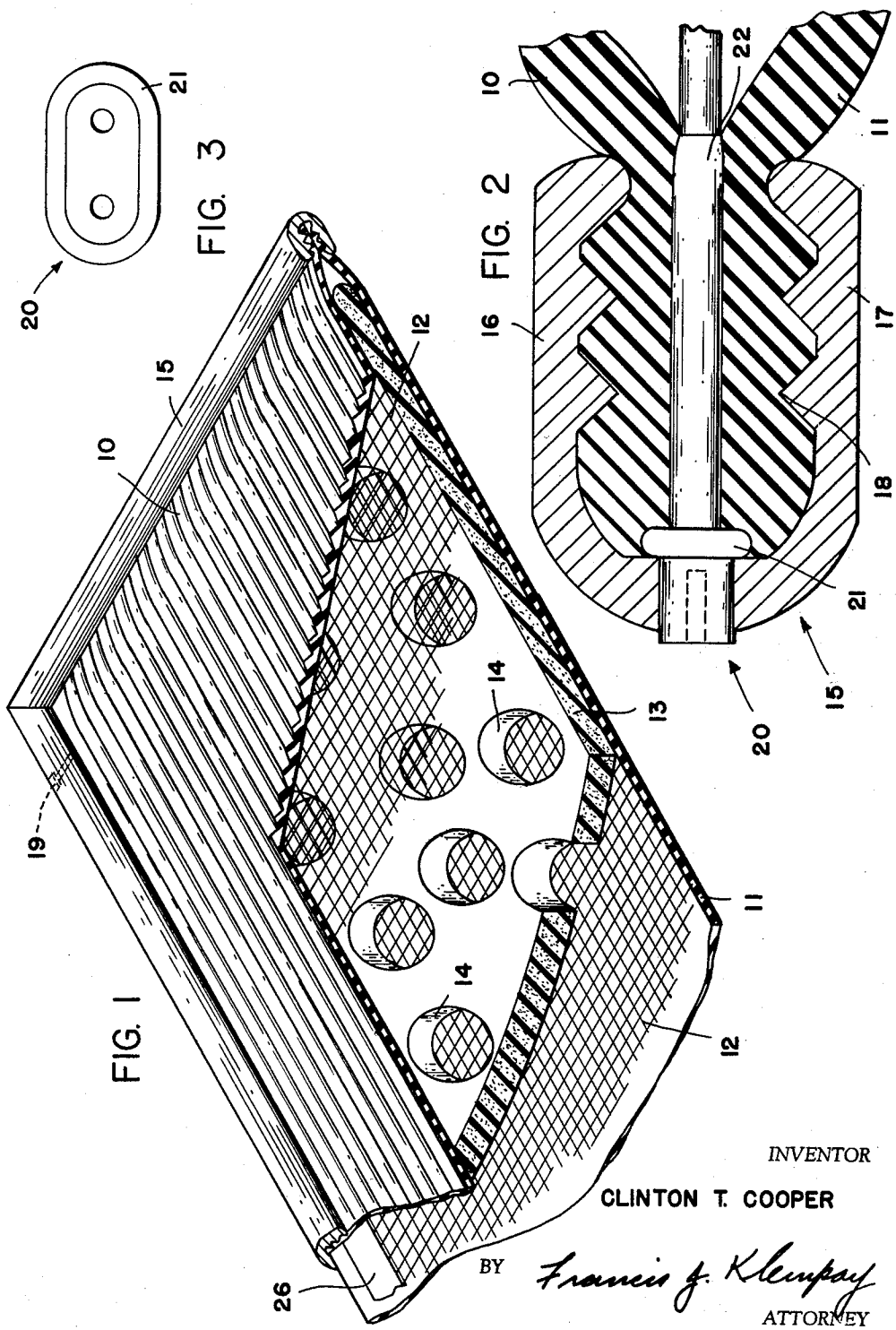
Jan. 12, 1965 C. T. COOPER 3,165,606

MAT SWITCH HAVING U-SHAPED BINDING CLAMPS

Filed June 30, 1961 2 Sheets-Sheet 1



INVENTOR

CLINTON T. COOPER

BY Francis J. Klempay

ATTORNEY

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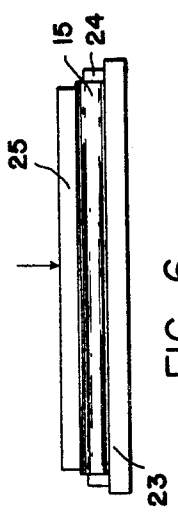


