Aug. 17, 1937. C. F. SCHNUCK 2,090,377

VULCANIZING PRESS FOR RUBBER BELTS OR THE LIKE

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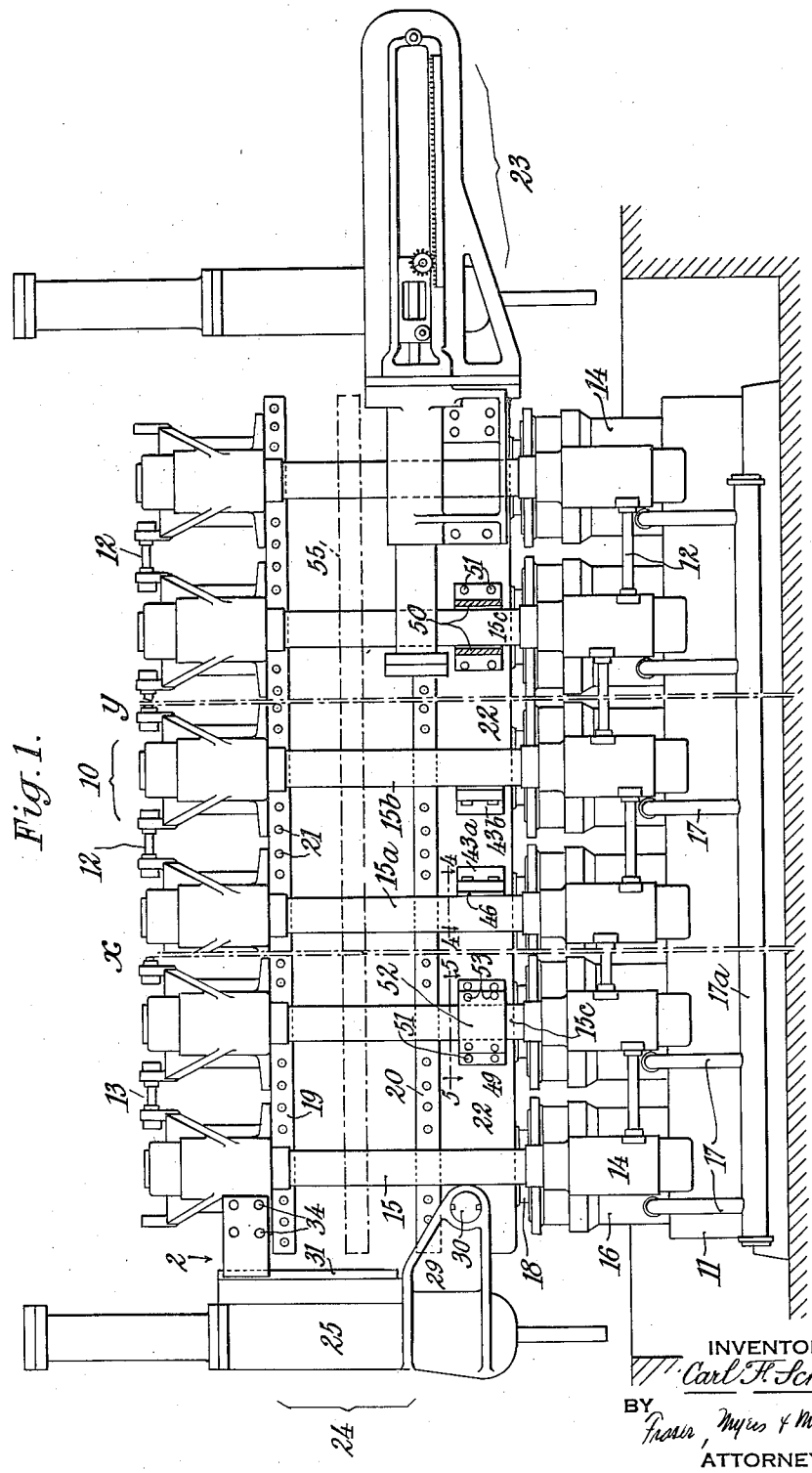


Fig. 1.

