

Nov. 20, 1962

L. G. EHMANN
PRESS

3,064,706

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2 Sheets-Sheet 1

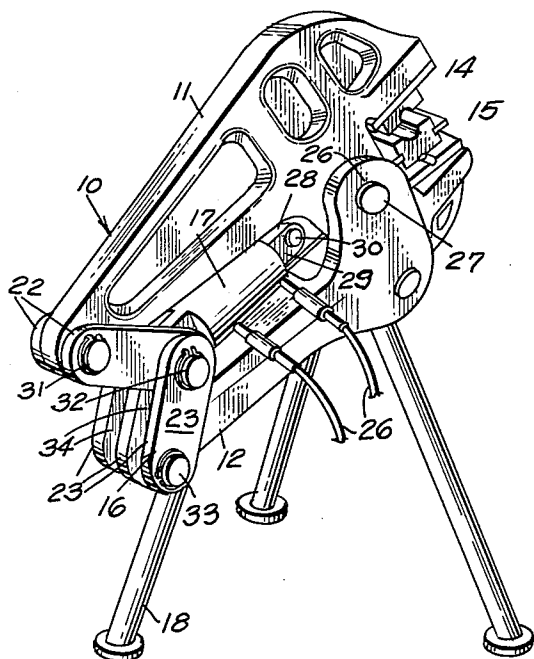


FIG. 1

FIG. 2

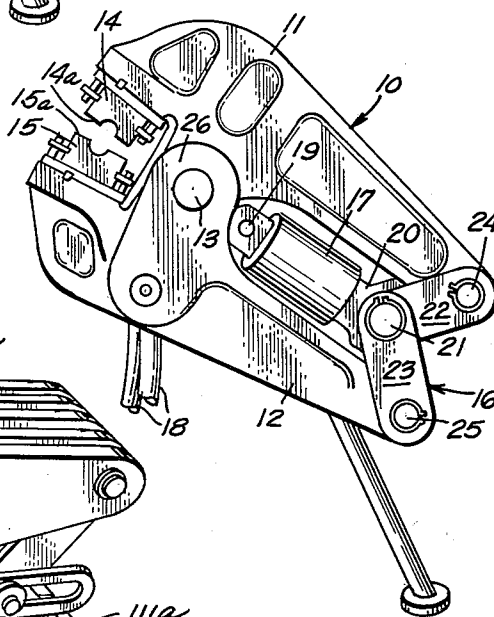
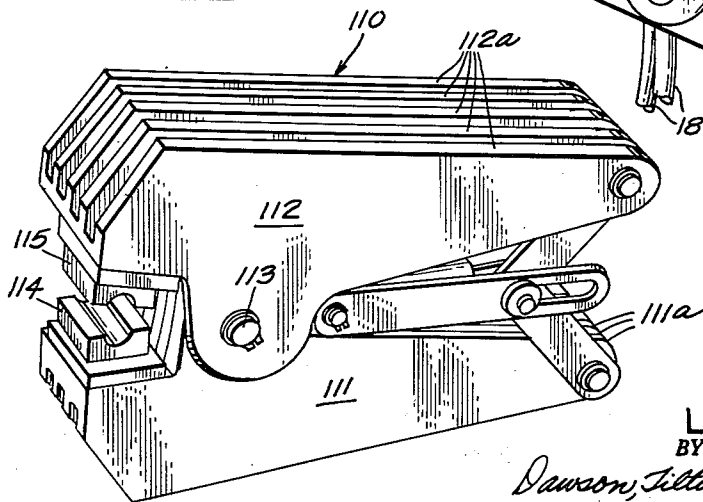


FIG. 3



INVENTOR.

