results in a bottom opening of the punch 10 defined by a circular cutting edge 11. I had the idea to use one of these punches, of appropriate size, as an egg shell breaker. By 'appropriate size' I mean that an end portion of an egg can be introduced into the bottom opening of the punch 10, in such a manner that the cutting edge 11 contacts the egg shell along a circumferential contact line.

As illustrated in Fig. 1, I placed a boiled egg into an egg holder and held the punch 10 on top of this egg with one hand. In the other hand I held a light hammer. After a few trials I found that by hitting the flat upper surface 12 of the punch in the right manner, the impulse applied by the hammer to the punch 10 was transmitted to the egg, thus obtaining a really clean circular break of the egg shell along the contact line with the punch 10. To my surprise, most of the time I could do this without producing small fragments of egg shell and without damaging the contents of the egg. I practised a lot in order to be able to hit the punch 10 with the hammer in a consistent way, so as to ensure a perfect demonstration of my egg shell breaker during the competition.

However, my strongest competitor, Doughnut Duck, succeeded in spying on my work during this training phase. He copied my egg shell breaker and modified it slightly, as shown in Fig. 2. In his version he simply replaced my punch 10 with a sleeve-like hole drill 20, which also had the 'appropriate size' as defined above. The serrated or saw-like cutting edge 21 of hole drill 20 achieved the same breaking effect as the continuous-contact cutting edge 11 of my punch 10. Nevertheless, Doughnut won first prize, whereas I had to be content with second place. I am sure that this was only because Doughnut's three nephews were on the jury.

The third prize was awarded to Pierre McDucksbill. He cut off the end of an egg with his mini-guillotine, which he normally uses for cutting off the tips of his cigars (see Fig. 3). The result was, however, not very satisfactory, due to the fact that the yolk ran out. Moreover, the cut end of the egg rolled across the table and fell onto the trousers of a jury member.

In the end, both Pierre and I were furious; Pierre cannot stand losing and I felt cheated. For the next competition Pierre and I therefore decided to cooperate. As Pierre is very rich, he provided financial support, and tasked me with inventing a new egg shell breaker. True to character, Pierre himself wanted to present this new breaker to the jury.

I decided that the new egg shell breaker should be able to achieve the same fantastic clean circumferential break of the egg shell which had been produced by the punch 10 and the hole drill 20, and which had so much impressed the jury the previous year. At the same time it should be easier and more convenient to handle and operate, since Pierre is, frankly, quite clumsy. Whenever Pierre tried my punch-hammer-system, he encountered problems in using the hammer. Unlike me, he was incapable of consistently reproducing the same impulse with the hammer, both in terms of the direction and the intensity of the impulse. In other words, he could not ensure that the hammer would hit the upper surface of the punch at the correct angle and with the appropriate force.

I therefore tried to improve my punch-hammer-system with the aim of reproducing the impulse independently of the skill of the user, that is, 'automatically'.

I considered again Pierre's mini-guillotine (see Fig. 3). Despite the disadvantage that the end of the egg is completely cut off, I found it interesting that in this mechanism, the blade 30 applies the same impulse to the egg every time it is used, since the blade always falls from the same height and is guided in a frame 33.

Consequently I also tried to provide a guide to cooperate with the punch, as illustrated in Fig. 4. I bored an axial hole through the punch 40 and introduced a barbecue skewer 43 through this hole. I then poked the skewer 43 into the top of an egg, lifted the punch up to the eye 45 at the end of the skewer 43 and let it drop down towards the egg. In this way, the skewer 43 guides the punch 40 and thus determines the direction of the impulse imparted by the punch 40 to the egg. Furthermore, for a given weight of the punch 40, the maximum intensity of the impulse is determined by the length of the skewer 43.

As an option, the weight of the punch 40 and/or the length of the skewer 43 could be reduced by providing a helical spring between the upper surface 42 of the punch 40 and the eye 45 of the skewer 43. In this case, the force of the compressed spring contributes to achieving the necessary intensity of the impulse.

However, I was still not satisfied. The egg shell breaker needed to be even easier for someone like Pierre to use. In particular, it was difficult to keep the skewer 43 in line with the axis of the egg. After further trials I finally developed two prototypes which I consider to be my best designs so far, as represented in Fig. 5 and 6-8, respectively.

