Jan. 29, 1963 V. K. QUARVE ET AL 3,075,346

TRACK PRESS HAVING OPPOSED RAMS AND RETRACTABLE JAW

Filed Feb. 21, 1958 12 Sheets-Sheet 1

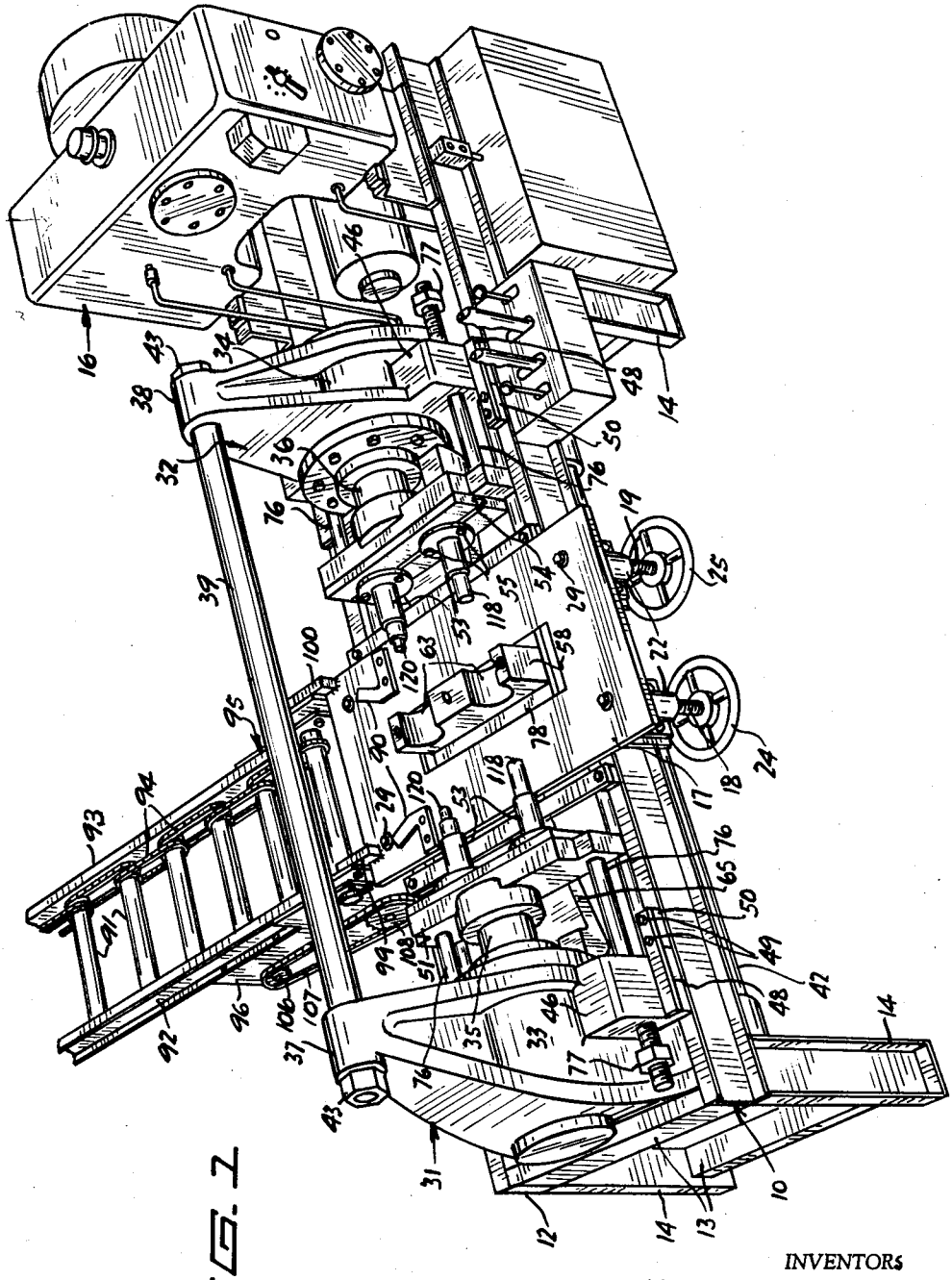


FIG. 1

INVENTORS
VERNON K. QUARVE
BY JOHN L. RODGERS, JR.
Carlson & Hyde
ATTYS.

Jan. 29, 1963 V. K. QUARVE ET AL 3,075,346

TRACK PRESS HAVING OPPOSED RAMS AND RETRACTABLE JAW

Filed Feb. 21, 1958 12 Sheets-Sheet 2

FIG. 2

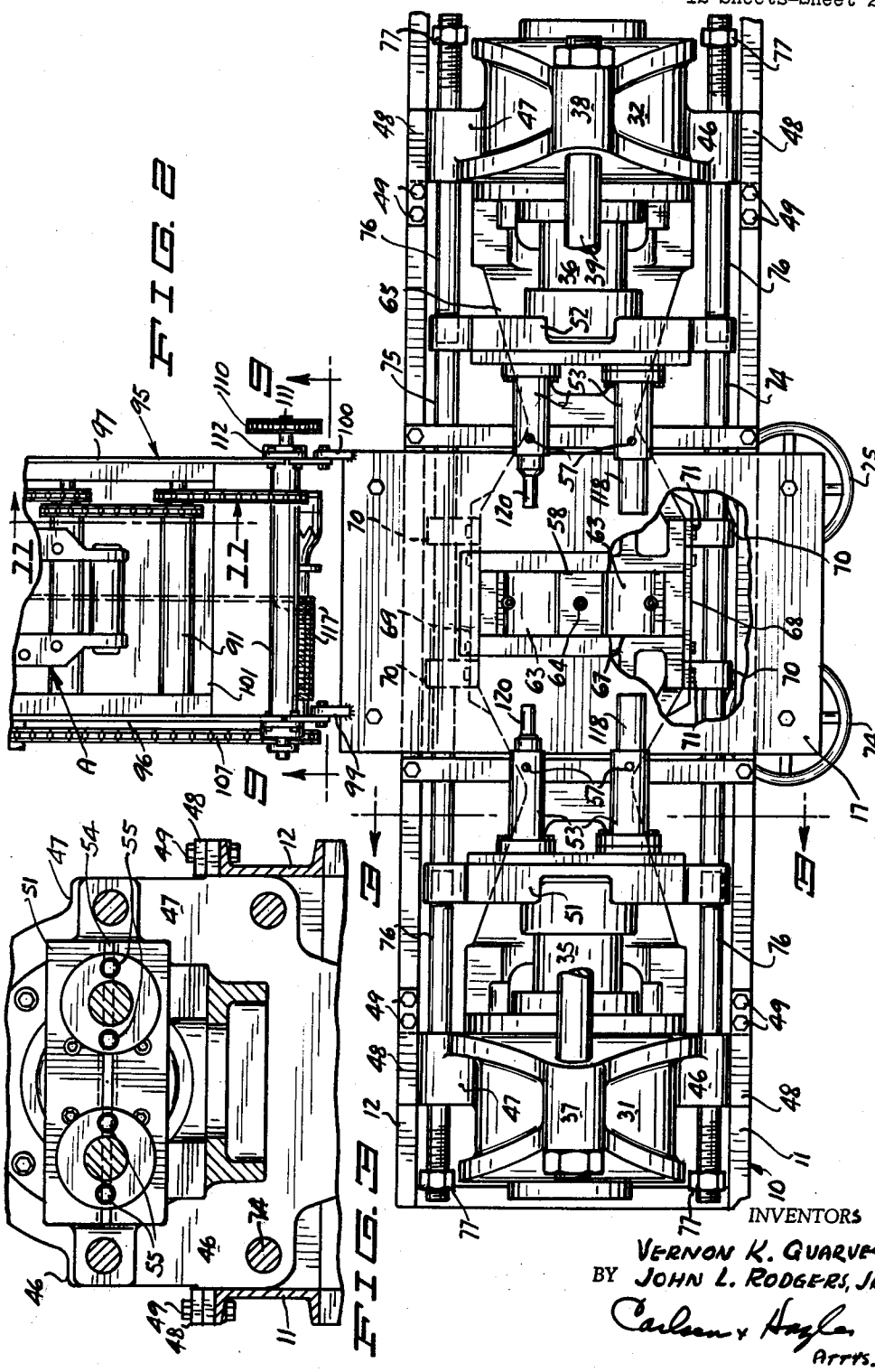


FIG. 3

INVENTORS
VERNON K. QUARVE
BY JOHN L. RODGERS, JR.
Carlson & Hayes
ATTYS.