LESLIE G. EHMANN

BY

Dawson, Tilton, Fallon & Ljungman

ATTORNEYS

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L. G. EHMANN

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FIG. 4

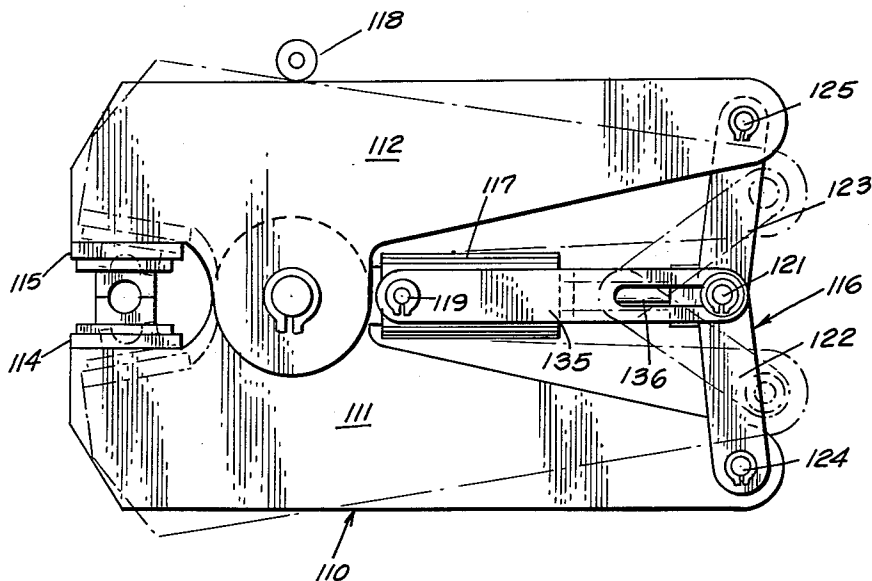


FIG. 5

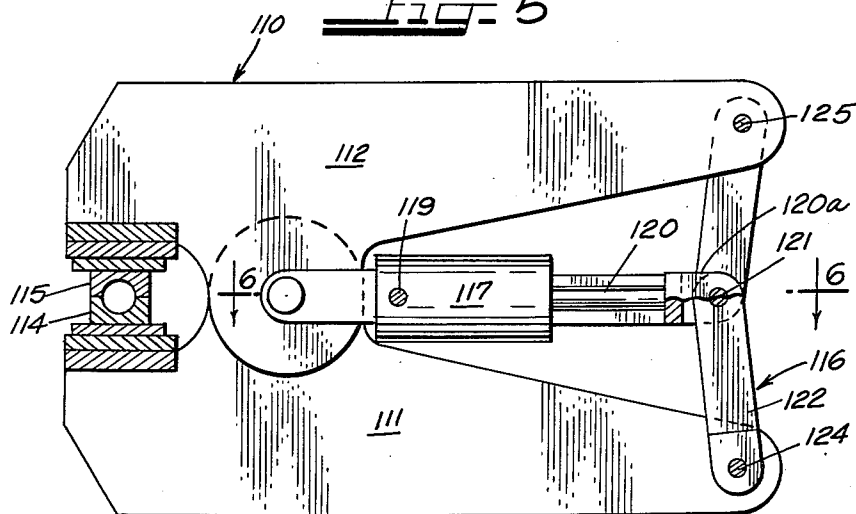
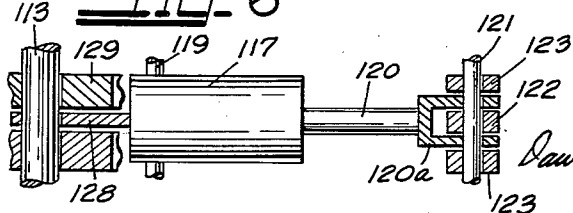


FIG. 6



INVENTOR.

LESLIE G. EHMANN

BY

Dawson, Tilton, Fallon & Livingston

ATTORNEYS.

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PRESS

Leslie G. Ehmann, Portland, Oreg., assignor to Esco Corporation, Portland, Oreg., a corporation of Oregon

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3 Claims. (Cl. 153—1)

This invention relates to a press and, more particularly, to a press adapted to swage sleeves and like fittings on wire rope.

The instant invention constitutes an improvement over the press shown in my prior Patent No. 2,908,217, issued October 13, 1959.

In swaging a fitting upon a wire rope, it is imperative that the loading be uniform, otherwise an unequally stressed composite structure will result. Where the wire rope is employed for hauling, as in a lumbering operation, premature failure at the swaged junction might not only be damaging to material and equipment but be dangerous to the personnel carrying on the operation, the wire rope lashing about if the sleeve joint fails. Here, it is to be appreciated that two of the conventional usages for swaged sleeves on wire ropes are for the provision of an end ferrule which is mounted in a choker hook, or the like, or for the formation of an eye-splice. An example of an eye-splice can be seen in my Patent No. 2,895,195, while a choker hook can be seen in my Patent No. 2,872,716.

