Oct. 18, 1966 H. JENNY ET AL 3,279,101

HEIGHT-ADJUSTABLE SCHOOL BLACKBOARD

Filed Dec. 3, 1963 3 Sheets-Sheet 1

FIG.1

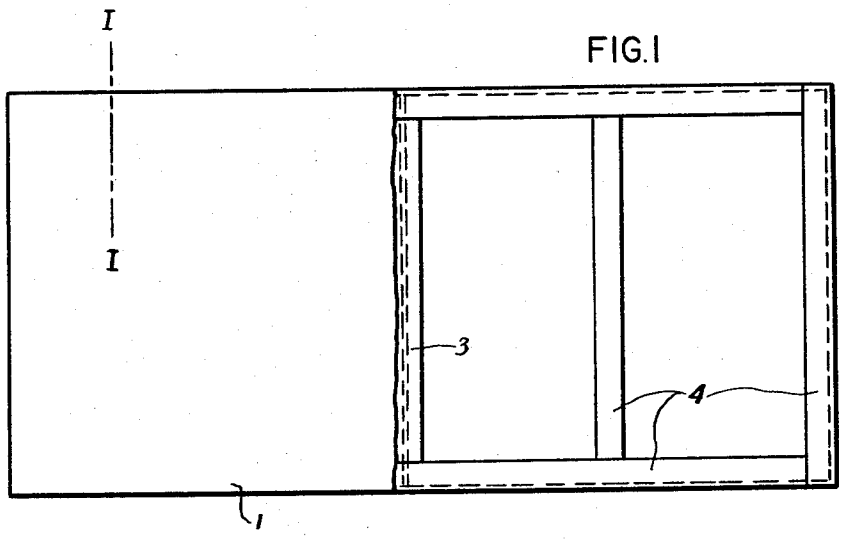
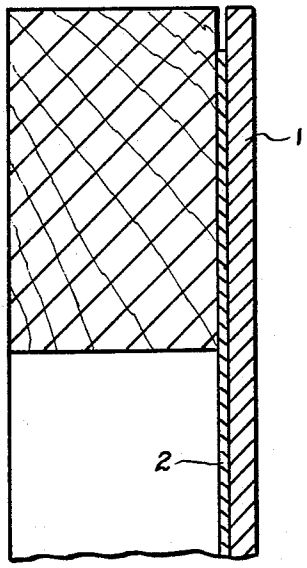