Jan. 29, 1963 V. K. QUARVE ET AL 3,075,346

TRACK PRESS HAVING OPPOSED RAMS AND RETRACTABLE JAW

Filed Feb. 21, 1958 12 Sheets-Sheet 3

FIG. 4

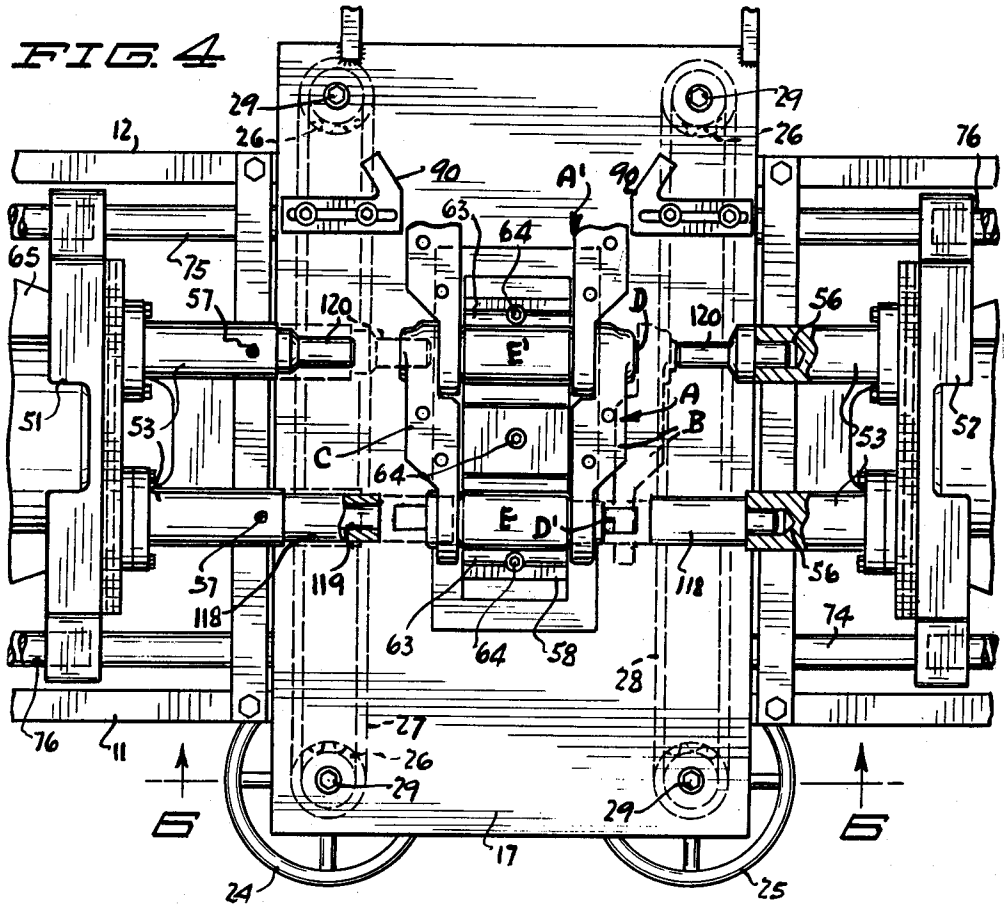
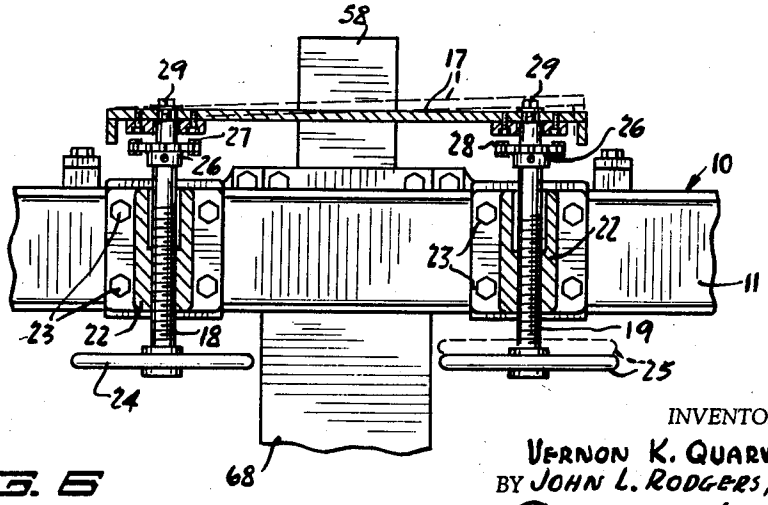


FIG. 6



INVENTORS
VERNON K. QUARVE
BY JOHN L. RODGERS, JR.
Carlson & Hoyle
ATTYS.

Jan. 29, 1963 V. K. QUARVE ET AL 3,075,346

TRACK PRESS HAVING OPPOSED RAMS AND RETRACTABLE JAW

Filed Feb. 21, 1958 12 Sheets-Sheet 4

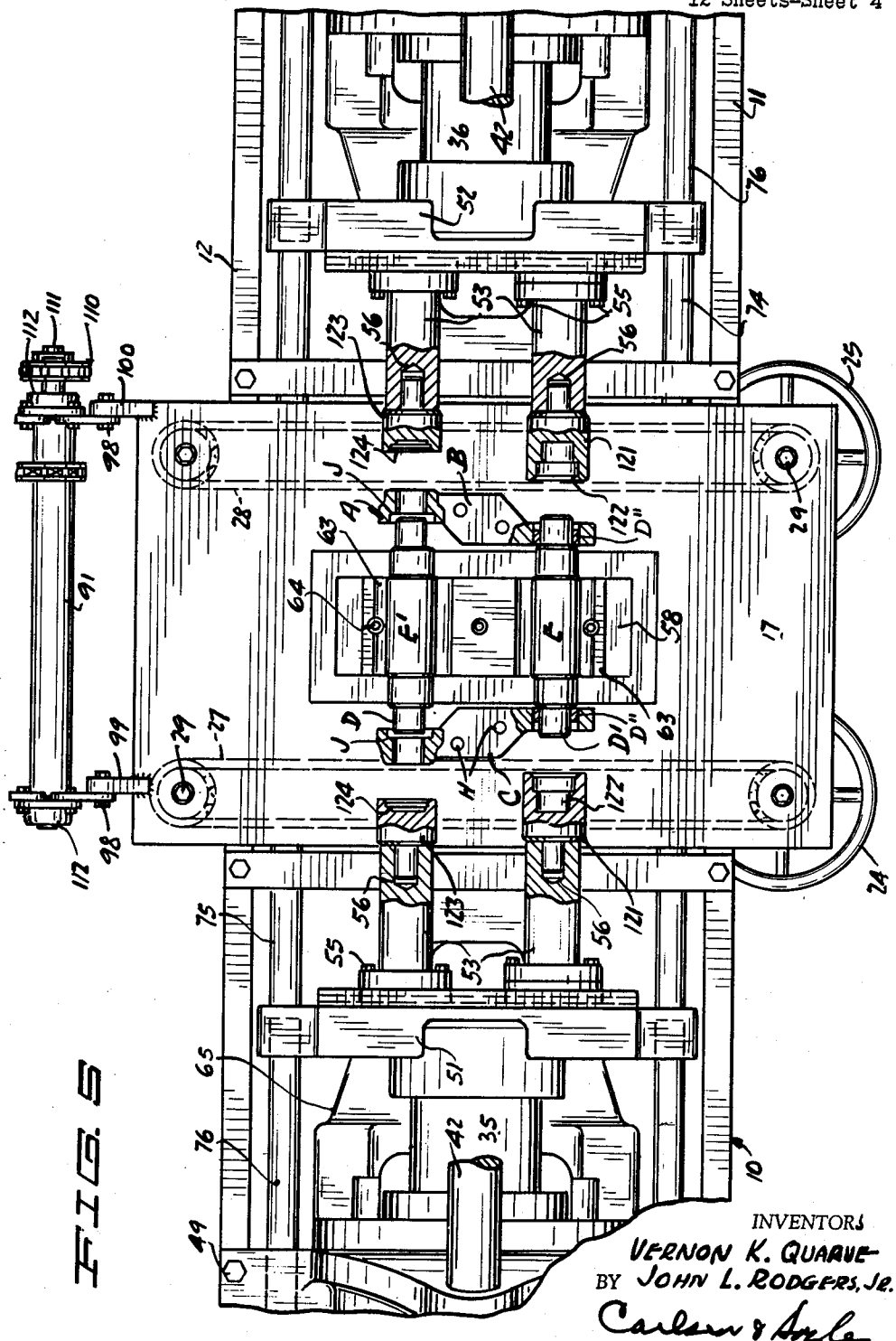


FIG. 5

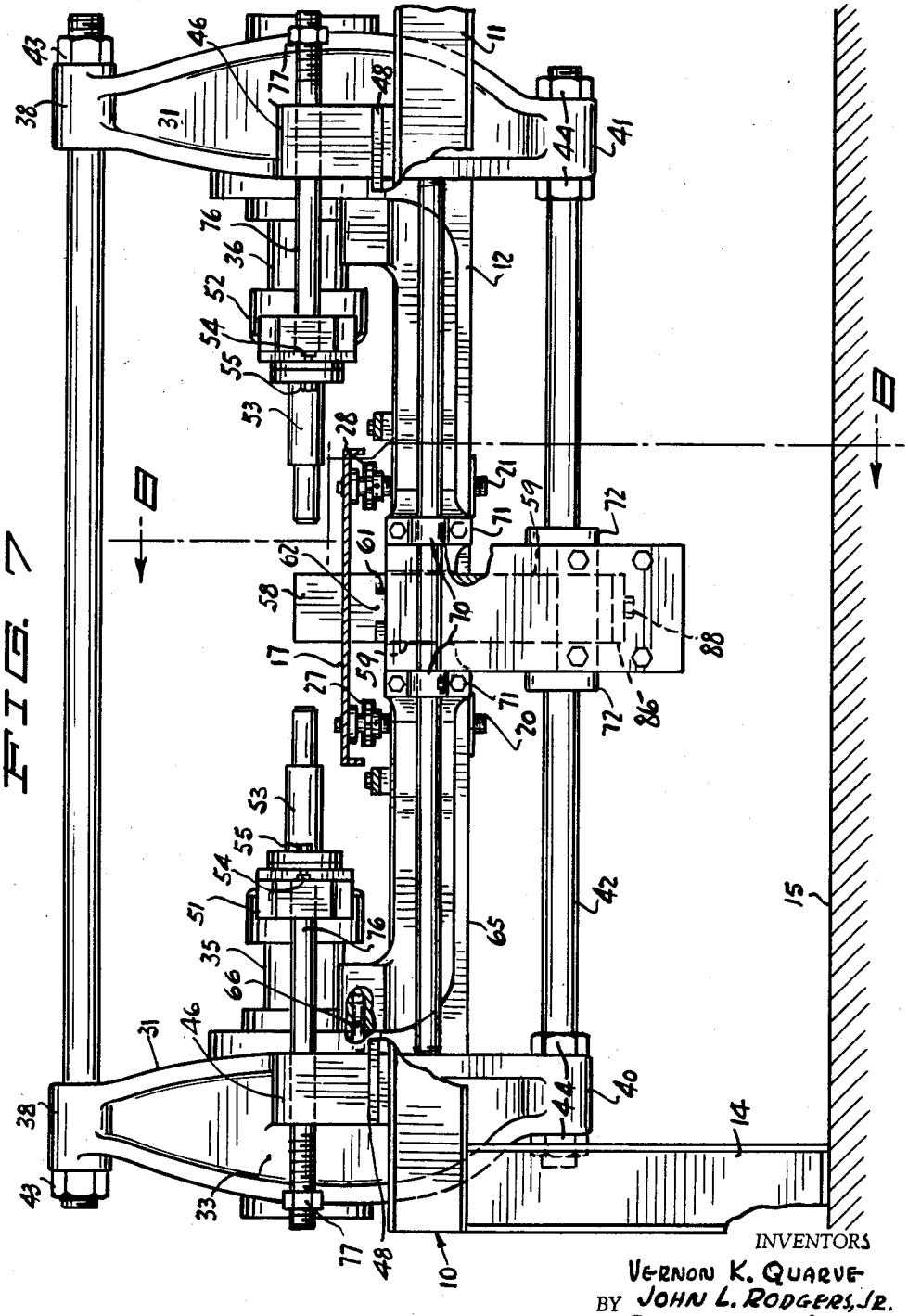
INVENTORS
VERNON K. QUARVE
BY JOHN L. RODGERS, JR.
Carlson & Gayle
ATTYS.