FIG. 6

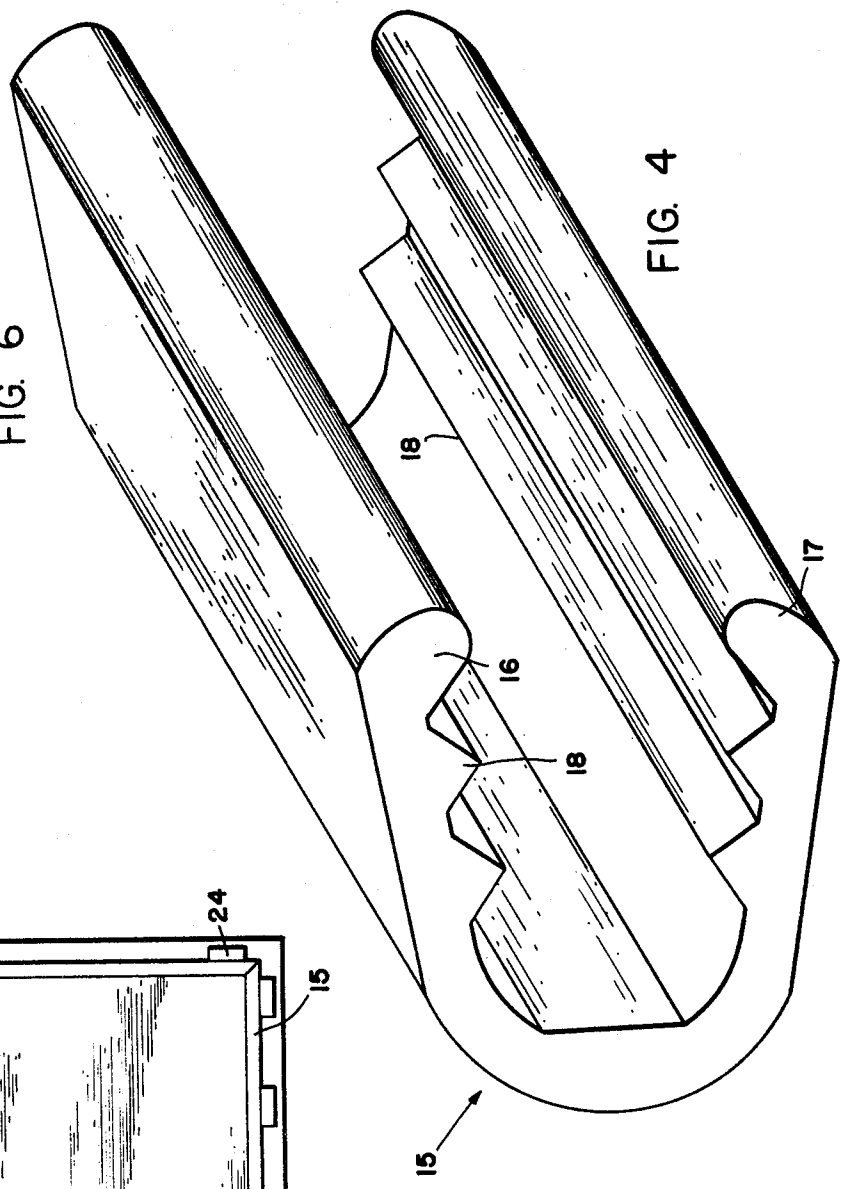


FIG. 4

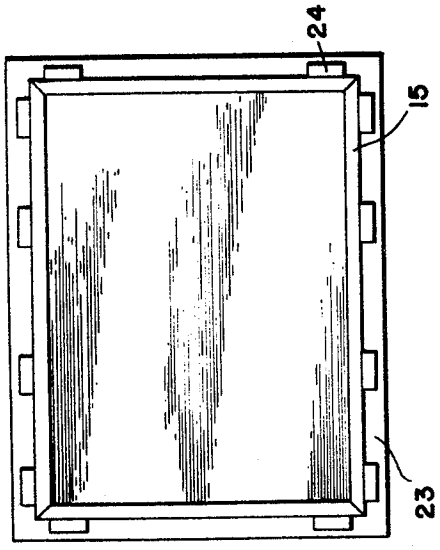


FIG. 5

INVENTOR
CLINTON T. COOPER

BY Francis J. Klempay
ATTORNEY

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3,165,606 MAT SWITCH HAVING U-SHAPED BINDING CLAMPS

Clinton T. Cooper, 372 Melbourne Ave., Youngstown, Ohio

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1 Claim. (Cl. 200—86)

This invention relates to an improved mat switch.

The primary object of the invention is the provision of a mat switch of improved appearance and of greater durability whereby the device is suitable for severe conditions of prolonged service in commercial establishments. Further objects of the invention are the provision of a mat switch which is reversible in use, an improved yet inexpensive arrangement for conducting the lead wires out of the assembly yet permitting the assembly to be reversed in use, and an improved method of binding the edges of the mat-like sheet material used in the assembly.