FIG.2



INVENTORS
HANS JENNY
MAX ALTMANN

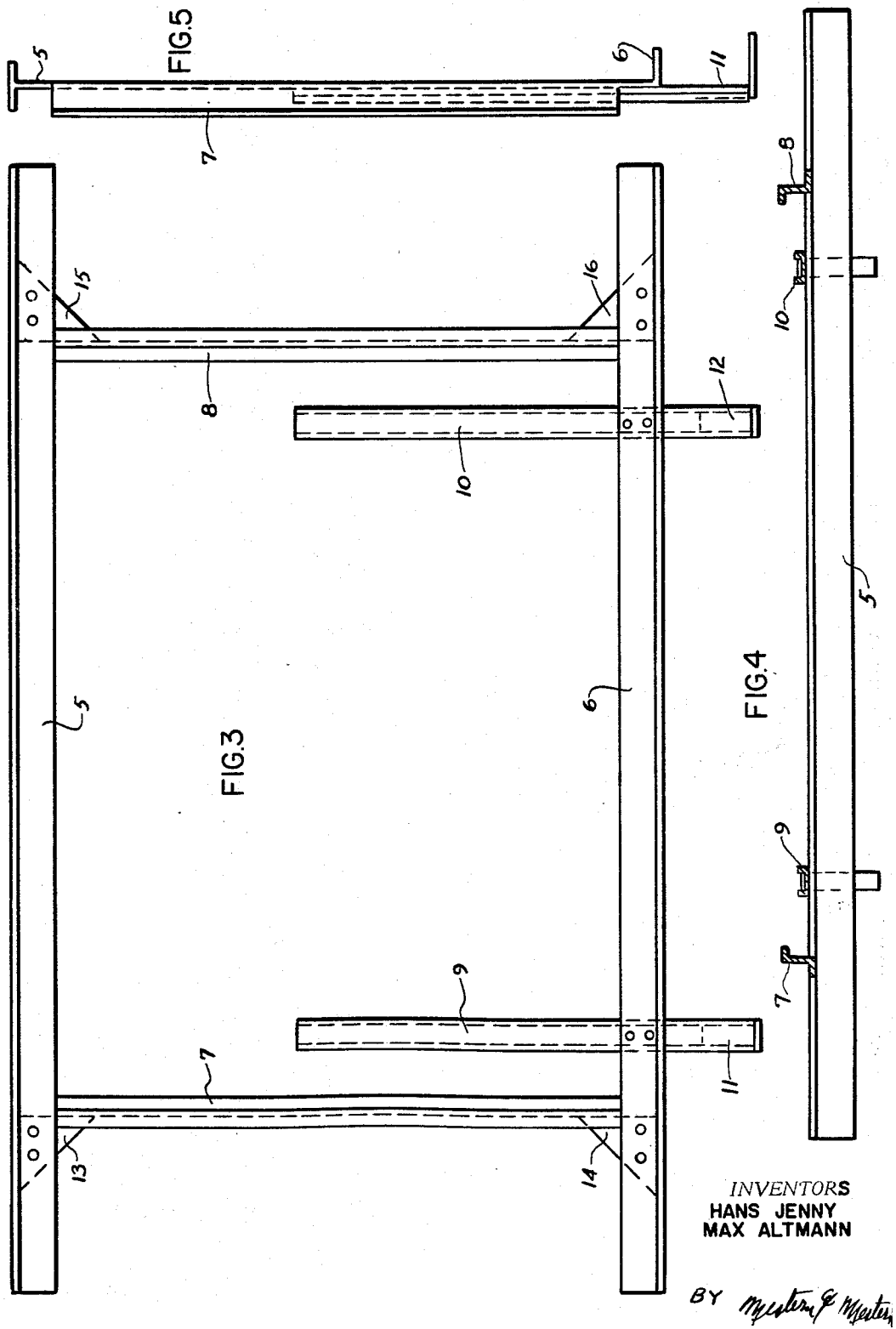
BY

Mesteru & Mesteru

Oct. 18, 1966 H. JENNY ET AL 3,279,101

HEIGHT-ADJUSTABLE SCHOOL BLACKBOARD

Filed Dec. 3, 1963 3 Sheets-Sheet 2



INVENTORS
HANS JENNY
MAX ALTMANN

BY Mystern & Masters

Oct. 18, 1966 H. JENNY ET AL 3,279,101

HEIGHT-ADJUSTABLE SCHOOL BLACKBOARD

Filed Dec. 3, 1963 3 Sheets-Sheet 3

FIG.8

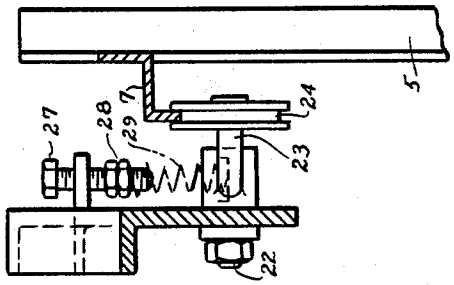


FIG.6

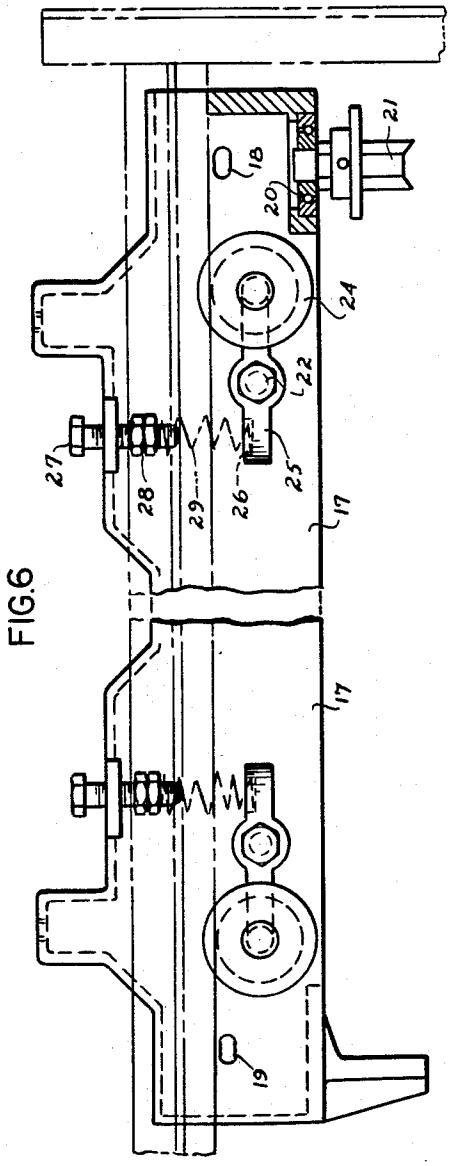
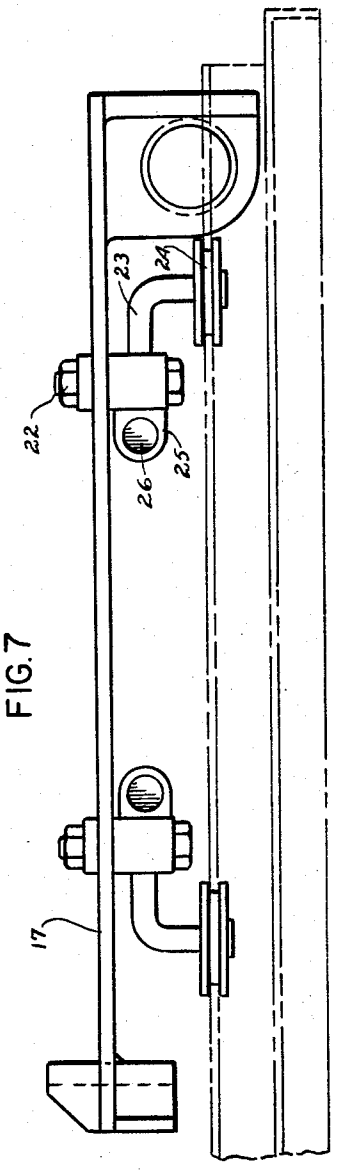


FIG.7



INVENTORS
HANS JENNY
MAX ALTMANN

BY

Mestern & Mestern

United States Patent Office

3,279,101

Patented Oct. 18, 1966

3,279,101

HEIGHT-ADJUSTABLE SCHOOL BLACKBOARD

Hans Jenny, Niederurnen, and Max Altmann, Niederwenigen, Switzerland, assignors to Firma Palor AG., Niederurnen, Saint Gallen, Switzerland

Filed Dec. 3, 1963, Ser. No. 327,598

Claims priority, application Switzerland, Dec. 4, 1962, 14,211/62; Nov. 16, 1963, 14,069/63

6 Claims. (Cl. 35—63)

School blackboards satisfying teaching requirements have already been known for some time. In order to make use of the available writing surface, they are made vertically adjustable, and further arranged to be movable so far down that the rearward wall surface can be exposed for the attachment of a projection screen. These known school blackboards not only have technical deficiences but also decisive economical disadvantages.

The blackboards themselves are made partly of wood and partly of asbestos cement panels; the writing surface of the latter is coated with a baked varnish; this has been found particularly durable since it does not wear away and thus retains its original, good properties, even after many years of use. The asbestos cement panels to be used must not be thicker than about 2.3 millimeters, since thicker panels are too heavy. These panels, however, are brittle and very sensitive to shocks and blows. Consequently, it frequently happens that such blackboard surfaces become damaged or partially useless during lessons or during intermission, by pressure, shocks or blows.

Hitherto it has been endeavored to remedy this by the use of reinforcing means, for instance a slatted background structure, intended to give support to the thin asbestos cement panel.

The assembly and fitting of such slatted backgrounds is, however, complicated and laborious. Such a reinforcement has also been found inadequate—for instance, the parts of the panel between the individual slats are particularly exposed. Hitherto, it has not been possible to obtain an absolutely plane writing surface, since the glue applied to the frame and slat elements, wraps the panel when drying.