Jan. 29, 1963 V. K. QUARVE ET AL 3,075,346

TRACK PRESS HAVING OPPOSED RAMS AND RETRACTABLE JAW

Filed Feb. 21, 1958 12 Sheets-Sheet 5

FIG. 7



INVENTORS

VERNON K. QUARVE

BY JOHN L. RODGERS, JR.

Carlson & Hayes

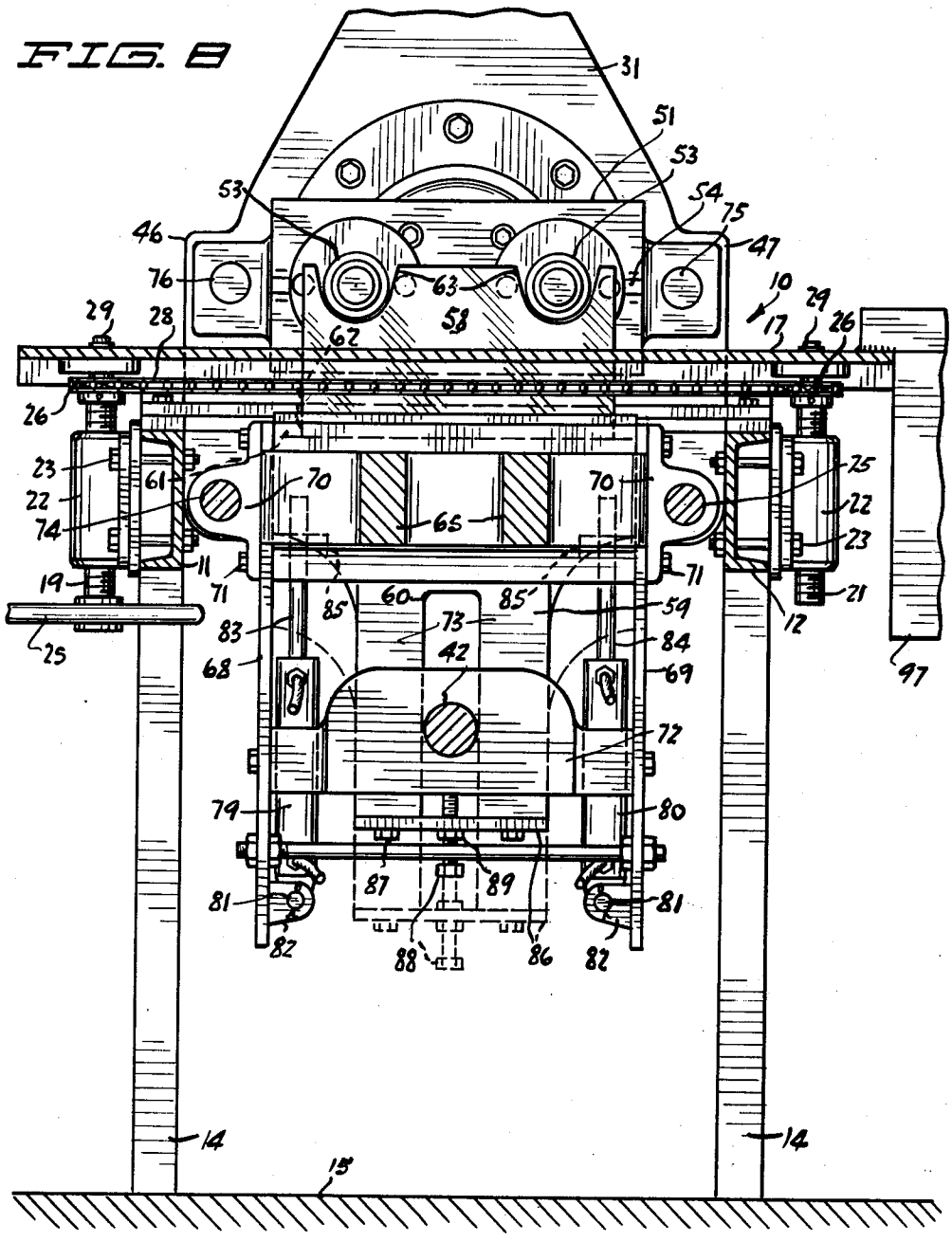
ATTS.

Jan. 29, 1963 V. K. QUARVE ET AL 3,075,346

TRACK PRESS HAVING OPPOSED RAMS AND RETRACTABLE JAW

Filed Feb. 21, 1958 12 Sheets-Sheet 6

FIG. 8



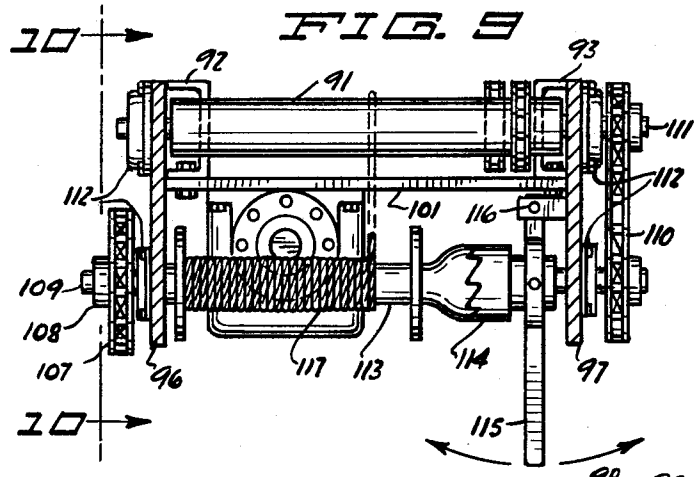
INVENTORS
VERNON K. QUARVE
BY JOHN L. RODGERS, JR
Carlson & Hayle
ATTYS.

Jan. 29, 1963 V. K. QUARVE ET AL 3,075,346

TRACK PRESS HAVING OPPOSED RAMS AND RETRACTABLE JAW

Filed Feb. 21, 1958 12 Sheets-Sheet 7

FIG. 9



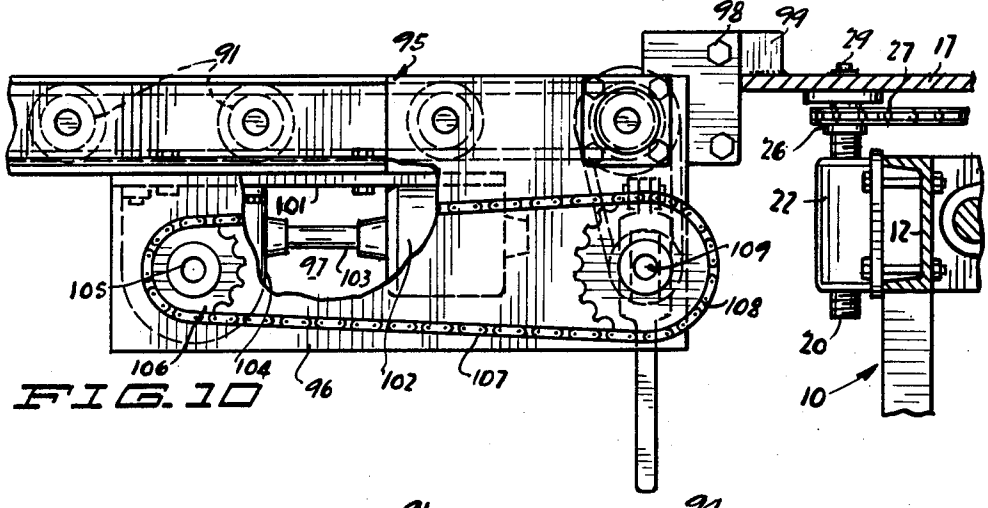


FIG. 10

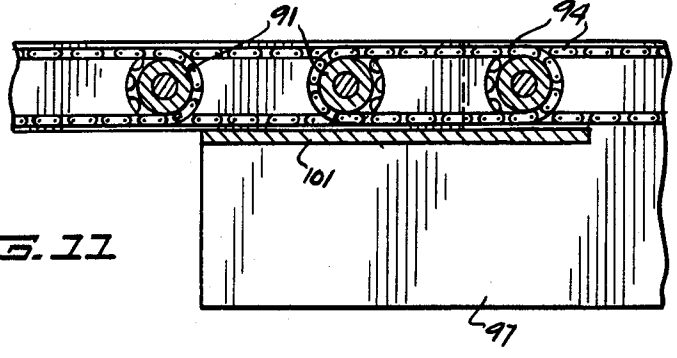


FIG. 11

INVENTORS
VERNON K. QUARVE
BY JOHN L. RODGERS, JR.
Carlson & Hayle
ATTYS.

