April 4, 1950 J. C. ROPER, JR 2,502,536

APPARATUS FOR DETERMINATION OF THE AMOUNT AND DISTRIBUTION OF APPLIED PRESSURE OF SHOE SOLES

Filed May 28, 1948 2 Sheets-Sheet 1

Fig. 1.

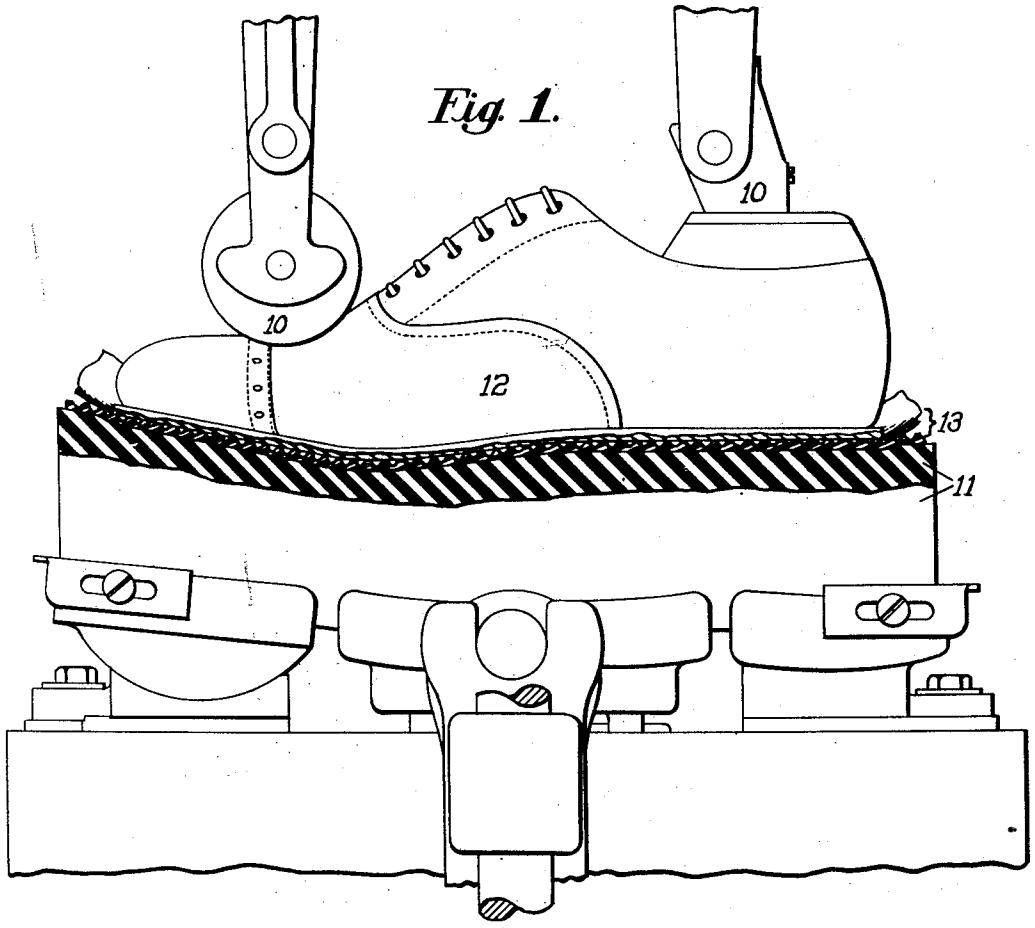
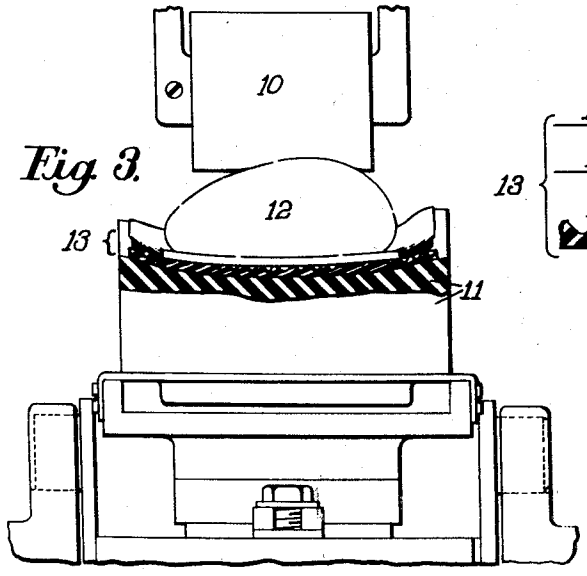