The school blackboards described are held in frames consisting of a T bar as the top frame member, an angle bar as the bottom frame member, and two or more Z-bars serving as connecting members and guide rails; in addition, there are the junction pieces for the substructure of the blackboard, the chalk ledge, and the rear wall. In order to give this frame some degree of stiffness, all the parts mentioned must be solidly welded together. This results in a shapeless, massive structure requiring much labor to produce, and difficult to transport. In practical use it has further been found that despite the many welded joints, lateral displacements bringing the whole structure out of alignment can occur, and steady and undisturbed motion of the height-adjustable blackboard cannot be attained. Moreover, it has not proved possible to obtain a plane frame for the blackboard itself which would remain so indefinitely. Such a frame for height-adjustable blackboards thus requires great care as to its construction and functioning.

Blackboard carriers (easels) which have to receive not only the frame and the board itself, but also the means for vertically displacing the complete blackboard, at present likewise consist of a large number of individual parts which must be screwed or welded together in a complicated and tedious manner. This is the source of difficulty remediable defects. Similarly, the arrangement for the vertical displacement of the complete blackboard which is required to ensure a smooth and undisturbed action of the corresponding elements cannot fulfill these conditions.

In the known school blackboards each carrier consists of 8–10 separate parts, which are partly screwed together, but in most instances are welded and finished in place. The vertical adjusting motion of such blackboards is as a rule performed by a device such as first described by applicants in their own Swiss Patent 331,795 of March 18, 1955. This seeks to obtain an elastic support of guide rollers running in rails in such manner that each guide roller is rotatably carried on a screw bolt, which itself is screwed vertically into a cylindrical sliding block disposed in a recess and influenced by a spring, intended to hold the sliding block, screw bolt and guide roller elastically against the guide rail. This spring consequently acts to force the screw bolt out of its position at right angles to the sliding block and thus cause the latter to jam in the recess, i.e. its action is retarding or jamming rather than controlling. The range of action of such a device is closely restricted. Finally, it attracts chalk and schoolroom dust, which cannot be removed since after assembly in the factory the device is no longer accessible. The blackboard therefore becomes increasingly difficult or ultimately impossible to move.

The defects described are the cause of considerable economic disadvantages. The blackboards have to be delivered to the place of use in two lots. The first lot comprises the blackboard underframe or carrier with the actuating mechanism and the control elements thereof. Both lots include bulky and heavy pieces which must travel as bulky goods. To these must be added, depending on the size of the blackboard, a counterweight of 120–150 kilograms for balancing the blackboard suspended in its actuating mechanism, which has also to be transported. The total transport costs incurred are so high that the sale and delivery of such blackboards to remote areas is no longer practicable. This restriction to a small consumer region also reduces the possible volume of sales, since new blackboards are only acquired for new or rebuilt schools or the like. New means have therefore to be sought to overcome these economic restrictions as well as to eliminate the technical drawbacks.

The object of the invention therefore is a height-adjustable school blackboard characterized in that it has a metal-reinforced ready to use blackboard body, a non-warping blackboard frame which cannot be mounted in a wrong manner, a device enabling undisturbed vertical motion of the blackboard controlled by rotary clamps; and a container filled with a finely-granular compound for balancing the weight of the blackboard.

An exemplary form of embodiment of the invention is shown in the drawing, in which are represented:

FIG. 1—a partial front view and a partial section of a blackboard body;

FIG. 2—a partial section along the line I—I of FIG. 1 on a slightly larger scale;

FIG. 3—the front view of the left-hand side of a blackboard frame;

FIG. 4—a top view of FIG. 3; and

FIG. 5—a side view;

FIG. 6—the side view of a blackboard underframe or carrier with rotary clamps and travelling roller; and, further to FIG. 6—

FIG. 7—a side view; and

FIG. 8—a top view.