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Fig. 2.

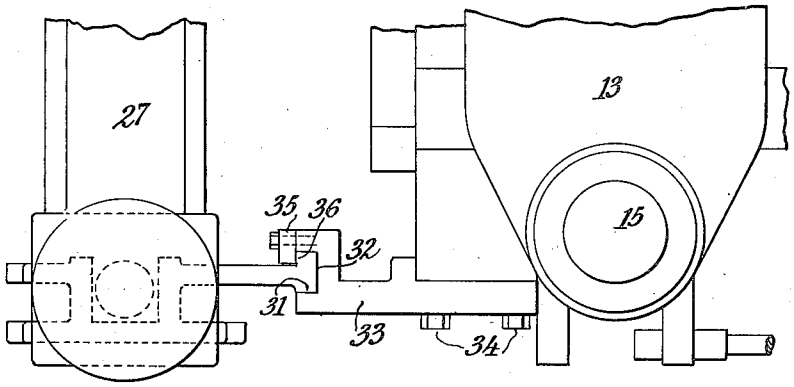


Fig. 3.

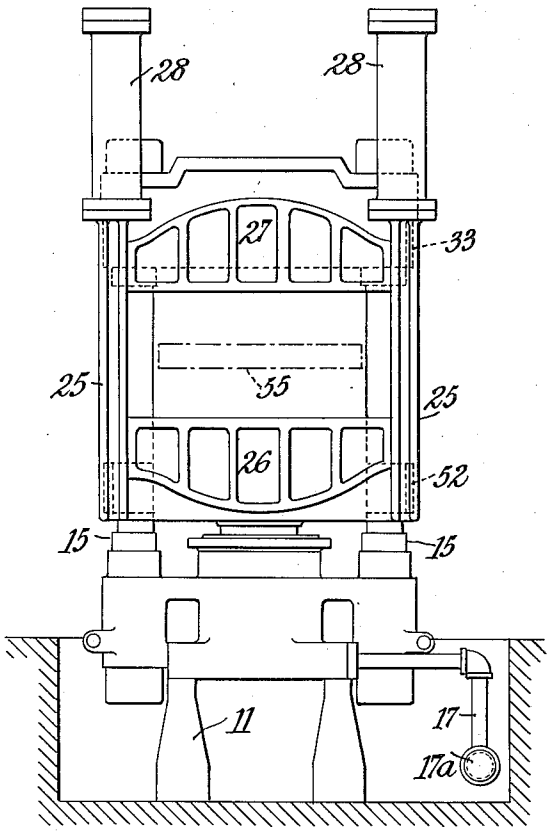


Fig. 5.

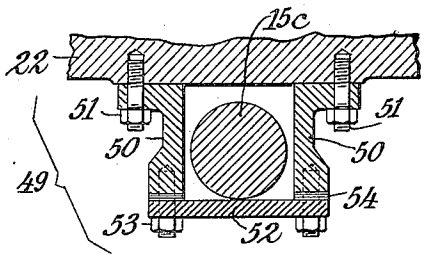


Fig. 4.

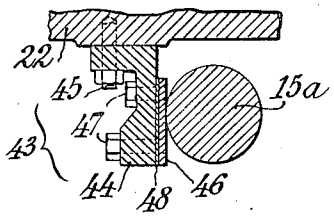


Fig. 6.

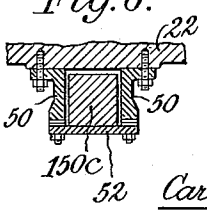
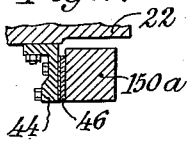


Fig. 7.



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VULCANIZING PRESS FOR RUBBER BELTS OR THE LIKE

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Application February 16, 1937, Serial No. 125,945

13 Claims. (Cl. 18—17)

This invention relates to presses of the general type wherein a rubberized belt, or similar rubber treated fabric, may be heated while under both tensile and compressive stresses so as to effect a complete and uniform vulcanization thereof; and in its more particular aspects, to a clamping frame adapted to engage one end of such a belt so as to oppose the pull exerted by an appropriate stretcher engaging the other end thereof.