The problem in all of the swaging operations is to deform a member by swaging so that after deformation it is uniformly stressed. To achieve this, it is necessary that the press structure responsible for the swaging be characterized by a substantial absence of deflection, or, if deflection occurs, that it is uniform insofar as the swage-providing portions are concerned. This problem can be solved in a large size press, as seen in my above-mentioned Patent No. 2,908,217. However, the problem of deflection becomes aggravated as the size of the press decreases. A small size press can be advantageously used in the field for the repair and replacement of fittings. Heretofore, such a press has not been available, especially one adapted to provide uniformly stressed fittings. The problem has been one of reconciling the need for compactness without sacrificing member strength so as to avoid undesirable deflection, especially in the die area which would necessarily be transferred to the sleeves or ferrules and inherently weaken them. In the large size press, the problem is different since extra material for reinforcement against undesirable deflection could be used generously, compactness not being a consideration. The small scale press is not only advantageous because of its consequent portability, but can be further advantageous if the physical dimensions are such as would permit the press to enter and clear the manhole openings in mines, especially where underground repair of cable is preferred to bring such lines above the ground for the necessary work.

It is, therefore, a general object of this invention to provide a novel press, especially one adapted to swage fittings on wire rope, and the like. Another object is to provide a press characterized by compactness, yet arranged so as to resist undesirable non-uniform deflection across the face of the die as well as between the die and the operating arm. Still another object is to provide a press for the swaging of wire rope fittings, and the like, in which two work or lever arms are pivotally interconnected intermediate their ends, corresponding ends of the arms being equipped with die means, while the other ends are interconnected through a toggle and fluid pressure cylinder network, the arms being so sized and the pivots being so arranged as to provide a com-

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pact press, yet one which is capable of uniform swaging.

Yet another object is to provide a press adapted to swage fittings on wire rope by means of confronting die components actuated by a toggle linkage through a pair of work arms, the movement of the toggle linkage being restrained by novel linkage means which becomes tensionally stressed as the confronting faces approach each other during the swaging operation.

10 A further object is to provide a swaging press which includes work arms equipped at corresponding ends with confronting die means, the ends being brought together by means of a fluid cylinder-actuated toggle system pivotally interconnected with the arms, the arms being slotted or laminated at least in the area of the pivotal connection so as to develop a "multiple shear" phenomenon on the various pivots to uniformize any deflection and thus achieve the production of a uniformly swaged fitting.

20 Other objects and advantages of the invention may be seen in the details of construction and operation set forth herein.

The invention will be explained in conjunction with the accompanying drawing, in which—

25 FIG. 1 is a perspective view of a press embodying teachings of this invention;

FIG. 2 is a fragmentary side elevational view of the press seen in FIG. 1;

30 FIG. 3 is a perspective view of a modified form of press and which also follows the teachings of this invention;

FIG. 4 is an elevational view, partially in section, of the press of FIG. 3 and which features the press in two operating positions, one of which is shown in phantom line;

35 FIG. 5 is a view similar to FIG. 4 but being partially in section; and

40 FIG. 6 is a fragmentary sectional view taken along the line 6—6 of FIG. 5.

In the illustration given in FIGS. 1 and 2, the numeral 10 designates generally a press which is adapted to swage fittings for wire rope and the like. The press 10 includes work or lever arms 11 and 12 which are pivotally connected together intermediate their ends as at 13. The arms 11 and 12 are equipped with die components 14 and 15 respectively at corresponding ends and these ends are brought together through the operation of a toggle system or linkage generally designated 16, the movement of which is induced by means of a hydraulic cylinder 17. If desired, the press 10 may conveniently be supported by means of legs 18.

45 The hydraulic cylinder and piston rod unit 17 is pivotally mounted as at 19 upon the arm 12 and the piston rod 20 thereof is pivotally interconnected as at 21 to the two toggle links 22 and 23. In turn, the toggle links 22 and 23 are pivotally connected to arms 11 and 12, respectively, by means of pivots 24 and 25.

50 A pressurized fluid may be conveniently introduced into the cylinder 17 through the conduit lines 26 (seen only in FIG. 1) and when this occurs, the piston rod 20 is extended so as to increase the angle between the toggle links 22 and 23. This necessarily results in bringing the die components 14 and 15 into abutting relation, i.e., where the confronting faces 14a and 15a thereof, approach a contacting relation.

55 In the embodiment seen in FIGS. 1 and 2, it will be noted that the pivots 21, 19 and 13 are colinear, irrespective of the disposition of the toggle linkage 16. Further, when the faces 14a and 15a are in contacting relation, these faces are also colinear with the just-mentioned pivots 13, 19 and 21. Also, the arms 11 and 12 are equal

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in length, i.e., the dimensions between the dies 14 and 15 and the pivots 24 and 25. Still further, the toggle links 22 and 23 are of substantially equal length between the pivots 21 and 24, and 21 and 25.