Jan. 29, 1963 V. K. QUARVE ET AL 3,075,346

TRACK PRESS HAVING OPPOSED RAMS AND RETRACTABLE JAW

Filed Feb. 21, 1958 12 Sheets-Sheet 8

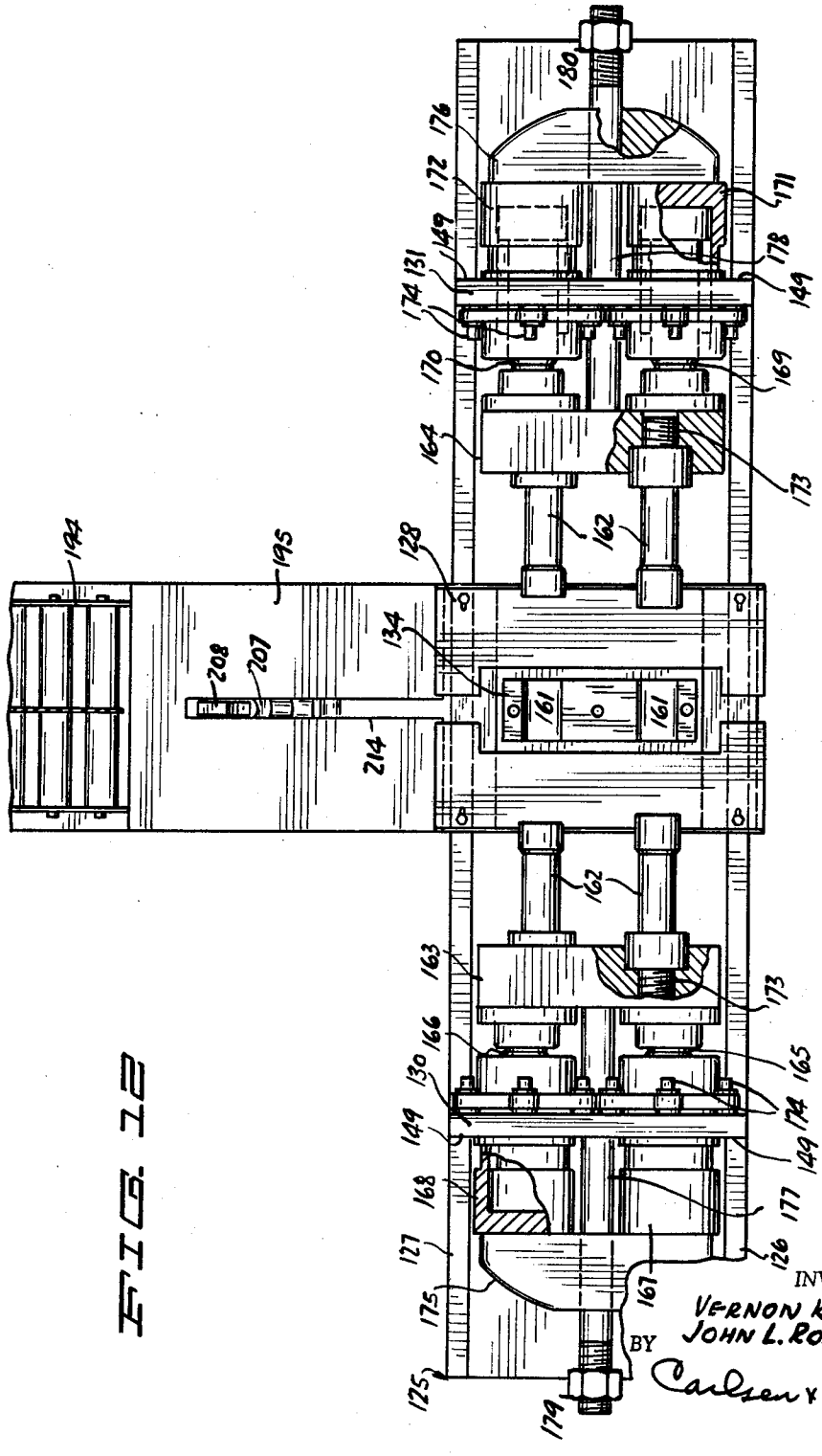


FIG. 12

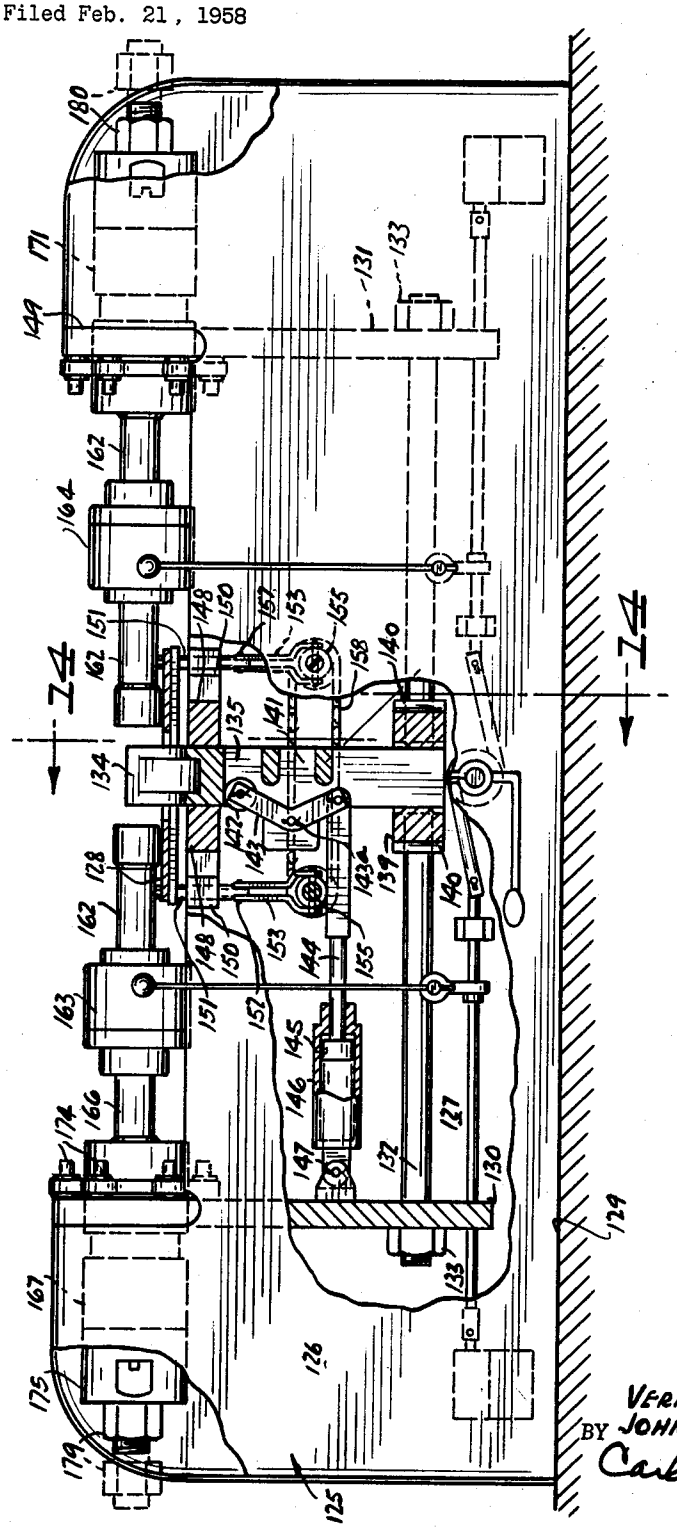
INVENTORS
VERNON K. QUARVE
JOHN L. RODGERS, JR.
BY Carlson & Hayes
ATTYS.