The general object of the invention is to provide for the attachment of the clamping frame to the press in such fashion that the forces imposed on the latter by the stretching of the belt will be divided substantially equally between two general lines of support; and to provide a novel guiding means for keeping the movable parts of the press, including such clamping frame, properly aligned at all times.

The full nature of the invention, together with other objects and various advantages thereof, will be more apparent from the following description taken in connection with the accompanying drawings in which—

Figure 1 is a side elevational view of a press, and of a clamping frame attached thereto and guided in accordance with my invention.

Fig. 2 is a sectional plan view of a fragment of the press of Fig. 1, taken on the line 2—2 thereof.

Fig. 3 is an elevational view of the press of Fig. 1 looking toward that end to which the clamping frame is attached.

Figs. 4 and 5 are fragmentary sectional views taken on the lines 4—4 and 5—5, respectively, of Fig. 1.

Figs. 6 and 7 are similar fragmentary sectional views illustrating the application of the guiding means to a press having tie rods of polygonal cross-section.

A press of the type to which the present invention is applicable is generally a very large and cumbersome structure, and usually is very long as compared to its width. The manufacture of such presses is something in the nature of a custom job rather than a production one. For these reasons, and others not here pertinent, it is usually, though not necessarily, built up, as illustrated in Fig. 1, from a plurality of substantially identical units 10 mounted in side by side relation upon appropriate supporting girders 11, and each unit is tied to its adjacent one, both at the top and the bottom thereof, by one or more tie bolts 12.

Each such unit comprises a top cross-head 13 and a base cross-head 14 joined together at the opposite sides by a pair of tie rods 15 of circular (as shown) or other desired configuration; and the base cross-head is provided with a cylinder 16 to which fluid may be admitted through a pipe 17 from a manifold 17a, so as to effect a raising of the piston 18 and the steam plates carried thereby.

The composite press, built up from these identical units, may, for purposes of description, be considered to comprise a single top cross-head joined to a single base cross-head by a plurality of tie rods, an upper steam plate 19 carried by the upper cross-head, a lower steam plate carried on a follower 22, the latter in turn being operatively supported by the pistons 18 and being considered for descriptive purposes as a part thereof. This follower 18 is preferably constructed as a single piece extending over all of the pistons, as shown, but if desired, it too may be built up from a plurality of substantially identical units each supported by one or more pistons. In any event, whether of integral or built up character, it will be considered for purposes of description and claiming as a single element supporting the lower steam plate. Both steam plates are cored throughout their length, as indicated at 21, for the circulation of steam or other heated medium so as to provide heated surfaces between which a belt may be pressed and vulcanized.

All of the foregoing is well understood in the art, and further description thereof is deemed unnecessary.

In vulcanizing rubber treated belts or the like, it is highly desirable to stretch the belt at the same time that it is being heated and compressed. This is usually accomplished by clamping one end of the belt in definite relationship to the press, and pulling upon the other end by an appropriate stretcher such as that illustrated at 23 in Fig. 1. For reasons which are readily apparent, both the stretching frame and the clamping frame should be so positioned with respect to the press as to engage the opposite ends of the belt on a line with the steam plates when the latter are in their closed position. Hence, these elements are usually attached to the follower 22 so as to be movable therewith; and it is with this attachment of the clamping frame that the present invention is primarily concerned.

The clamping frame 24, as may be seen in Figs. 1 and 3, comprises a pair of side members 25, a lower cross-beam 26 affixed to the side members, an upper cross-beam 27, and means, such as hydraulic cylinders 28, for moving the latter beam towards the former so as to engage an end of a belt disposed therebetween.

