

1,066,447.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

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STRENGTH-TESTING MACHINE.

1,066,447.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, FRED P. CLEVELAND, a citizen of the United States of America, and resident of Holyoke, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Strength-Testing Machines, of which the following is a full, clear, and exact description.

This invention relates to a machine or apparatus for testing and determining the strain under which sheet material, such, for instance, as leather, cloth or the like, when subjected to a pulling strain from an incision or perforation thereunder, will become torn from the slit out to the margin.

In testing sheet material like patent leather, or other leathers, the practice has been that of slitting with a knife through the sheet, near the margin, and, inserting the forefinger through the slit, pulling on the material until the same becomes torn out from the slit to the edge,—reliance being placed for the determination of the strength of the material upon the expertness and judgment of the person testing.

The object of the present invention is to provide means for clamping the sheet material at one point, permitting a marginal portion thereof to overlap relatively to a carriage or slidable member, coöperative with which is a tool which not only makes an incision through the material but remains in engagement therewith and constitutes a pulling element as an appurtenance of the carriage,—together with means for imparting a sliding movement to the carriage, and a pressure gage for indicating the degree of force necessarily exerted by the carriage moving means for effecting the tearing through to the edge of the sheet material penetrated by the said tool.

The invention is described in conjunction with the accompanying drawings and set forth in the claims.

In the drawings:—Figure 1 is a sectional elevation substantially centrally through the improved machine. Fig. 2 is an enlarged partial section, vertically, of the slidable carriage having a gage and an incising tool in coöperative relations thereto. Fig. 3 is a cross sectional view of a part of the machine as taken on line 3—3, Fig. 1. Figs. 4 and 5 are plan views showing the

gage and a marginal portion of the sheet material being tested, together with the incising tool, and representing conditions before and after the making of the test.

In the drawings, A represents the body or stationary base of the apparatus having a cylindrical bore B extending longitudinally and horizontally therein.

a and *b* represent annular bushing plugs screw engaged in the ends of the bored base; and within the bore are pistons C and D, provided with suitable cup leathers or hydraulic packing, and arranged in suitable separation to give space for occupancy between them of a body *x* of liquid, such as glycerin. The piston C as to a portion of its length is made tubular and internally screw threaded and receives engagement therewithin of the threaded inner end portion of a screw shaft F which is rotatably fitted through the annular bushing plug *a*, but rendered endwise immovable by the abutment of the shoulders *g g*². The said shaft F is provided with a hand wheel G for conveniently turning it and securing thereby an endwise forcing movement of the piston C against the body of liquid. The other piston D has a stem or extension D² longitudinally extended to the exterior of the end portion of the base support and provided with a knob or shoulder *i*, which in conjunction with the bracket arm *h* forms a means by which with uniformity the piston D may normally and determinatively be positioned at its datum or starting position.

On the top and at or toward one end of the base support A is a clamp, here shown as comprising a standard *j* of goose neck form having the lower clamping member *j*² and the screw operated upper clamping member *j*³,—no particular invention being comprised in the details of the clamping device,—it being sufficient to state thereof that a roll of leather *y* or other sheet material may be disposed in the space partially encircled by the goose neck standard, with more or less of the material toward one edge thereof drawn horizontally between the upper and lower clamp members *j*³, *j*², to an overlapping relation to the carriage J, and that the portion between said clamp members may be confined in a fixed position thereby.

The "carriage," as herein termed, is made

in the form of a skeletonized block which is slidable longitudinally on the top of the supporting base at or near the end portion thereof opposite from the position of the fixed clamp. The carriage is made with a comparatively large opening k intermediately therein, and it comprises upper and lower separated portions k^2 k^3 , separated by a space k^4 which leads from its end toward the fixed clamp to the larger opening k in the carriage. The said separated upper and lower portions k^2 , k^3 , of the carriage, have vertically alined openings m , m^2 , intersecting the horizontal opening. These alined vertical openings are transversely elongated and receive the engagement therein of the incising tool L. The incising tool is made with a comparatively wide blade-shaped lower portion n , a narrowed neck n^2 above the blade portion, and a handle provided shank n^3 above the neck,—such tool as here represented, though not necessarily so, being separable from the carriage and is utilized manually.