Jan. 29, 1963 V. K. QUARVE ET AL 3,075,346

TRACK PRESS HAVING OPPOSED RAMS AND RETRACTABLE JAW

Filed Feb. 21, 1958 12 Sheets-Sheet 9

FIG. 19



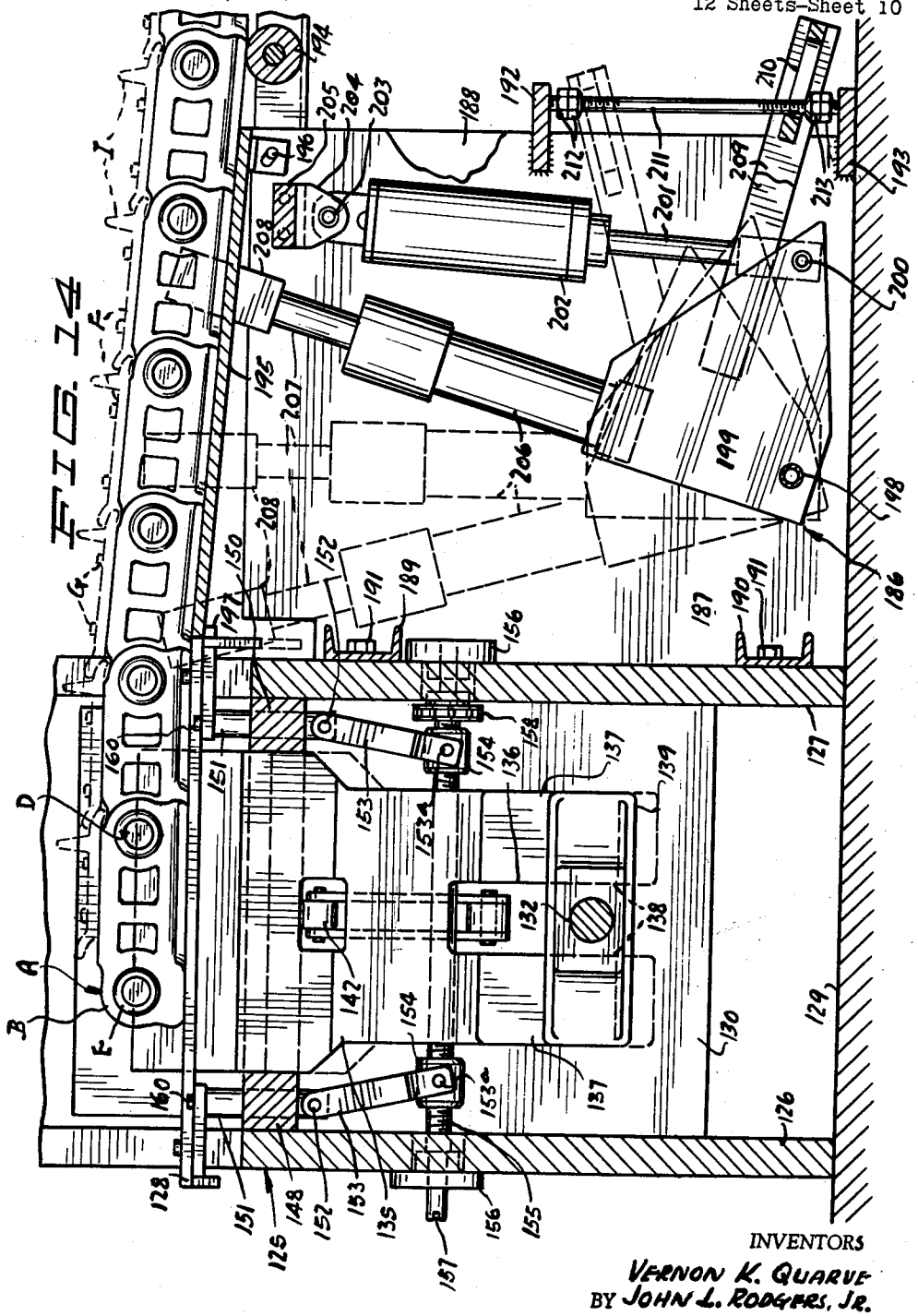
INVENTORS
VERNON K. QUARVE
BY JOHN L. RODGERS, JR.
Carlson & Hayes
ATTYS.

Jan. 29, 1963 V. K. QUARVE ET AL 3,075,346

TRACK PRESS HAVING OPPOSED RAMS AND RETRACTABLE JAW

Filed Feb. 21, 1958 12 Sheets-Sheet 10

FIG. 14



INVENTORS

VERNON K. QUARVE

BY JOHN L. RODGERS, JR.

Carlson & Hayes

ATTYS.