This clamping frame, as a unit, is attached directly to the press as hereinbefore mentioned, and for this purpose it has a pair of angle arms **29** which engage bosses, or a cross-rod **30**, located below the lower steam plate, to provide a pivotal attachment at this point. Each of the side members **25** is provided with a vertically-disposed slideway **31** adapted to engage a channel **32** formed in the outer end of a guide bracket **33**, the latter being bolted or otherwise secured, at **34**, to the top cross-head **13** above the upper steam plate. A gib **35**, bolted to the channel in such fashion as to engage the lip **36** of the slideway, prevents the frame from swinging away from the press when it is not under tension.

With such an arrangement, as may be seen, the frame is perfectly free to move upwardly and downwardly with the follower, thus to maintain the upper surface of the lower crossbeam **26** in the plane of the upper surface of the lower steam plate **20**. Further, however, and more important is the fact that with this arrangement the stress imposed on the frame by the pull of the belt will be divided substantially equally between two spaced lines of support, namely, the bosses **30** and the upper crosshead **13**; and the provision of the pivotal connection permits the frame to adjust itself so that this equal stress distribution will always be achieved.

In view of the sliding relationship between the clamping frame and the top crosshead, it is quite evident that the follower must be carefully guided, both against lateral and longitudinal movement of the frame. For this purpose, a plurality of guide blocks rigidly attached to the follower and slidably engaging the tie rods, are provided; and in order to avoid any interference, by these guide blocks, with the free expansion and contraction of the follower in response to temperature changes, they are divided and arranged in two sets, the first of which is adapted to oppose movement lengthwise of the press and the second set to oppose transverse movement.

Considering the first set, and with reference particularly to Fig. 4, it will be noted that the block generally designated **43** comprises an angle **44** bolted or otherwise secured as at **45** to the side face of the follower **22**, and a plane bearing plate **46** having its bearing surface disposed at right angles to the side surface of the follower. The latter element is removably attached to the angle by bolts **47**, and a shim **48** is interposed therebetween so that clearance between the bearing and the tie rod which it engages may be adjusted.

In the preferred embodiment the first set comprises four such blocks **43**, there being two attached to each of the opposite sides of the follower. By reference to Fig. 1, it will be noted that these blocks are disposed in back to back relationship so that the plane bearing surface of block **43***a* makes line contact with the cylindrical surface of the tie rod **15***a* on one side thereof, while the block **43***b* makes like contact with the cylindrical surface of the adjacent rod **15***b* on the opposite side thereof, so that between the two of them any movement of the follower lengthwise of the press is effectively opposed.

It is further to be noted that these blocks **43** are attached to the follower at or very near its midpoint so that they engage the two middle rods **15**. Accordingly, the end portions of the follower are perfectly free to expand and contract in response to temperature changes without any interference by the guide blocks; and the line contact between the plane bearing surface and the cylindrical rod surface permits free lateral expansion and contraction of the follower.

The remaining pair of blocks **43**, identical both in construction and arrangement to those above described, are mounted upon the side of the follower opposite to that illustrated in Fig. 1.

One of the blocks **49** of the second set is illustrated in Fig. 5, wherein it may be seen to comprise a pair of angles **50** appropriately bolted as at **51** to the side of the follower **22** and so spaced apart as to leave adequate clearance between the sides of the angle and the tie rod **15***c* disposed therebetween; and a bearing plate **52** bolted at **53** to the ends of the angles, over shims **54**, with its plane inner face disposed substantially parallel to the side surface of the follower and slidably engaging the outer cylindrical surface of the rod **15***c*.

In the preferred arrangement four such blocks are attached to the follower **22** and the point of attachment for each is at or near an end of the latter element. Thus, in Fig. 1 it may be seen that the guides **49** are attached to the follower at such point that the bearing plate may engage the next to the last rod at each end of the press on each side thereof. Here again the plane bearing surface permits constant engagement of the tie rod to prevent sidewise movement of the follower without in any way interfering with the free expansion and contraction of the latter, and this feature is of great importance in the present instance.