In accordance with FIGS. 1 and 2, **1** is a blackboard panel of asbestos cement, of a thickness of about 2.2 millimeters, the front side whereof has a writing surface of baked varnish. On its rear side it is reinforced by a sheet metal plate **2** of about 0.3 millimeters thickness which is cemented thereon; for larger blackboard sizes this backing sheet is divided into separate panels, with expansion joints **3**. The two firmly-attached panels **1**

and 2 are then attached on a wooden frame 4, which may also be effected by cementing or glueing.

Blackboard bodies of this construction have an absolutely and permanently plane writing surface on which the wooden frame glued on the back is not apparent; it can be more closely and freely written on with chalk, owing to the counter-pressure of the backing sheet 2. The shock and impact resistance of the writing surface is practically unlimited. Tests at the Federal Establishment for Testing Materials, Zurich-Dübendorf, have shown that an asbestos-cement panel of 2.2 millimeters having a permanent baked-on writing surface and a cemented backing plate of 0.3 mm. thickness, withstands the impact of a weight of 1 kilogram on an area of 0.5 cm.², dropped from a height of 1 meter on the writing surface of the freely supported blackboard body, without experiencing damage or showing visible impact marks. A further, substantial advantage is that the board reacts elastically to the impact of test balls, as the experimental series have shown. Yet another great advantage of such a metal-reinforced blackboard body is that magnets applied to the writing surface are attracted and held thereon. The magnetic field penetrating the thin asbestos cement panel 1, is sufficiently powerful for drawings, pictures, plans, etc. placed under the magnets to be held on the board. The aforesaid Materials Testing Establishment has also investigated this action of the blackboard body. The holding power of the magnets was found to be quite adequate for the objects which are used for the purpose. In addition it was found that a magnet is 15–20% more strongly attracted by the metal sheet, when a 2.2 mm. thick asbestos cement sheet is placed between the magnet and the metal sheet than when an air gap of the same thickness is left between the magnet and the metal sheet. The metal reinforcement of the blackboard body is thus more effective in its action than the total of the individual elements. It will be clear that this offers quite new and unexpected posibilities for instructional purposes for the blackboard body according to the invention.

The blackboard is transported as a thin piece so that space and expenses are saved.

At the place of use, the blackboard body 1–4 is assembled within a blackboard frame, as represented in FIGS. 3–5. This has as the top frame member a T bar 5, and as a lower frame member an angle bar 6, as well as connecting bars of Z-shape, 7 and 8, which latter also act as guide rails for the vertical motions of the blackboard. The T bar 5 and angle bar 6 form the horizontal frame members, and the connecting bars 7 and 8 the vertical members thereof. The slide bars 9 and 10, as well as the brackets 11 and 12 for the chalk ledge, are attached on the angle bar 6. The pair, associated angle plates, the so-called gusset plates 13 and 14, and 15 and 16 respectively, are welded to the Z bars 7 and 8, staggered with respect to each other, and are attached to the horizontal frame members, the T bar 5 and the angle bar 6, during assembly at the place of use, by at least 2 screws each. In order to obtain absolutely flat or plane bearing surfaces for the blackboard body to be applied thereon, the gusset plates 13–14 and 15–16 are screwed on the side of the blackboard frame opposite the writing surface, which can be quickly and undetachably effected. They ensure the non-warping rigidity of the completed blackboard frame. In the separate state, the individual members take up very little space during transportation, which again offers considerable economic advantages.

Contrary to the known school blackboards, the blackboard carriers are in this case of unit construction. Instead of a multiplicity of details which have to be welded or screwed together and usually require further work, a single workpiece is used, preferentially of cast-iron, to which only the controlling elements have to be attached. FIGS. 6, 7 and 8 show such a blackboard carrier: 17 is its body, with the oval (oblong) holes 18 and 19 for its attachment by means of masonry bolts to the schoolroom wall. A self-aligning ball bearing 20 receives the spindle 21 of a chain sprocket, not shown, controlling the balance weight. Guiding and control of the vertical movement of the blackboard is effected by at least one pair of two-armed clamping levers arranged under each other. Each of these is rotatable on a pivot 22 and has one arm 23 bent at approximately right angles, carrying the guide roller 24 running in the Z-shaped guide rail, e.g., 7. The other lever arm 25 has at its free end a recess 26 into which a compression spring 29, influenced by a clamping screw 27 and counter-nut 28, is fitted, which enables the pressure on the guide roller 24 to be controlled. The guide roller 24 is pressed elastically against the guide rail 7 by the clamping lever assembly 22–29. The associated lower clamping lever works in the same manner—see FIG. 6. As a rule, a single control unit with two clamping levers suffices for the blackboard carrier; the other carrier can be equipped with guide rollers on fixed bearing pins.