Jan. 29, 1963 V. K. QUARVE ET AL 3,075,346

TRACK PRESS HAVING OPPOSED RAMS AND RETRACTABLE JAW

Filed Feb. 21, 1958 12 Sheets-Sheet 11

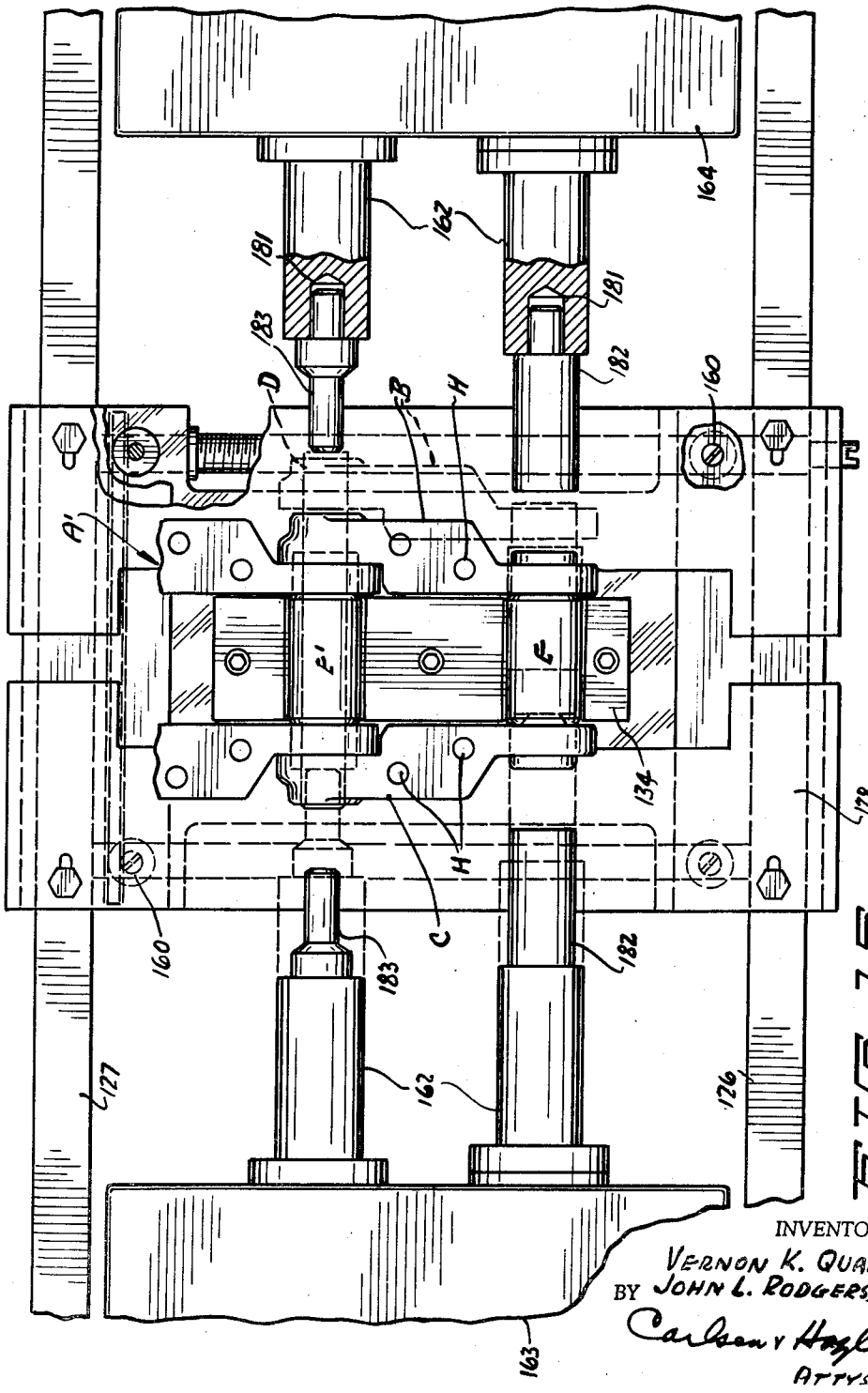


FIG. 15

INVENTORS
VERNON K. QUARVE
BY JOHN L. RODGERS, JR.
Carlson & Hayes
ATTYS

Jan. 29, 1963 V. K. QUARVE ET AL 3,075,346

TRACK PRESS HAVING OPPOSED RAMS AND RETRACTABLE JAW

Filed Feb. 21, 1958 12 Sheets-Sheet 12

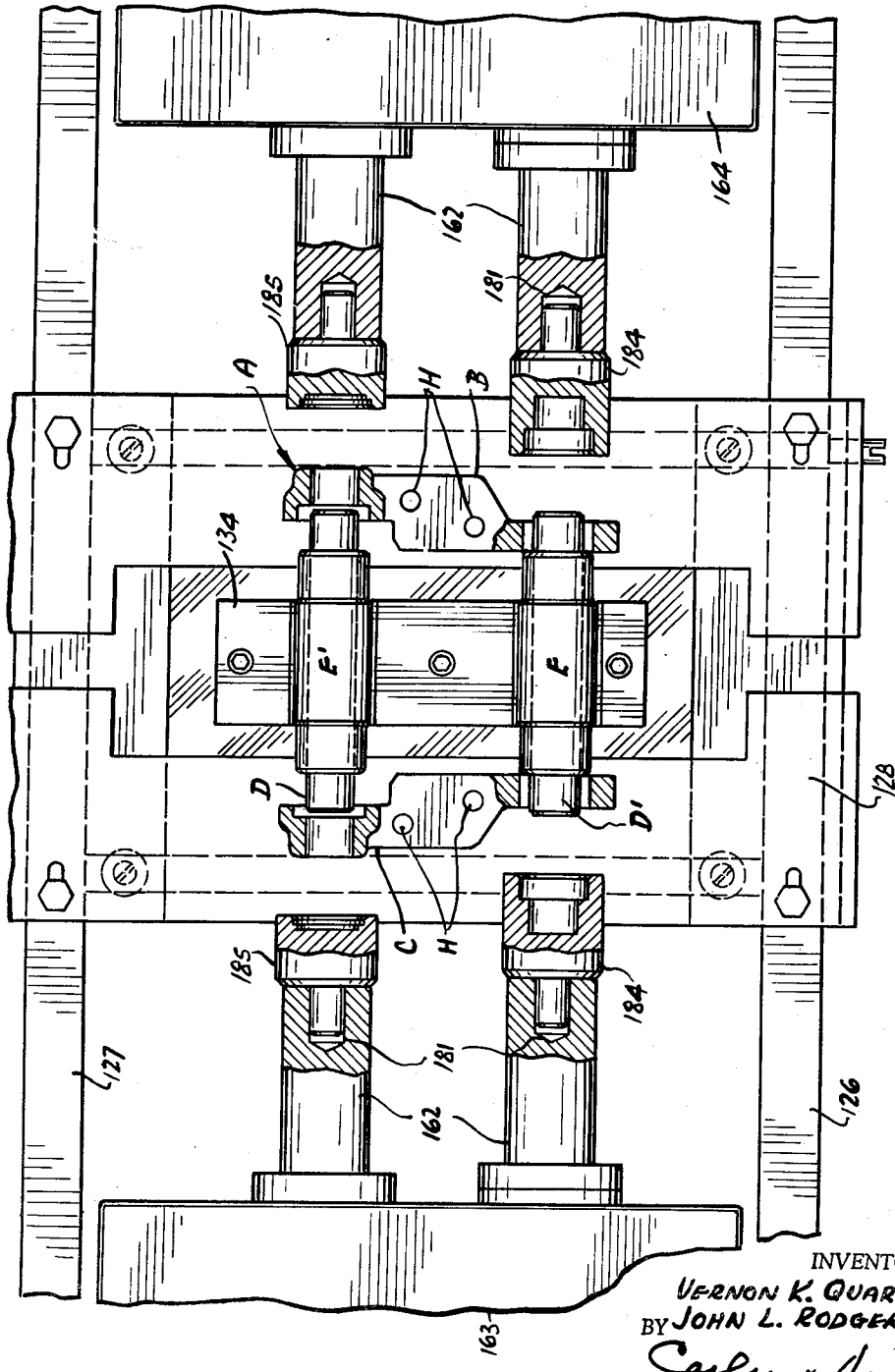


FIG. 16

INVENTORS
VERNON K. QUARVE
BY JOHN L. RODGERS, JR.
Carlson & Hayle
ATTYS.

United States Patent Office

3,075,346

Patented Jan. 29, 1963

3,075,346

TRACK PRESS HAVING OPPOSED RAMS AND RETRACTABLE JAW

Vernon K. Quarve and John L. Rodgers, Jr., Minneapolis, Minn., assignors to Rodgers Hydraulic Incorporated, St. Louis Park, Minneapolis, Minn., a corporation of Minnesota

Filed Feb. 21, 1958, Ser. No. 716,711
6 Claims. (Cl. 59—7)

Our invention relates to improvements in that class of machinery which has come to be known in the art as track presses, the purpose of which is to perform certain disassembly and reassembly operations upon the endless tracks or traction belts used by crawler or track laying tractors. An example of an earlier embodiment of such a track press is to be found in Patent No. 2,268,225, issued December 30, 1941, and our present invention provides numerous and valuable improvements in this and all other presses for the same purpose of which we are aware.

Crawler or track laying tractors are, of course, now very widely used and they generally are quite large, for heavy duty work. The traction belts or tracks are thus also of heavy duty construction and as commonly made up such tracks consist of a plurality of pivotally connected sections or links operating in the manner of sprocket chains around the drive and idler sprockets of the machine, and with ground engaging shoes, usually including what are commonly called grousers, removably secured to the links. These shoes form a tread surface substantially wider than the tracks themselves, providing the necessary large area bearing and traction contact with the ground surfaces which enables these tractors to operate under conditions and under loads impossible with the wheel type of tractor. Each section or link of the track comprises, in addition to the shoe, a pair of side links spaced apart to receive the sprocket teeth between them and it is the custom to pivotally join each set of side links to the next by means of cross pins and surrounding bushings both of which extend transversely with respect to the length of the track. To differentiate between the parts and avoid confusion the track part made up of a pair of side links and their connecting pin and bushing will be hereinafter referred to as "track section." The side links of each track section are relatively wide spread at one end to receive therebetween the relatively more closely spaced ends of the next adjacent side links and the bushings are a press fit in the closer spaced ends of each pair of side links while the pins are a press fit in the wider spread ends of each link pair. Thus the necessary pivot action between adjacent track sections is provided for by the oscillation of the pins about their axes within the bushings, as will be understood. The tracks must, for proper operation, be maintained in a proper condition of tautness and this is accomplished while the tracks are in good condition by the adjustment of the sprockets.

Naturally these tracks are subject to quite rapid wear, not only because of the very nature of their operation but particularly because they usually operate in the presence of sand and other abrasive materials which aggravate the wear problem. Thus in all too short a time the tracks are found to have become stretched to the point that they are too slack for proper operation and beyond the point at which this slackness may be taken out by adjustment of the sprockets. The wear with which our invention is primarily concerned is that occurring upon the pins and bushings. Such wear takes place first over less than one-half of the peripheral surfaces of the pins and bushings and it is possible, if the matter be attended to in time, to turn these components upon their axes a half-turn and

present relatively unworn surfaces at the critical points, to thus restore the tracks to proper length and secure much greater useful life from them. Turning the pins and bushings in this manner and for this purpose is not new, per se, but it is an operation which presents a number of problems which it is the purpose of our invention to solve in a new and much better manner than possible heretofore.

Turning or resetting the pins and bushings, or their replacement if they are broken or so badly worn as to require this, involves the removal of the tracks from the tractor so that they may each be operated upon as a string of the connected links or sections and so that the track string may be moved over a work table upon the press. The tracks have the usual master pins so that they may be parted and removed from the tractor for this purpose and to simplify the description herein as well as clarify the drawings it will be assumed that the shoes are removed, without limiting us to such mode of operation since as is known to those skilled in the art it is possible to replace or reset the pins and bushings without completely removing these shoes if so desired. In machines of the general type disclosed in Patent No. 2,268,225 aforesaid the track string is moved across the work table to present the links in succession in work positions at which a hydraulic ram, suitably tooled, is aligned with the pins or bushings as the case may be and a retractable jaw supports the adjacent side link of the track so that the movement of the ram toward the track will force the pin (or bushing) from the side links when the track is being disassembled, or re-press the side links one at a time back into place in reassembling the track. Great power is necessary because these relatively large components are press fitted together under very high pressure and the thrust of the ram providing this power must be accurately applied along the axes of the pins and bushings for proper operation. While a machine of this general construction is satisfactory in many respects it does suffer from the efficiency standpoint in that only a single pin, or bushing, may be worked upon at one time, so that the labor required to completely disassemble and then reassemble the track with reset or new pins and bushings represents a very substantial item of expense. It must be borne in mind that the pins and bushings are a press fit in both sides of the track, or in both side links of each pair thereof as has been described, and thus after one end of each pin and bushing is freed from one side link in the disassembly operation, the remaining assembly must be reversed to free the opposite ends of the pin and bushing from the other side link.

In accordance with our invention and as its primary object we provide a track press which will remove or install both the pin and bushing of one side link at the same time and then, operating from the opposite side of the track string (without any re-positioning of the track), will remove or install both the pin and bushing of the other side link. Thus in what amounts to no more than two rapid, cordinated operations a complete track section will be disassembled or reassembled in a single operation and the saving in time and labor by contrast with the multiple operations required by older machines is so great that there is actually little comparison. A single operator may perform the entire operation, even upon the largest and heaviest tracks, and present day labor costs being what they are the resulting saving in the expense of servicing the tracks, as well as reduction in the down time of the tractor with which the tracks are used, are extremely important.

Another object is to provide a track press which includes a double-faced retractable jaw which when in use fits quite closely between the inner surfaces of the side

links to successively support them against the thrust of the rams in opposite directions as the rams, properly tooled to fit the bushing and pins, move in from opposite sides of the track, in short strokes to free the side links from one end of the pins and bushings at a time or reassemble the side links on the pins and bushings without danger of broaching, breaking or deforming the parts, and to provide means whereby the ram travel may be very accurately controlled so that in reassembly the side links will be properly spaced to fit the shoes, which are held to the links by bolts, and the pins and bushings will also be accurately re-positioned. Broaching of the pins, bushings and side links has long represented a problem in this field and the short stroke operation and accurate alignment of the parts as they are worked upon in our press is found to completely solve this problem.

In order to accommodate the press to operation upon various sizes of tracks it is necessary that the ram tools be properly spaced according to the pitch of the track and it is another object of our invention to provide for such adjustment in a convenient way. Likewise our invention provides for the ready accommodation of the retractable jaw to the pitch of the track, and the adjustment of the height of the work table as well as the angle thereof relative to the axes of the pushing tools to suit the size and condition of the track being worked upon.

Another object of our invention is to provide means for facilitating the handling of the track string and the accurate location of each link in succession in work position and which may embody a powered roller conveyor table to feed the track onto the work table of the press, a power winch and cable to pull the track string onto said conveyor, and a track pusher or kicker which will advance the track one link at a time, these track handling components being usable in any desired, workable combination.

Still another object is to provide a track press of the nature described having pushing tools for both the pin and bushing (or the side link when used for assembling the track) at each side of the track in conjunction either with a single operating cylinder and ram for each pair of such tools or of separate cylinders and rams for each tool, there being two of the cylinders in the first instance and four in the second. The four cylinder type of machine may be most desirable for very large presses, or for factory use, and in this connection it may be noted that our press may be utilized either as a repair or servicing facility, in many instances portably mounted upon a truck or other suitable carrier for operation on the job or in the field, or as a machine specifically constructed for the initial fabrication and assembly of the tracks in the factory, without departing from the scope of our invention.