The carriage J has an adjustable block o within the larger opening k therein to make a gaging abutment for the marginal portion of the sheet material brought through the horizontal opening k^4 , the same having a threaded stem o^2 extending through a longitudinally elongated slot o^3 in the top of the carriage and receiving the confining thumb nut o^4 thereon. The carriage has a longitudinal extension arm or bar J^2 which has a connection with the collar J^3 fastened on the piston rod or extension D^2 .

From the space in the bore B between the pistons C and D, a passage f rearwardly and upwardly leads to which is connected a conduit or pipe-like member f^2 of a fluid pressure gage E, the character, manner of connection and mode of operation of which may be the same as that fully and clearly described and shown in Letters Patent of the United States granted to John L. Perkins, June 8, 1909, Number 924,579.

In the use of the present machine, the sheet material is positioned as shown in Fig. 1, held clamped between the members j^2 and j^3 and marginally overlapped through the opening k^4 relatively to the carriage J; the incising tool is then guided and engaged through the alined openings m , m^2 , making the incision as represented at w , Fig. 4, through the sheet material at the suitable distance from its edge as predetermined or standardized by the gage abutment o . The incising tool has now become an appurtenance of the carriage, and constitutes a member thereof operative for the exertion, under the endwise sliding movement of the carriage in a direction away from the fixed clamp, of a pulling strain on the leather or other sheet material for securing its breaking through from the slit or incision to the

edge in the manner more or less nearly as represented in Fig. 5. The movement of the carriage J is imparted through the rotation of the hand wheel G which endwise moves the piston C, and through the medium of the liquid interposed between such piston and the one D, causes the movement of the latter piston and the carriage therewith connected.

The pressure to which the liquid,—some of which is displaced transversely and is operative on the pressure gage E,—is subjected during and at the termination of the action of tearing the material from the incision through to the edge, is indicated or registered on the pressure gage in substantially the same manner as shown in the stretch testing machine described in the J. L. Perkins patent above mentioned.

For making "tearing out" tests on leather, skin, or other sheet material by the employment of a machine substantially as described, it becomes easy not only to make what may be termed standardized incisions, that is those having the same length and shape in all pieces, but to assure a standardized positioning of the incisions in the marginal portions of the materials being tested. The distance from the edge of the material in which the slits or perforations are made may be as predetermined by the setting of the abutment gage o .

The incising tool although here represented as separable from the carriage, may, if desired, be included as a permanent part of the organized machine.

The carriage J is represented as detachably connected with the collar J^3 of the piston extension D^2 so that this part, as occasion requires, may be interchanged on the Perkins strength testing machine hereinabove referred to for the second and movable clamp which forms a component of the machine to be employed for the other character of sheet material testing.

I claim:—

1. In a strength testing machine, in combination, a support having a clamp mounted in a fixed position thereon, for the confinement of sheet material, a carriage slidable on the support and relatively to which an edge portion of the sheet material may be disposed, a device engageable with the carriage and for penetration of an edge portion of the sheet material disposed relatively to the carriage, means for imparting a sliding movement to the carriage, a pressure gage, and means operable by the carriage sliding means and coöperative with said gage, for indicating the degree of force exerted by the carriage sliding means for effecting a rupture of the sheet material penetrated by the carriage engaging member.

2. In a strength testing machine, in combination, a support having a clamp mounted in a fixed position thereon for the confine-

ment of sheet material, a carriage slidable on the support having separated portions between which a marginal portion of the sheet material may be disposed, said separated portions having a guideway for the engagement therein of a sheet material penetrating tool, a material penetrating tool engageable in said guideway, means for imparting a sliding movement to the carriage, a pressure gage and means operable by the carriage sliding means and cooperative with said gage, for indicating the degree of force exerted on the carriage for the rupture of the material penetrated by said tool.