The control assembly reliably functions indefinitely and has a play of over 20 mm. which is large enough to compensate for any differences arising either from the blackboard frame 5–16 or the blackboard body 1–4, without the blackboard thereby shifting its position. At the same time, a very elastic and smooth action of the vertical movements of the blackboard itself is obtained. Finally, the control mechanism requires no servicing, since the clamping lever and its bearing are insensitive to dust, etc.

Finally, the problem of balancing the weight of the blackboard in motion is solved in a similarly simple manner. Instead of an iron weight or weights of 120–150 kg., incurring high transportation costs and labor for their installation, the weight balancing the blackboard is a container filled with a mixture of finely granular material, which can usually be obtained locally. For this purpose, sand or a mixture of sand and gravel will be found most suitable. These are easily procurable and can be very accurately weighed or measured. The empty container, which is simply a box, can at the same time be used for transporting assembly tools or the like.

The blackboard according to the invention is thus found to be a logical assembly and a novel, interrelated solution of both the technical and the economic problems involved. The individual elements are not only important in association with the entire assembly, but each individual element separately represents a decisively important feature.

What we claim is:

1. A vertically adjustable, warpproof blackboard suitable for shipping in the form of its component parts for easy assembly at the place of use, which comprises, in combination, a coated asbestos panel; a sheet metal backing on said panel; a first frame at the rear of said panel plus backing; said panel backing and first frame constituting the assembled first component part; a second component part, readily assembled together with said first component part and other minor parts at the place of use constituting a second frame comprising a T-bar as top member; an angle bar as bottom member; said bars being connected at their ends each by a Z-bar which also serves as a guide rail; a pair of slide bars attached to said angle bar; means for maintaining the rectangular shape of said second frame; a blackboard carrier holding the assembled blackboard; at least one pair of two-armed clamping levers disposed one above the other, each of them pivotably rotatable, one arm of each being bent at right angles; a guide roller being disposed on said arm and moving within said guide rail; the other lever arm being provided with a recess at its free end; spring means, coacting with a clamping screw and nut thereon, disposed in said recess and regulating the pressure on said guide roller which thus is urged elastically against said guide rail; light-weight containers to be filled with a heavy finely grained substance upon assembly to act as counterweights and facilitate the vertical movement of said panel;

and sprocket and bearing means for said counterweight.

2. The blackboard as defined in claim 1, wherein said means for maintaining the rectangular shape are gusset plates, one on each corner of said second frame; said gusset plates being welded to said Z-bars and connected to the upper and lower members by at least two nuts and bolts each; and staggered with respect to each other.

3. The blackboard as defined in claim 1, wherein said panel has a thickness of substantially 2.2 mm. and said backing a thickness of substantially 0.3 mm.

4. The blackboard as defined in claim 1, wherein said backing consists of a plurality of metal sheets interconnected by expansion joints.

5. The blackboard as defined in claim 1, wherein said backing sheet is magnetic thus capable of holding magnets urged onto said panel.

6. The blackboard as defined in claim 1, wherein said panel is coated with a baking enamel.

References Cited by the Examiner

UNITED STATES PATENTS

579,767	3/1897	Mushoff	35—63
722,462	3/1903	Smith	272—81
948,218	2/1910	Gregory.	
1,004,375	9/1911	Costello	35—66
1,394,572	10/1921	Neil et al.	35—63
2,161,587	6/1939	Pettis	35—63
2,189,019	2/1940	Rowe.	

FOREIGN PATENTS

987,539	4/1951	France.
1,099,707	2/1961	Germany.
759,050	10/1956	Great Britain.
331,795	3/1955	Switzerland.

EUGENE R. CAPOZIO, *Primary Examiner.*

JEROME SCHNALL, *Examiner.*

H. S. SKOGQUIST, *Assistant Examiner.*