Fig. 3.



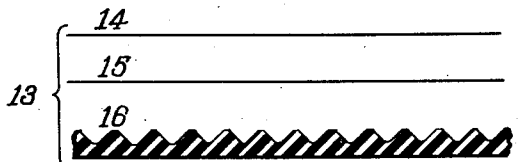


Fig. 2.

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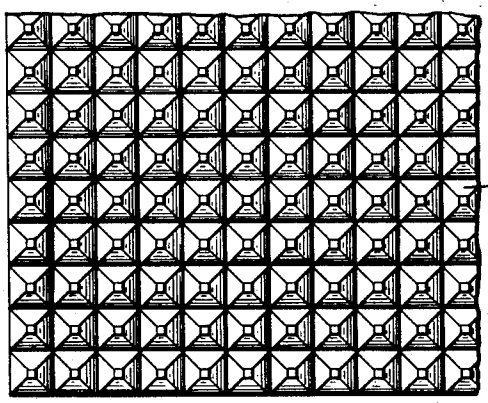


Fig. 4.

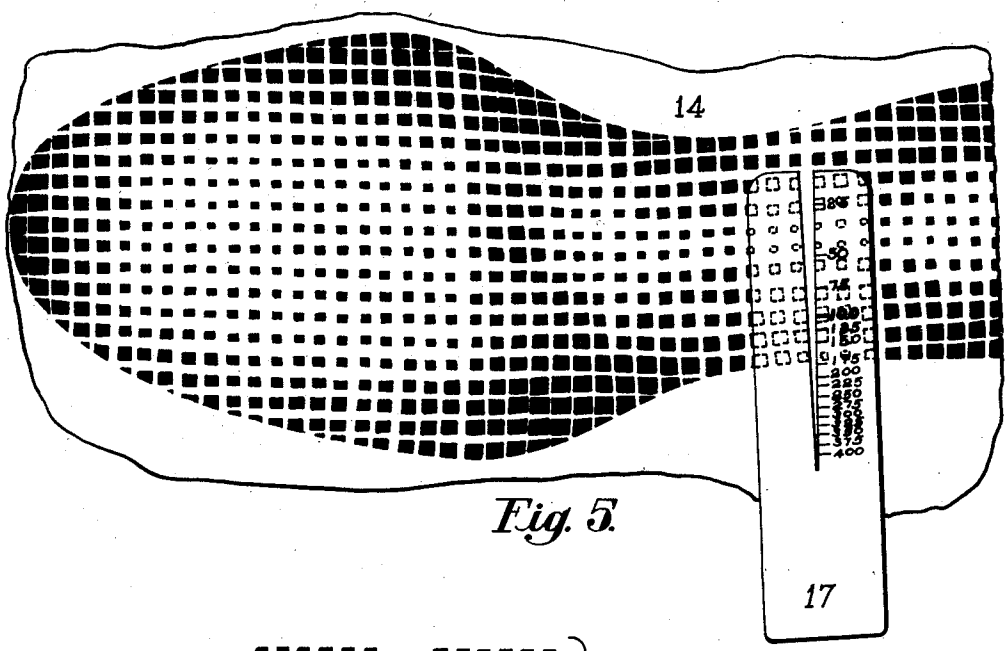


Fig. 5.