Figs. 4 and 5 show the application of the guiding means of the invention to a press having tie rods of circular cross-section. While this is the usual type of construction, the invention may be used with presses having rods of other configuration. Figs. 6 and 7 illustrate the application of guide blocks **43** and **49**, constructed exactly as hereinbefore described, to a press having tie rods **150***a* and **150***c* of polygonal cross-section. Such rods, in certain instances, are to be preferred for they present a great deal larger bearing surface to the guide blocks than do the uniformly round rods of Figs. 4 and 5, and yet they in no way act to oppose free expansion and contraction of the follower. Obviously, if desired, the round rods of Figs. 4 and 5 could be provided with a flat surface for engaging the bearing surface of the guide blocks; and would thus represent a combination of the two sets of Figs. 4–5 and 6–7.

In the illustrative embodiment of the invention it will be noted that the press is broken at two points *x* and *y*, so that only the end units and the middle units **10** of the press are shown. Obviously, any greater or lesser number of units may be interposed to increase or decrease the total length of the press.

If desired, one or more additional steam plates may be inserted between those shown at **19** and **20**. One of these, **52**, is illustrated in Fig. 1.

Since certain changes may be made in the construction and arrangement of the press, all within the abilities of a mechanic skilled in the art, it is intended that the foregoing shall be construed in a descriptive rather than in a limiting sense.

What I claim is:

1. The combination with a belt vulcanizing press, or the like, having a frame with base and top crosshead members joined by side members, upper and lower steam plates disposed within the

frame, and means for moving the lower plate towards the upper one so as to compress a belt therebetween; of a clamping frame having means for engaging an end of a belt disposed between said steam plates, said clamping frame having pivotal connection with the plate moving means, and being slidably engaged with the top cross head of the press.

2. The combination with a belt vulcanizing press, or the like, having base and top crossheads joined by side members, upper and lower steam plates, and means for moving the lower plate towards the upper one so as to compress a belt therebetween; of a clamping frame having means for engaging an end of a belt disposed within the press, pivotal means for attaching said frame to said means for moving the lower steam plate adjacent one end of the press, and guide means fixedly attached to the top crosshead and slidably engaging said frame.

3. The combination with a belt vulcanizing press or the like having a top crosshead, an upper steam plate supported by said crosshead, a lower steam plate, and a vertically disposed piston adapted to support the lower steam plate and to move it towards the upper one whereby to compress a belt therebetween; of a clamping frame comprising upper and lower cross beams, means for moving said beams towards each other so as to engage an end of a belt therebetween, and side members having vertically disposed ways thereon; pivotal means for attaching said side members to said piston below said lower steam plate, and guide brackets fixedly attached to said top cross head above said upper steam plate and slidably engaging the ways of said side members.

4. The combination with a belt vulcanizing press or the like having base and top crossheads, connecting members for said crossheads, upper and lower steam plates, and a vertically disposed piston for moving the lower steam plate towards the upper one so as to compress a belt therebetween; of a clamping frame adjacent one end of the press comprising side members having vertically disposed ways formed thereon, a lower crossbeam fixedly attached to the side members, an upper crossbeam slidably supported by the side members, and means for moving the upper beam towards the lower one so as to engage an end of a belt therebetween; pivot means for attaching the side members to the piston at such a point that the upper surface of the lower crossbeam will lie substantially in the plane of the upper surface of the lower steam plate; and guide brackets fixedly attached to the upper crosshead and having bearing surfaces slidably engaging the ways of the frame at points above the lower surface of the upper crossbeam when the latter is in such position as to engage an end of a belt.

5. The combination with a belt vulcanizing press or the like having top and base crossheads, a plurality of tie rods disposed along the opposite sides of and joining said crossheads, a plurality of cylinders formed in the base crossheads, a piston in each of such cylinders, a follower disposed lengthwise of the press and supported by the pistons, guide means for said follower, an upper steam plate attached to the upper crossheads, and a lower steam plate disposed upon and supported by the follower; of a clamping frame having means for engaging an end of a belt disposed between the plates of the press; and means connecting said press and frame comprising a pivot carried by the follower and engaging the frame, and guide brackets carried by an upper crosshead adapted slidably to engage said frame.