As can be seen from Fig. 5, I selected a hollow cone-like body 50 which, as in the punch 10, comprises a circumferential cutting edge 51 defining an opening. A ball 57 is arranged in a sliding manner on a shaft 53 which is fixed to the top of the body 50 opposite the opening. When the ball 57 falls, gravity accelerates the ball, until it impacts the top of the body 50 in a direction determined by the shaft 53. Provided the ball 57 drops from a sufficient height, the impulse imparted to the egg is adequate to break the egg shell. An abutment 55 on the top of the shaft 53 limits the movement of the ball 57. As an amusing addition I made the abutment 55 in the form of the head of a hen.

For the other prototype, I employed a spring in order to provide an adequate impulse. As can be seen in Fig. 6-8, this prototype also has a cone-like body 60, but this time with a flat upper impact surface 62. Fixed to this impact surface 62 are two guiding rails 63 between which a slider 64 runs. A helical spring 69 is interposed between the slider 64 and a crossbar 65 joining the two rails 63. A rod 66 is arranged inside the spring 69. This rod 66 is attached to the slider 64 near its free end 67, the free end 67 projecting from the slider 64 towards the impact surface 62. At its opposite end, the rod 66 passes freely through the crossbar 65 and is provided with a knob 68. The knob 68 is used to pull the rod 66, thereby retracting the slider 64 towards the crossbar 65 and compressing the helical spring 69 (see Fig. 8). Upon release of the knob 68, the spring 69 accelerates rod 66 and slider 64 in a direction determined by the rails 63, until the free end 67 of the rod 66 hits the impact surface 62, thereby imparting an impulse to the egg via the body 60. The intensity of the impulse is mainly determined by the characteristics of the helical spring 69. The contribution of gravity can be neglected in this prototype.

One could consider combining some aspects of both prototypes with each other, e.g. by providing a helical spring between the ball 57 and the abutment 55 in Fig. 5, or using a heavy ball fixed to the free end 67 of the rod 66 as an impact means in Fig. 6-8. In both cases, the impulse transmitted by the body 50 or 60 to the egg would then result from gravity and the spring force in combination.

I hope that I have provided you with all of the information that you need in order to draft a patent application covering all aspects of my invention, including the egg shell breaker of Fig. 4. Please send your invoice to Pierre McDucksbill.

Yours sincerely,

Toni Turbine
Inventor

Annex: newspaper cutting comprising 3 drawings
 5 drawings representing my invention