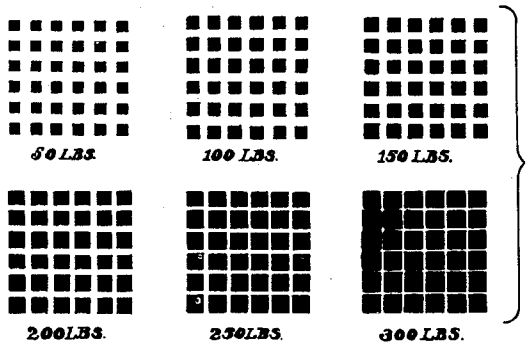


Fig. 6.

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UNITED STATES PATENT OFFICE

2,502,536

APPARATUS FOR DETERMINATION OF THE AMOUNT AND DISTRIBUTION OF APPLIED PRESSURE OF SHOE SOLES

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4 Claims. (Cl. 346—40)

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This invention relates to apparatus for determining the amount and location of pressure applied to the soles of shoes in the operation of sole laying and sole attaching machines.

It is recognized that podiatrists have employed somewhat similar impression-obtaining means supported by a flat surface for securing a foot impression due to the weight of the body. In such use, however, the pressure would hardly exceed 10 pounds per square inch and the impression obtained would serve only to provide an outline of the patient's foot or to indicate roughly the relative distribution of the body's weight on different portions of the foot.

Heretofore, there has been no reliable method of ascertaining the amount and relative distribution of pressure applied to a shoe bottom in sole laying and attaching machines, such as is illustrated in United States Patent No. 1,549,243, E. E. Winkley, dated August 11, 1925, where the pressure per square inch is in the order of 100 pounds.

Accordingly, the object of this invention is to provide apparatus whereby the amount and distribution of pressure on a shoe sole in a sole laying or attaching machine may be ascertained and recorded in a practical manner. Thus the relative efficiency of different pressure applying pads may be recorded and compared and adjustments of a given pad made to secure adequate pressure all about the marginal portion of the shoe bottom. Another application of this invention is to provide apparatus for indicating the pressure applied in the shank area, especially of deep shank shoes. In this latter case an impression may be made on paper pasted to the bottom of the shoe sole, the paper being slashed if required to conform to the shank area of the shoe bottom. Pasting the paper to the sole is desirable in order to prevent wrinkling which might otherwise occur.

In the drawings,

Fig. 1 is a view of a shoe in a sole attaching press with an impression producing device located between the shoe and the pad;

Fig. 2 is an exploded, cross-sectional view of the impression apparatus;

Fig. 3 is an elevational view looking toward the toe of the shoe, the impression-producing device being in section and the pad partly in section;

Fig. 4 is a top plan view of a portion of a pressure mat, enlarged two diameters, that might be used in conjunction with the invention;

Fig. 5 is a partial view of a typical impression made by a man's shoe when sole attaching pressure is applied. A V-slotted gage is shown placed over the squares of the impression indicating how the amount of pressure may be read directly from a calibrated scale; and

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Fig. 6 is a chart consisting of one-inch squares showing the size of impressions resulting from the application of pressures from 50 to 300 pounds, in 50-pound increments.

The invention comprises apparatus consisting of means for engaging a shoe, a yielding pad for the sole, mechanical means for relatively moving the shoe engaging means and the pad for applying heavy pressure to the shoe and sole, and means between the pad and sole for producing a multiplicity of individual impressions, the area of each of which is a function of the pressure applied in the locality of that impression. The impression-producing means may comprise a sheet 16 (Fig. 2) of material having one surface substantially covered with small projections diminishing regularly in size from the sheet outward, a transfer sheet 15 adjacent to the projections, and an impression-receiving sheet 14 next to the transfer sheet. The sheet 16 may be a pressure mat of any flexible, resilient material so long as one surface has a plurality of projections which are distortable so that an increase of pressure on each individual projection will produce a flattening of the top portion and a resultant increase in the area of the printing surface. Fig. 4 is an illustration of an impression-producing means which consists of a rubber mat having many truncated pyramids of the proper durometer, the base of each side being approximately $\frac{3}{16}$ inch in length. The transfer sheet 15 may be of any suitable material such as inked fabric, carbon paper, or any flexible, duplicating material. The impression-receiving means 14, may simply be a sheet of paper, preferably thin enough so as to be readily pliable but not so thin as to wrinkle easily.