6. The combination with a belt vulcanizing press according to claim 5, further characterized in that the guide means for the follower comprise a first set of guide blocks fixedly attached to the follower substantially midway between the ends of the latter, each such block having a bearing surface disposed at right angles to a side surface of the follower and slidably engaging one of said tie rods so as to oppose movement of the follower only in a direction lengthwise of the press; and a second set of guide blocks affixed to the follower near the ends thereof, each such second block having a bearing surface disposed substantially parallel to the side surface of the follower and slidably engaging an adjacent tie rod so as to oppose movement of the follower only in a direction crosswise of the press.

7. A belt press or the like comprising base and top crossheads, a plurality of tie rods disposed along the opposite sides of and joining said crossheads, a plurality of cylinders formed in the base crossheads, a piston in each cylinder, a follower disposed lengthwise of the press and supported by the pistons; and means for guiding said follower comprising a first set of guide blocks fixedly attached to the follower substantially midway between the ends of the latter, each such block having a bearing surface disposed at right angles to a side surface of the follower and slidably engaging one of said tie rods so as to oppose movement of the follower only in a direction lengthwise of the press; and a second set of guide blocks affixed to the follower near the ends thereof, each such second block having a bearing surface disposed substantially parallel to the side surface of the follower and slidably engaging an adjacent tie rod so as to oppose movement of the follower only in a direction crosswise of the press.

8. A belt press or the like substantially according to claim 7, further characterized in that each of said tie rods are substantially circular in cross section, and each bearing surface of each guide block is substantially plane so as to engage the tie rods only along a line contact.

9. A belt press or the like substantially according to claim 7, further characterized in that the first set includes at least two such blocks affixed to the same side surface of said follower with the bearing surfaces thereof oppositely disposed so as to engage adjacent faces of two of said tie rods.

10. A belt press or the like substantially according to claim 7, further characterized in that the first set includes at least two blocks affixed to the same side of the follower at such points as to lie between two adjacently disposed tie rods, and said blocks are oppositely disposed so that the bearing surface of one block engages one rod so as to oppose movement of the follower lengthwise of the press in one direction only and the other block engages the other rod so as to oppose movement of the follower lengthwise of the press in the other direction only.

11. A belt press or the like comprising a plurality of substantially identical units disposed in side by side relation, each including a base and a top crosshead, a pair of tie rods of circular cross section disposed on opposite sides of the crossheads and connecting them, a cylinder formed in the base crosshead, and a piston disposed within said cylinder; a plurality of tie

bolts connecting adjacent crossheads, a single follower disposed lengthwise of the press and having operative connection with each piston, and means for guiding such follower comprising a first set of guide blocks including a pair of blocks affixed to each side of the follower substantially midway between its ends, each such block having a plane bearing surface extending substantially at right angles from the side of the follower and each pair being oppositely disposed so that the bearing surface of one will slidably engage one tie rod on one side thereof and the bearing surface of the other will engage an adjacent tie rod on the other side thereof, so as to oppose movement of the follower lengthwise of the press, and a second set of guide blocks affixed to the opposite sides of the follower adjacent the opposite ends thereof, each such block having a plane bearing surface disposed substantially parallel to the side of the follower and engaging one adjacent tie rod in such fashion as to oppose movement of the follower crosswise of the press.

12. The combination with a belt vulcanizing press or the like having a frame with base and top crosshead members joined by side members, a steam plate disposed within the frame, and means for supporting and pressing a belt against such plate; of a clamping frame having means for engaging an end of a belt disposed within the press, said clamping frame having pivotal connection with the belt supporting and pressing means and being slidably engaged with the top crosshead of the press.

13. The combination with a belt vulcanizing press or the like having a frame with base and top crosshead members, an upper steam plate disposed within the frame, and means including a lower steam plate for moving towards and pressing a belt against said upper steam plate; of a clamping frame having means for engaging an end of a belt disposed within the press, said clamping frame having pivotal connection with the means including the lower steam plate, and being slidably engaged with the top crosshead of the press.

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