DUCKTOWN NEWS

Winners of 2003 Egg Opening Contest

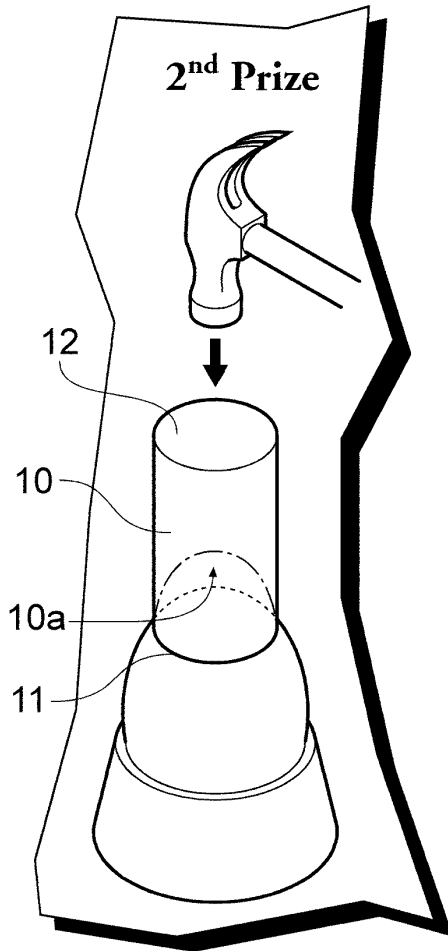


Fig. 1

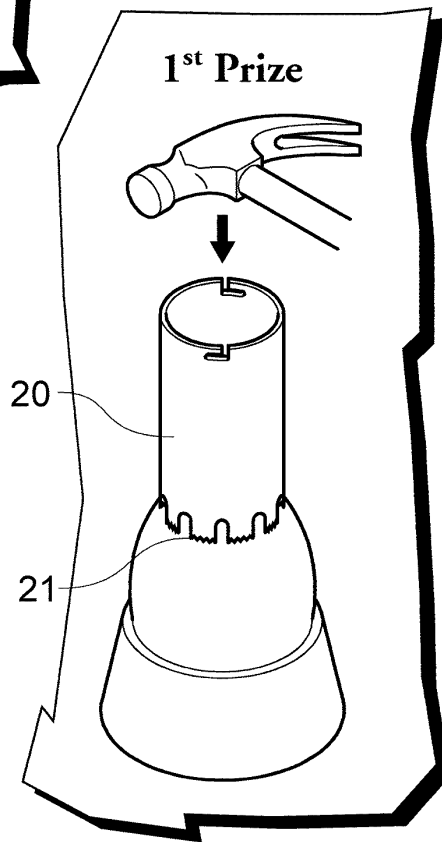


Fig. 2

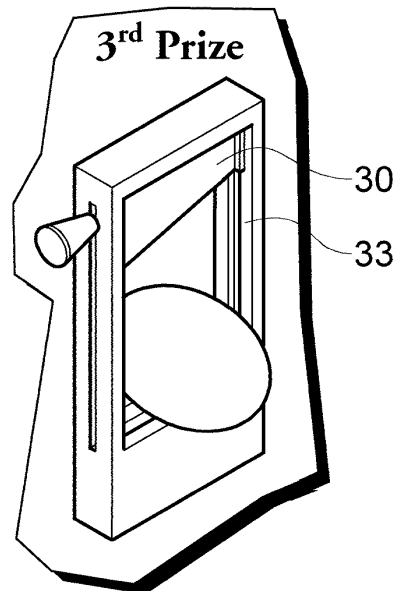


Fig. 3

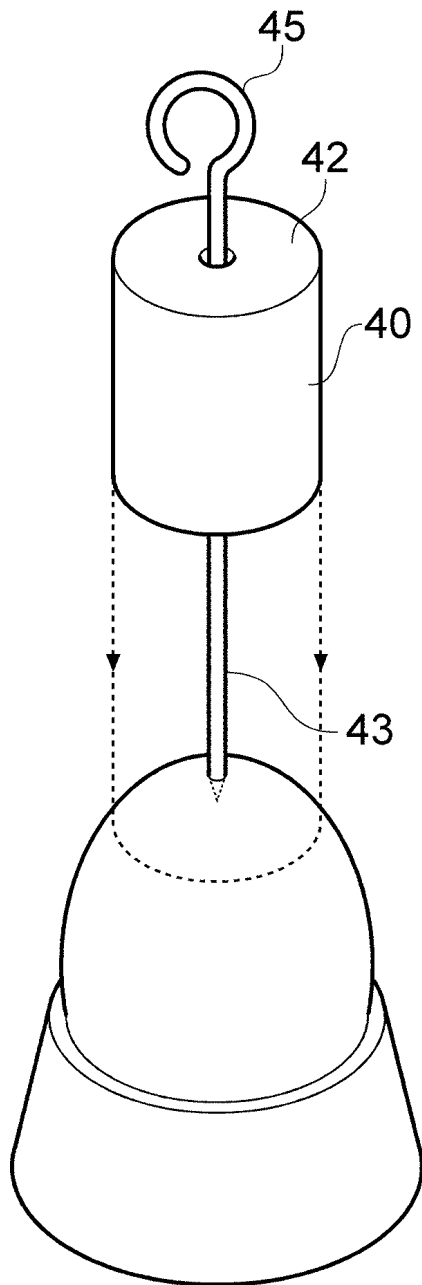