In the illustration given, the arm 12 is equipped with laterally projecting integral lug portions 26 which are apertured for the receipt of transversely extending pins 27 forming the pivot 13. The arm 11 is somewhat thinner than the arm 12 and is disposed between the lug portions 26, being suitably apertured for the rotatable receipt of the pin 27. On the side of the pivot 13 remote from the die component 15, the arm 12 is equipped with a longitudinally-extending lug 28, on which a clevis 29 integrated with the cylinder 17 is pivotally mounted by means of the pivot pin 30, thereby providing the above-mentioned pivot 19.

The arm 11 at the end thereof remote from the die-carrying end, is equipped with the pivot 24 provided through the rotatable receipt of a transversely disposed pin 31. Rotatably mounted on the pin 31 are a pair of linkage elements 22. As described above, these linkage elements 22 are pivotally connected together and to the piston rod 20 of the cylinder 17 by means of the pivot 21.

As best seen in FIG. 3, an additional link 135 is provided extending between the pivot 119 and the pivot 121, the link 135 being slotted as at 136 for the sliding receipt of the pivot 121. As the arms 111 and 112 diverge at the toggle end, i.e., when the die components 114 and 115 come together, the link 135 is placed in tension and serves as a limit for the degree to which the die components 114 and 115 can be placed in compression.

As can also be seen clearly from FIG. 3, the arms 111 and 112 are essentially laminar in their construction, comprising a plurality of webs which are united only at the portions 111a and 112a immediately adjacent the die components 114 and 115. Thus, at each pivot, 113, 119, 124 and 125, the arms engage the associated pivot pins at a plurality of spaced-apart points, developing an advantageous multiple shear on the various pivot pins.

In the inventive press, the stresses are all self-contained, i.e., the press operates equally well in any position without depending upon any special supports, external members, etc. As shown, however, the lower lever arm may be the wider arm to provide additional stability as where the pivotal connection is made of several ears and matching grooves oriented in symmetrical arrangement.

While, in the foregoing specification, I have set forth a detailed description of an embodiment of the invention for the purpose of explanation thereof, many variations in the details herein given will be appreciated by those skilled in the art without departing from the spirit and scope of the invention.

I claim:

1. A swaging press comprising a pair of elongated arms, a pivot interconnecting said arms intermediate their ends, each of said arms being equipped with a plurality of longitudinally elongated slots to provide transversely spaced bearing portions engaging said pivot, a face-equipped die on each arm at corresponding ends adapted to mate in a swaging operation, a cylinder and piston rod unit, a second pivot interconnecting one of said arms and

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said unit, a two element toggle system, a third pivot interconnecting said two elements and said unit, fourth and fifth pivots interconnecting said elements with said arms, the axes of all of said pivots being disposed in parallel relation, and restraining means extending between said second and third pivots operative to be stressed in tension as said die means approach mating position, said arms being equipped with slots extending normal to said pivot axes about said first, fourth and fifth pivots, said arms being substantially identically dimensioned relative to said die means and said first, fourth and fifth pivots, whereby the mated die faces and the axes of said first, second and third pivots all lie in the same plane.

2. In a press for the swaging of wire rope sleeves, and the like, first and second elongated lever arms, each of said arms being equipped with a transverse opening adapted to receive a pivot rod, with at least one arm being equipped with a longitudinally-extending slot intersecting its opening, the opening-equipped portion of the other arm being received in said slot with the arm openings aligned, a pivot rod extending through said aligned openings and pivotally interconnecting said arms, face-equipped dies at corresponding ends of said arms adapted to have the faces thereof brought into adjacent confronting relation in a swaging operation, said arms being substantially identically dimensioned between said pivot rod and dies, the end of each arm opposite the die-equipped end being equipped with a second pivot rod opening, a pivot rod at each second opening, said arms being substantially identically dimensioned between said openings and the first-mentioned pivot rod, a plurality of substantially identical toggle links mounted in one end thereof on each of said second opening pivot rods and extending toward the arm other than the one on which said links are mounted, said links each being equipped with a pivot rod opening in the other end thereof, a third pivot rod interconnecting the other ends of all of said links, a cylinder and piston rod unit pivotally connected at one end to one of said arms adjacent said first-mentioned pivot rod and at the other end to said third pivot rod, said faces, when in contacting relation, defining a plane with said first-mentioned and third pivot rods and the pivotal mounting of said cylinder and piston rod unit all having axes lying in said plane, the axis of said third pivot rod at all times being between the line joining the axes of the second opening pivot rods and said first mentioned pivot rod.

3. The structure of claim 2 in which each of said arms is equipped with a plurality of longitudinally-extending slots extending from a point adjacent to but spaced from the die-equipped ends, whereby said first-mentioned pivot rod and said second-mentioned pivot rods contact each arm at a plurality of transversely spaced-apart portions.

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