Fig. 1 illustrates the apparatus in use: The abutments 10, 10 provide means for pressing the shoe 12 against the yielding pad 11, the numeral 13 indicating generally the sheet of paper 14, the transfer sheet 15, and the pressure mat 16 of Fig. 2 under pressure.

Upon releasing the attaching pressure and removing the sheet of paper 14, an impression such as that shown in Fig. 5 is obtained. A V-shaped gage 17 correctly positioned over an area to be measured illustrates the manner in which the pressure applied to a certain locality of the shoe bottom may be determined. The gage is so calibrated that the greater the distance between the

two sides of the gage, the lower the pressure reading. In use, the gage with its long V-shaped tapering notch is moved over the locality where the pressure is to be determined until the sides of the notch register with the sides of two adjacent impressions and the pressure is read directly from the gage at this point. It is likewise possible to utilize a similar V-shaped gage which is properly calibrated to obtain a pressure reading when the size of one individual impression is to be determined.

Fig. 6 is a chart which supplies another alternative method of ascertaining the amount of pressure applied at a particular point on the shoe bottom. It is merely necessary to match the impressions being tested with squares of the same size on the chart and then read the pressure indicated on the chart.

Thus, it is apparent that the impressions produced by the apparatus of my invention may be employed to ascertain the amount of pressure applied to different portions of a sole in a sole attaching machine, and may be used with definite results even when the bottoms of the shoes treated have bottoms of widely varying contours. It has long been desired to be able to ascertain the pressures applied to different portions of the bottom of the shoe by sole attaching machines and the present apparatus solves that problem.

Having thus described my invention, what is claimed is:

1. In a sole pressing machine, a pad, means for applying pressure between a shoe and the pad, a sheet of resilient material having a surface with a plurality of distortable printing elements and a transfer sheet, both of said sheets being located between the pad and the shoe bottom, whereby the application of pressure produces impressions on record sheet means which impressions indicate by their size and location the amount and distribution of pressure applied to the shoe.

2. In a sole pressing machine, a yieldable sole pressing pad, means for applying pressure between a shoe and the pad, a sheet of flexible material having a surface substantially covered with uniformly distributed projections which diminish in size from the sheet outward and a transfer sheet, both of said sheets being positioned between the pad and the shoe bottom, whereby the increase in pressure produces proportional increase in the area of the impression transferred to record sheet means, thus indicating the location and amount of pressure applied.

3. In a sole pressing machine, a yieldable sole pressing pad, means for applying pressure between a shoe and the pad, and located between the shoe and the pad, a flexible, pyramid-studded rubber mat increasingly distortable in response to increased pressure and an inked ribbon, whereby upon application of pressure the amount and distribution of pressure is indicated on record sheet means by the relative size and location of the impressions transferred by the inked ribbon to the record sheet means.

4. In a sole pressing machine, a yielding pad, abutments for the shoe, means for moving the pad and abutments relatively to apply pressure to a shoe located between them, a transfer sheet and a flexible sheet of resilient material having on the face next to the transfer sheet a multiplicity of uniform projections evenly distributed over the sheet, each projection diminishing in size from the sheet outward, said sheets being located between the sole of the shoe and the pad, whereby upon application of sole attaching pressure to the shoe the size of the impression transferred to record sheet means by each projection will indicate the amount of pressure applied to the shoe in the locality of the projection.

JOSEPH C. ROPER, JR.

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