Fig. 4

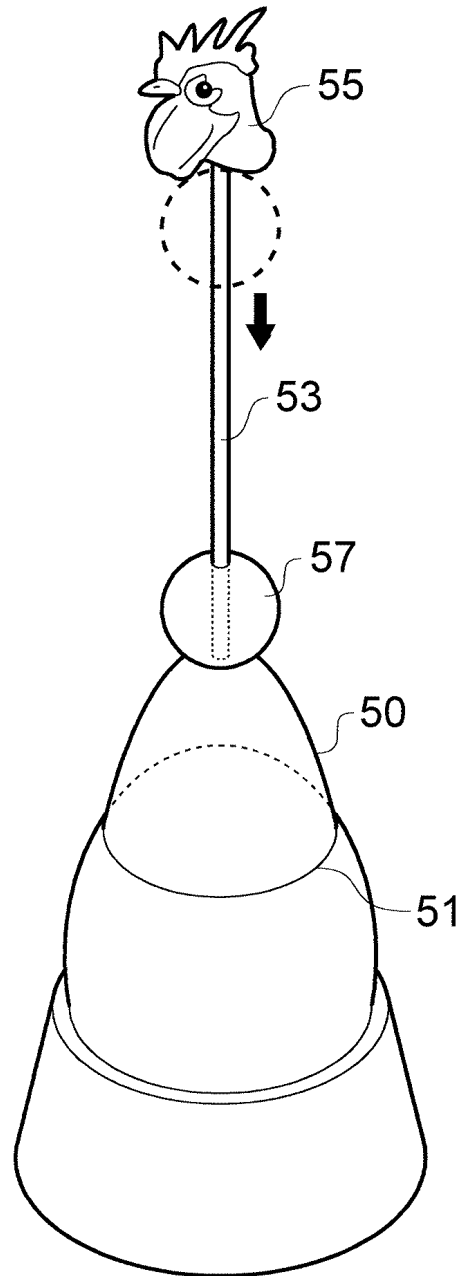


Fig. 5

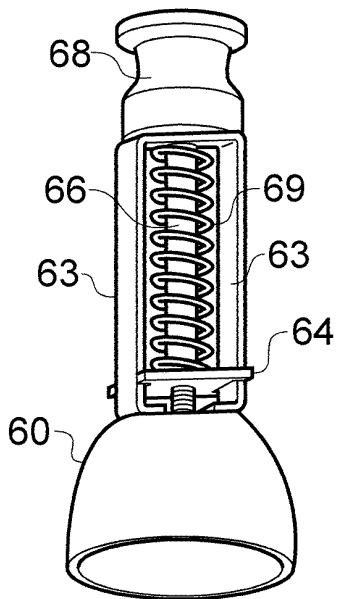


Fig. 6

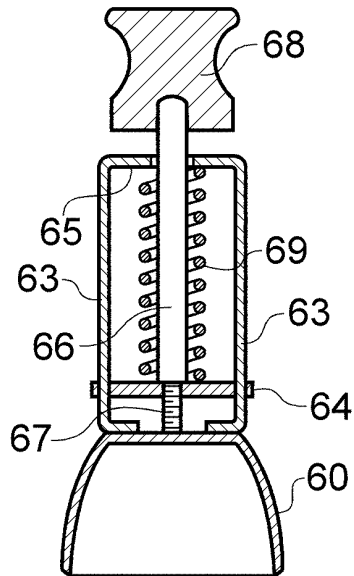


Fig. 7

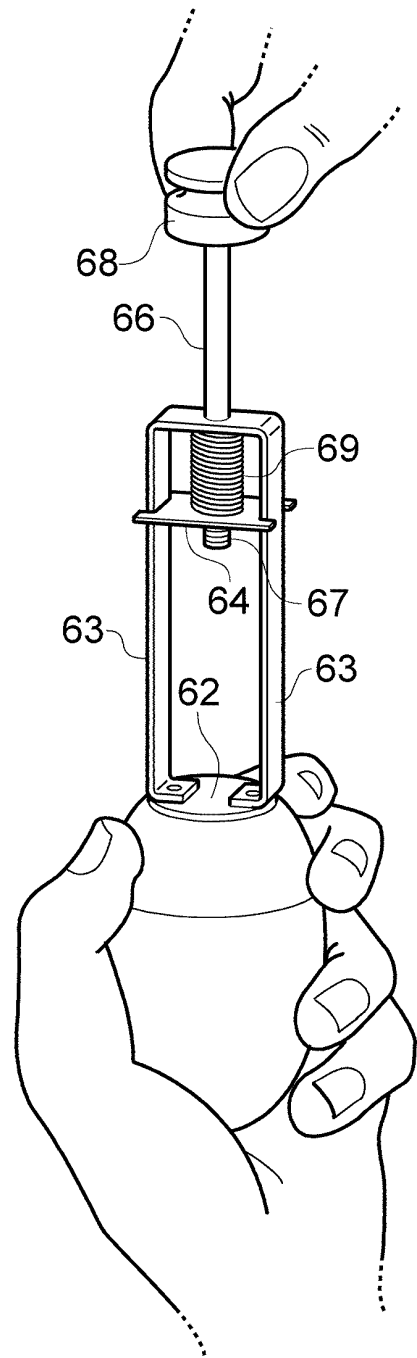


Fig. 8