3. In a strength testing machine, in combination, a support having a clamp mounted in a fixed position thereon for the confinement of sheet material, a carriage slidable on the support having separated portions between which a marginal portion of the sheet material may be disposed, said separated portions having a guideway for the engagement therein of a sheet material penetrating tool, a tool engageable in said guideway, means for imparting a sliding movement to the carriage, and means operable by the carriage sliding means and cooperative with said gage, a pressure gage for indicating the degree of force exerted on the carriage for the rupture of the material penetrated by said tool, and an abutment member provided on the carriage for gaging the distance from the edge of the sheet material of its penetration by said tool.

4. In a strength testing machine, in combination, a base support having a cylindrical horizontal longitudinally extending liquid containing bore therein, a piston in the bore at one end of the contained liquid and means for moving it, another movable piston in the bore at the other end of the contained liquid having an extension projecting to the exterior of the base support, a clamp mounted in a fixed position on the base support, for the confinement of sheet material, a carriage having a connection with the extension of the second piston, slidable on the support and relatively to which an edge portion of the sheet material may be disposed, a device engageable with the carriage and for penetration of an edge portion of the sheet material disposed relatively to the carriage, a pressure gage, and a conduit leading from the liquid containing bore to connection with, and for operating, the pressure gage.

5. In a strength testing machine, in combination, a base support having a clamp mounted in a fixed position thereon for the confinement of sheet material, a carriage slidable on the support having upper and lower portions thereof in separation with the longitudinally extending space between them opening toward the fixed clamp, said separated portions having vertically aligned openings therein, a sheet material incising

tool adapted for insertion through said vertical openings and to have a portion thereof extend across said horizontally extending space, means for imparting a sliding movement to the carriage, a pressure gage, and means operable by the carriage sliding means and cooperative with said gage, for indicating the degree of force exerted on the carriage for the tearing rupture of the material penetrated by said tool.

6. In a strength testing machine, in combination, a base support having a clamp mounted in a fixed position thereon for the confinement of sheet material, a carriage slidable on the support having upper and lower portions thereof in separation with the horizontally extending space between them opening toward the fixed clamp, said separated portions having vertically aligned openings therein, a sheet material incising tool adapted for insertion through said vertical openings and to have a portion thereof extend across said horizontally extending space, an adjustable gage abutment provided on the carriage for determining the extent of overlapping of the sheet material, relatively to the carriage, means for imparting a sliding movement to the carriage, and a pressure gage for indicating the degree of force exerted on the carriage for the tearing rupture of the material penetrated by said tool.

7. In a strength testing machine, in combination, a base support having a clamp mounted in a fixed position thereon for the confinement of sheet material, a carriage slidable on the support having upper and lower portions thereof in separation with the horizontally extending space between them opening toward the fixed clamp, said separated portions having vertically aligned openings therein, a sheet material incising tool adapted for insertion through said vertical openings and to have a portion thereof extend across said horizontally extending space, constructed with a comparatively wide blade shaped lower portion, a narrowed neck above the blade portion, and a handle above the neck, means for imparting a sliding movement to the carriage, and a pressure gage for indicating the degree of force exerted on the carriage for the tearing rupture of the material penetrated by said tool.

8. In a strength testing machine, in combination, a base support having a stationary goose neck standard mounted thereon, provided with a base extension to constitute a lower clamping member and having a movable clamping member operatively supported through the head of such standard, the space within the goose neck standard being adapted for the accommodation of a roll of sheet material, a portion of which may be passed between the clamping members, a

carriage slidable on the base support and relatively to which an edge portion of the sheet material may have an overlapping disposition, an incising tool appurtenant to the carriage and for penetration of an edge portion of said sheet material, means for imparting a sliding movement to the carriage, and a pressure gage for indicating the

degree of force exerted by the carriage sliding means.

Signed by me at Holyoke, Mass., in presence of two subscribing witnesses.

FRED P. CLEVELAND.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."