Still a further object is to provide various details of construction and arrangement of the frame and operating components of the press, all of which will contribute to its efficient, convenient and fast operation, its flexibility as to use with tracks of various sizes and types, its treatment of the track without damage thereto, and its ability to cope with the many problems which inevitably crop up in the servicing and maintenance of these track or traction belt structures which are subjected to many strains, loads and difficult working conditions in crawler type tractor operations.

These and other more detailed and specific objects will be disclosed in the course of the following specification, reference being had to the accompanying drawings, in which—

FIG. 1 is a perspective view of a track press according to our invention and showing the same as equipped with a track conveyor and winch.

FIG. 2 is a top plan view of the press according to FIG. 1 and with portions broken away to show details of construction.

FIG. 3 is a fragmentary vertical cross sectional view taken substantially along the line 3—3 in FIG. 2.

FIG. 4 is an enlarged top plan view of the central portion of the press illustrating a track section in position for disassembly, one step in this process being indicated in dotted lines.

FIG. 5 is an enlarged top plan view of the central portion of the press similar to FIG. 4 and showing one track section in position for assembly, the ram elements being provided with suitable tools for this purpose and portions of these components being shown in section.

FIG. 6 is a fragmentary longitudinal and vertical sectional view taken substantially along the line 6—6 in FIG. 4 and showing the support or work table in an inclined position in dotted lines.

FIG. 7 is a frontal elevation of the press with one end portion thereof omitted and with certain parts of the frame broken away to better illustrate the construction.

FIG. 8 is an enlarged vertical cross sectional view taken along the line 8—8 in FIG. 7.

FIG. 9 is an enlarged sectional detail view of the power winch and associated components along the line 9—9 in FIG. 2.

FIG. 10 is a side elevation of the track winch and conveyor and adjacent portion of the track press itself, viewed substantially along the line 10—10 in FIG. 9 and with a part of the winch housing broken away to illustrate components therewithin.

FIG. 11 is a fragmentary longitudinal sectional view of the power operated track conveyor taken along the line 11—11 in FIG. 2.

FIG. 12 is a top plan view of a modified form of press wherein the ram elements are individually actuated by hydraulic cylinders, showing a modification in the frame structure and a track pusher or moving mechanism designed to move the track one section at a time into work position on the press. In this view certain portions are broken away and shown in section.

FIG. 13 is a frontal elevation of the press of FIG. 12 with a substantial portion of the frame broken away and internal components shown in section in order to better illustrate the construction.

FIG. 14 is an enlarged vertical cross sectional view taken substantially along the line 14—14 in FIG. 13, showing a length of track in side elevation and also illustrating the construction and operation of the track pusher or track moving mechanism.

FIGS. 15 and 16 are enlarged fragmentary plan views of the central or working portion of the modified form of press illustrated in FIGS. 12 through 14 and respectively showing the same as a track section is disassembled and then reassembled. In both of these views certain portions are broken away and shown in section to better illustrate the construction.

Before describing the construction and the operation of the track press of our invention we will first as briefly as possible describe the track which is to be operated upon. This track in small lengths appears in FIGS. 4, 5, 14, 15 and 16 and throughout these views the corresponding components of the tracks will be referred to by corresponding reference characters. As has been stated hereinbefore the track is made up of a plurality of identical link assemblies, here for convenience called sections, which are pivotally connected and constitute a string of track, normally endless, to function as a large and heavy sprocket chain operating over the sprockets upon the tractor (neither here shown). When the track is to be worked upon a master pin (also not shown but present in every track) is removed so that the track is parted and may be pulled along endwise as a long string of connected sections as will be clear. One section of track is designated generally at A and comprises as its components spaced apart side links B and C apertured adjacent their ends to receive cross members in the form of a pin D and a bushing E and when assem-

bled one such pin is telescoped into and through each bushing. The side links B are so shaped that when properly assembled they have relatively wide spread ends and relatively closer ends and it is into the latter that the ends of the bushings E are press fitted very tightly in the initial fabrication of the track. As seen in FIGS. 5 and 15 the close spaced ends of the next adjacent side links of the next section, designated generally at A', fit between the wide spread ends of the side links B and C with another bushing E' pressed in place and a pin D telescoped through this bushing and press fitted into the wide spread ends of the side links. This arrangement is repeated throughout the length of the track and the alternate press fitting of the bushings and pins into the opposite ends of the track sections hold them in assembly but the telescopic relationship between the pins and bushings permits the necessary pivotal, flexing motion between the track sections. The pins and bushings are forced into the side links under very high pressures in order that the track will remain in assembly and resist the relatively tremendous strains and stresses to which it is subjected in operation and thus great power is needed to press the pins and bushings out of the side links in disassembling the track and, of course, in pressing the side links back in place in reassembling the track, as will be readily appreciated by those skilled in the art.

In addition each track section includes a shoe or tread which forms the actual ground engaging surface and these are generally rectilinear metal pieces bolted or cap screwed to the side links B and C of each section. For clarity in our present disclosure these shoes appear only in the side elevation of the track in FIG. 14, being there designated at F and their mounting cap screws or bolts at G but the openings for the latter appear at H in FIGS. 4, 5, 15 and 16. In most instances the shoes F will have transversely extending cleats I, commonly called grousers, for added traction.

The type of track here shown is known as the recessed type for the reason that the extremities of the bushings project slightly beyond the outer surfaces of the closer spaced ends of the side links and into recesses J provided for their accommodation within the wider spread ends of the side links around the points at which the pins are pressed into the side links as clearly shown. This is by far the most commonly used type of track, hence the reason for its showing herein.

In order to disassemble a track section A (assuming for convenience here that its shoe F is removed) it is necessary to press the bushing E from the closer spaced ends of the side links B—C and the pin D from their wider spread ends. This action reduces the track section to its four component parts, i.e., the two side links and the cross members, i.e., the pin and the bushing and frees this entire disassembled track section from the next section of the track string. Reassembly requires the reverse of this action, of course replacing the pin in the bushing of the next track section in the string as the side links are pressed back upon their pin and bushing.

It will be noted that while the opposite ends of the side links differ in spacing their inner surfaces are substantially parallel between the locations of the pins and bushings.

With the foregoing in mind the track press of our invention, as illustrated in FIGS. 1 through 11, will now be described in detail. The press comprises a main frame designated generally at **10** and in the stationary form of machine, as contrasted with the portable or vehicular version (not shown) in which it may be made, this frame comprises suitable heavy front and rear beams **11—12** cross connected by frame elements denoted collectively at **13** and carried upon a plurality of legs **14** by which the press is suitably mounted upon the shop floor surface **15**. At one end a housing and control structure designated generally at **16** is provided on the frame and in and on this assembly are conveniently mounted an engine, fluid pump, fluid reservoir, air compressor, controls and related elements which provide and control a supply of hydraulic fluid under pressure and air under compression for operation of the working parts of the press. These elements may be arranged in any suitable way and since they are not regarded as novel per se nor necessary to an understanding of the novel features of our invention they are neither shown nor detailed herein.

Located centrally of the length of the frame **10** between the structure **16** and the opposite end of the frame is a track support means or work table **17** traversing the beams **11—12** and as here shown of generally rectangular shape. Adjacent each of its four corners this work table **17** is carried upon upright support and adjustment screws of which there are four, designated at **18, 19, 20** and **21**. The screws **18—19** and **20—21** are, respectively, located forwardly and rearwardly of the front and rear beams **11—12** and are threaded in tapped brackets, indicated throughout at **22**, flanged and secured by bolts **23** or the like to the beams. The screws **18—21** support the work table **17** above the level of the beams **11—12** and the forwardmost screws **18—19** are provided at lower ends with hand wheels **24—25** by which they may be readily turned by the operator from his station in front of the press. Above the level of the beams **11—12** each screw **18—21** has secured thereto a sprocket indicated throughout at **26** and sprocket chains **27—28** join the sprockets on the screws **18, 20** and **19, 21** so that, by turning the hand wheels **24—25**, the work table may be moved upwardly and downwardly as a unit, and so that one side or the other of the table may be raised slightly above the other, as designated by the dotted lines in FIG. 6, and for a purpose presently to appear. The upper ends of the screws **18, 21** are held to the work table by cap screws **29** but there is sufficient play at these points to permit the slight angling of the table as just described, while the weight of the table and the track resting thereon will hold the table down to the position to which it is elevated by the screws **18—21**.

Spaced apart lengthwise upon the frame **10** are heavy end castings **31—32** each including a cylinder **33—34** in which is slidable a ram **35—36** movable on a common axis toward and away from the support on work table **17**. At their upper ends **37—38** the end castings **31—32** are rigidly connected by a heavy upper tie rod **39** and similarly (see FIG. 7 for example) the lower ends **40—41** of the end castings are connected by heavy lower tie rod **42**. The tie rods **39, 42** parallel each other and the upper rod has nuts **43** while the lower has nuts **44** in pairs at opposite sides of the lower ends **40, 41** of the castings so that the assembly constituted by these parts may be adjusted and squared up as may be required. Heavy front and rear lugs **46—47** upon the end castings **31—32** have forward and rearward projections slidably overlying the front and rear beams **11—12** of the frame **10** and held down thereupon by means of rectilinear clips **48** bolted at **49** to the upper flanges of said beams. Resilient or rubber blocks **50** are held in place by the bolts **49** and are on the inner or facing sides of the lugs **46—47**. These resilient blocks **50** are thus positioned to resist movements of the adjacent end castings **31—32** in the direction of the work table **17** and thus center the parts but the entire assembly of end castings, cylinders, rams and tie rods is permitted resiliently limited movement crosswise of the frame **10** for a purpose presently to appear.