The above objects are accomplished, in the present invention, primarily by binding the superimposed edge portions of upper and lower expanses of sheet-like mat material with a rigid frame so constructed that the said edge portions are tightly gripped and the strength of the material itself holds the sections of the frame in properly assembled relation. Preferably the framing sections are rigid extrusions of suitable material such as aluminum or a thermoplastic and as such may be produced very economically. The individual frame sections are mitre cut from long lengths of the extrusions and when the frame is assembled on the mats the mitre cuts make neat corners.

The extruded framing material is U-shaped in cross-section and is bendable so that the leg portions of the section may be tightly clamped down onto the mat material and be secured thereby. The frame is applied in a jig or fixture which holds the frame tightly closed until the clamping is accomplished, and, by bending down the entire length of each frame section at one stroke, puckering of the material of the mats is avoided to provide a smooth even product.

Another object of the invention is accomplished by housing a terminal connector between the two mat expanses and substantially within one of the rigid framing sections whereby the same is adequately protected against foot traffic. An end portion of the connector extends horizontally out through an aperture in the connecting web of the framing section, and the cord connection is made to this exposed end of the terminal.

The above and other objects and advantages of the invention will become apparent upon consideration of the following specification and accompanying drawing wherein there is disclosed a preferred embodiment of the invention.

In the drawing:

FIGURE 1 is a perspective view, partly in section, of an assembled floor mat switch constructed in accordance with the principles of my invention;

FIGURE 2 is a fragmentary sectional view, on an enlarged scale, showing the manner in which the electrical terminal connector is installed in the assembly of FIGURE 1;

FIGURE 3 is an end view of the terminal connector of FIGURE 1;

FIGURE 4 is a perspective view of a section of the metal extrusion which is used in the assembly of FIGURE 1; and

FIGURES 5 and 6 are plan and side elevational views, respectively, illustrating a process and apparatus used in the manufacture of the assembly of FIGURE 1.

Referring first to FIGURE 1, the floor mat switch of my invention is a sandwich affair having outer exposed

top and bottom sheets **10** and **11**, respectively, which are made of suitable wear and water-resistant material, preferably rubber, and which are ribbed on one side surface for anti-skid purposes. The sheets **10** and **11** are identical so that the mat switch assembly is readily reversible in use. As shown, the inner surfaces of the sheets **10** and **11** are preferably smooth, and overlying each of these surfaces is a layer of screen **12** made of fine current-conductive wire. Interposed between the two screen layers is a thin mat **13** of suitable yieldable material, such as sponge rubber, which has the property of restoring itself to its initial thickness after a heavy concentrated weight, such as the foot of a pedestrian, is removed therefrom. The mat **13** is formed with a multiplicity of closely spaced enlarged apertures **14** so that upon any concentrated weight being applied to the assembled mat the two screen layers **12** will be caused to meet at one point or the other and thereby establish an electrical contact.

The above described and sandwiched materials are held together and edged by a framing section designated generally by the reference numeral **15** which, in practice, is preferably but not necessarily an aluminum extrusion. The section **15** is deep in cross section—having relatively long leg portions **16** and **17**, and the section is manufactured with these leg portions divergently related as shown in FIGURE 4 of the drawing. Further, the inner surfaces of these leg portions **16** and **17** are sharply serrated longitudinally as shown at **18** to tightly grip the edge portions of the mat sheets **10** and **11** to prevent the same from pulling out of the frame section **15**. In the final product the two leg portions **16** and **17** of the framing section are bent down parallel so that the material of the sheets **10** and **11** is compressed and is tightly forced into the serrations **18**, as shown in FIGURE 2.

In the manufacture of the mat switch described above, the sheets **10** thru **13** are first cut to proper rectangular size and the framing section **15** which comes from the mill in long lengths is mitre-cut to precise lengths to form the end and side bindings for the assembled mat switch. One of the framing section lengths is formed with an elongated aperture in its web portion, as shown at **19** in FIGURE 1, to receive the terminal connector **20**. This connector, which may be of more or less conventional construction, has an elongated insulating body with an outer section to be snugly received in the aforesaid aperture in the framing section. Immediately inward of this outer portion is an integral enlargement **21** which, as shown in FIGURE 2, is operative to prevent the outward movement of the terminal connector with respect to the framing section **15**. The terminal connector **20** has an elongated inwardly directed shank **22**, and, in accordance with usual practice, extending through this shank is a pair of conductive wires which are connected at their outer ends to metallic contacts housed within bores shown as extending inwardly into the outer portion of the terminal connector.

At the time of assembly, one of the wires from the connector **20** is soldered or welded to one of the conductive screens **12** and the other wire is connected to the other screen **12**. The elongated shank of the connector is simply laid between edge portions of the two sheets **10** and **11** and the framing section **15** having the aperture **19** is then applied edgewise over the overlapped edge portions of the sheets **10** and **11** so that the outer portion of the terminal connector passes through the aperture. The framing section may be readily applied in this manner because of the divergent relation of the legs **16** and **17** thereof. In actual practice all of the four frame sections making up the binding for the assembled mat switch is first thus loosely applied to the superimposed layers of materials **10** thru **13** and this assembly is then placed in a jig or fixture shown in FIGURES 5 and 6.

The assemblying fixture of FIGURES 5 and 6 comprises a base plate 23 on the upper surface of which are rigidly mounted a number of gauge blocks 24 arranged in a rectangular pattern precisely dimensioned to the outer periphery of the finished frame. The loosely assembled mat switch as described above is placed on the plate 23 within the upstanding blocks 24, and it should be apparent that while the sheets 10 and 11 are made of quite flexible material the same have appreciable columnar strength in their respective planes whereby upon the same being laid down flat on the plate 23 any bulges appearing in the sheets may be removed by pushing down on the top sheet with the palm of the hand which forces the edges of the sheets deep into the framing sections 15. With the layers of the mat assembly thus flattened and the connector 20 positioned in aperture 19 and the wires thereof connected to the two conductive screens 12 the mat assembly may now be completed by bending down or closing the two legs 16 and 17 of the framing sections. This is best done in a press with the force being applied through an elongated beam which is substantially coextensive with the length of the respective framing section being closed. Such a beam is shown schematically at 25 in FIGURE 6. I have found that puckering and other difficulties are avoided when the entire reaches of the respective framing sections are bent down at the same time. As the edge portions of the two sheets 10 and 11 are forced tightly together by closure of the framing sections, the sheets 10 and 11 are stretched slightly so that the resultant product is a neat flat article. It should also be observed that by use of the fixture shown in FIGURES 5 and 6, the mitred ends of each of the framing sections are brought into tight accurate register with the mitred ends of adjacent sections so that the resultant frame after bending down of the legs 16 and 17 is very neat in appearance. I have found that the combined tensile strength of the two layers 10 and 11 which are clamped within the framing sections 15 is sufficient to prevent any appreciable outward movement of the framing sections, and accordingly the frames stay neatly assembled even after long periods of use of the assembled mat.

It should now be apparent that I have provided an improved mat switch and an improved method of making the same which accomplishes the objects set out initially above. The rigid frame and the mat assembly edged thereby are extremely rugged and durable and will withstand prolonged periods of severe service. Both sides of the assembly are identical so that if and when any appreciable wear shows on the initial upper side, for example, the assembly may be simply turned over and used further without any loss of appearance or efficiency.

The rigid frame adequately protects the edges of the assembly from scuffing or curling, thus contributing to the durability of the assembly. Also, the presence of the frame makes a user tend to lift his feet so that the same are brought down more vertically onto the mat, thus reducing wear.

While I have specifically referred to the framing section as being an aluminum extrusion, it should be clear that other materials may be suitable for this purpose—as, for example, a thermoplastic which could also be fabricated by an extrusion process, and which could be closed onto the edge portions of the mat material upon heating the web of the section. Likewise, materials other than those specifically mentioned for the tread expanses, and the collapsible inner separating layer (13) may be found suitable. Reference should therefore be had to the appended claim in determining the scope of the invention.

I claim:

A reversible floor mat switch comprising upper and lower identical expanses of flexible insulating wear-resistant flat sheet-like material bound along their overlying edges with a rigid frame, the inner faces of said expanses being overlaid inwardly of said frame with current-conductive wire screens, a layer of compressible material having a pattern of closely spaced enlarged apertures therein normally separating said screens but yieldable upon a concentrated weight being applied to said upper expanse to permit said screens to contact each other through one or more of said apertures, and said frame comprising a plurality of sections made of soft metal and each being U-shaped in section to provide legs overlying the bottom surface of the lower expanse and the top surface of the upper expanse of said sheet-like material, said frame sections having their leg portions serrated on their inner surfaces and bent toward each other to tightly clamp the edge portions of said expanses, one of said frame sections having a horizontal aperture in the web connecting its two legs, and an insulating terminal connector having an outer body portion extending through said aperture and a flange bearing against the inner face of said web as well as a shank portion clamped between edge portions of said expanses of sheet-like material and between the legs of the said one of said frame sections, said terminal connector having electrical connections with said screens.

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