It will be understood that by selective admission of fluid under pressure to opposite ends of the cylinders **33—34** the rams **35—36** may be moved in horizontal planes toward and away from the work table **17** and secured to the ends of these rams are ram heads **51—52** extending forwardly and rearwardly substantially the full depth of the frame **10**. On the facing surfaces of these

ram heads are ram elements denoted collectively at 53, a pair on each ram head and adjustably mounted thereupon by ordinary T-grooves 54 and T-bolts 55 so that the spacing between the individual ram elements of each pair thereof may be conveniently adjusted. As is best seen in FIGS. 4 and 5 the facing ends of the ram elements 53 are bored out to provide sockets 56 to receive means in the form of tools for operating upon the track as will presently appear, said tools having shanks to enter said sockets and being removably held therein by set screws, designated at 57. The ram heads, ram elements and associated tools constitute work elements for operation upon the chain, as will later appear, and the same is true as to corresponding parts of the machine of FIGS. 12–16.

Centrally disposed in the work table 17 is a retractable jaw, designated generally at 58, actually consisting of a replaceable jaw insert block located in a jaw carrier 59. The latter is forked at 60 to slidably straddle the center of the lower tie rod and is a strongly made rectangularly headed element the upper surface of which has a forwardly-rearwardly extending upwardly opening groove 61 to receive a tenon 62 depending from the underside of the jaw 58, which itself is a heavy rectangular metal block. In line with the axes of the ram elements 53 as viewed from above the retractable jaw 58 has upwardly opening transversely extending grooves or notches 63 to engage the bushings E—E' of a track section and its adjacent counterpart (FIGS. 4 and 5) and, of course, if the pitch of the track varies, i.e., the distance between the axes of these bushings differs then a jaw with grooves properly spaced will be put in the jaw carrier 59 (or inserts will be placed in the grooves 63) and the spacing between the ram elements 53 will be correspondingly adjusted. Other adjustments will be set forth hereinafter. Downwardly recessed set screws 64 hold the jaw in the jaw carrier when in use, these screws appearing in FIG. 4 as an example.

A bucker or sub-frame 65 extends between the end castings 31—32 lengthwise and horizontally between the front and rear beams 11—12, having its ends doweled at 66 to the castings (FIG. 7) and centrally this frame 65 provides an upright guideway 67 (FIG. 2) through which the jaw carrier 59 is slidably supported for upward and downward movements. Depending from this central guideway portion of the bucker frame 65 are front and rear vertical and parallel plates 68 and 69 and secured to each is a pair of longitudinally spaced apart bearings denoted throughout at 70 held in place by cap screws 71 or equivalent fasteners. Some distance below the bucker frame 65 the front and rear plates 68—69 are joined by a forwardly-rearwardly extending compression yoke 72 which slidably and guidably engages the lower portions of the legs 73 formed by the aforesaid forking of the jaw carrier 59 and in conjunction with this guideway at 67 in the bucker frame 65 this yoke provides a strong and rigid guide for the jaw and its carrier. Heavy longitudinal front and rear tie rods 74—75 extend through the aforesaid bearings 70 and at their ends are tapped or otherwise fastened into the end castings 31—32 providing added support, and the cage-like or turret-like formation made up of the end castings 31—32, the upper and lower tie rods 39, 42, the bucker frame 65 and front and rear tie rods 74—75 all combine to form a structure which while relatively light considering the forces which it must withstand will nevertheless resist these forces and stresses to best advantage. Twisting tendencies of this structure about a longitudinal axis are prevented by resting the end castings 31—32 upon the beams 11—12 and are further resisted and the ram elements 53 retained in proper horizontal alignment by the fact that the front and rear ends of the ram heads 51—52 are connected to the inner ends of heavy and relatively short ram travel limit rods, indicated throughout at 76 which extend outward in opposite directions slidably through the aforesaid heavy lugs 46. In addition the outer end portions of these rods 76 are threaded to accommodate stop nuts 77 which, as the rams 35—36 advance toward the jaw 58, will contact the outer end faces of the lugs 46 and thus halt this travel. The importance of thus limiting the ram travel will shortly be made clear.

The jaw 58 is retractable as stated, that is it may be projected upwardly to work position above the work table through an opening 78 in the table or may be pulled downward to clear the table top at the will of the operator of the press. As is best seen in FIG. 8 the jaw is moved vertically for this purpose by a pair of cylinders 79—80 located in upright positions, one at the front and the other at the rear of the jaw structure and pivotally attached at their lower ends at 81 to brackets 82 on the lower ends of the plates 68—69. These cylinders 79—80, most conveniently operated by compressed air, reciprocate front and rear plungers 83—84 the upper ends of which are secured at 85 to the jaw carrier 59 so that as the plungers move upwardly and downwardly the jaw carrier and jaw 58 will be correspondingly moved. In order to limit the upward travel of the jaw 58 and thus accurately position its grooves 63 with respect to the work surface formed by the table 17 the lower ends of the legs 73 of the jaw carrier have secured thereto a stop plate 86 by cap screws 87 or equivalent fasteners and an adjustable stop screw 88 is threaded through this stop plate to upwardly engage the compression yoke 72 as the jaw rises and thereby limit its travel. A lock nut 89 is provided upon the stop screw 88 to retain it in its adjustment once made.

The string of track to be worked upon, once it is parted by removal of its master pin as aforesaid, is pulled from the rear of the press forwardly across the work table 17 toward the jaw 58 in such fashion as to bring one section of the track at a time into registry with the jaw and so that the bushings E and E' of the end and next adjacent track section will be engaged in the grooves 63 when the jaw is moved upward as just set forth. The jaw is retracted, i.e., pulled downward as the track is being moved into position. Flaring guides 90 (FIG. 1) may be provided at the rear of the work table to guide the track onto the press and these may be adjustably mounted as seen in FIG. 4 if so desired, the guides if used serving the obvious purpose of centering and guiding the track toward registry with the retractable jaw. For supporting the string of track any suitable conveyor of proper length may extend rearwardly from the press but in consonance with the ease and speed of the operation of our improved press that portion of the track adjacent the press rests upon rollers 91 (FIGS. 1, 2, 9–11) of a power driven conveyor of substantial length, these rollers being journaled between parallel side rails 92—93 suitably supported from the floor surface adjacent the press at a level about that of the work table 17. All of these rollers 91 are connected at corresponding ends by sprocket chains 94 for rotation in unison. Located between this powered track conveyor and the rear end of the work table 17 is a drive and power winch mechanism, designated generally at 95, here shown as comprising side plates 96—97 forming continuations of the side rails 92—93 and pivotally attached at 98 to brackets 99—100 affixed to the rear edge of the work table to move at forward ends upwardly and downwardly with the table as it is adjusted. The side plates 96—97 are cross connected below the forward end of the conveyor by a generally horizontal mounting plate 101 from which is suspended a suitable prime mover such as a reversible compressed air motor 102 connected at 103 to a speed reducer 104 also suspended from the plate 101 and having a laterally extending output shaft 105 (FIG. 10) on which is a sprocket 106 connected by a sprocket chain 107 to a sprocket 108 upon the corresponding end of a countershaft 109 at the forward end of this assembly. This countershaft 109 extends through the other side plate 97 (FIG. 9) and a chain and sprocket connection 110 is made to the laterally extended end 111

of the forwardmost conveyor roller 91 to supply torque to all of the rollers. Throughout this mechanism suitable bearings 112 are provided for the various shafts involved. On one end portion of the countershaft 109 there is journaled an elongated winch spool 113 (FIG. 9) which may be driven off the countershaft through a manually controllable clutch 114 having dentally engaged parts, one of which is keyed to the countershaft and may be engaged with the other part on the spool by means of a shipper lever 115 pivoted at 116. Secured to and coiled upon the winch spool is a length of strong flexible cable 117 which may be attached in any suitable way to the string of track so that when power is applied to the winch spool 113 this cable will pull the track onto the powered roller conveyor which will then move the track accurately and controllably a section at a time into registry with the jaw 48 as will be readily understood.

Referring now to FIG. 4 particularly as a starting point the operation of disassembling a track section A will be set forth. As there shown the track section A is positioned in the jaw 58 with the bushing E of this section lying in the forwardmost groove 63 and the corresponding bushing E' of the next track section in line resting in the rearmost jaw groove. The track pin D is exposed at its ends at the wider ends of the side links B and C, while the ends of the bushing E are similarly exposed at the narrower end of the track section. Bushing pushers or tools 118 are then fitted into the front ram elements 53 at each side, these being of such diameter as to freely enter the openings in the side links B—C into which the ends of the bushing E are a press fit and being each bored out at 119 (as shown for the one at the left in FIG. 4) large enough to nicely clear a track pin and designated at D', which may be readily placed by hand into this bushing to act as a temporary guide. Pin pushers or tools 120 are placed in the rear ram elements 53 and are of a diameter such as to freely, nicely enter the openings in the side links into which the ends of the pin D is pressed. As has been set forth these tools have shanks to fit the sockets 56 in the ram elements and the tools are held in place by the set screws 57.

Now by admitting fluid to the cylinders 33—34 in succession the rams 35—36 will be advanced and the pin and bushing pushed from the side links, one link at a time. As an example and as seen in FIG. 4 the advance of the left hand ram 35 will cause the tools 118 and 120 to engage the proximate ends of the bushing E and pin D respectively, forcing the side link C into supporting contact with the adjacent side of the jaw 58 and as the travel of the tools continues they will force out the press fitted ends of the bushing and pin until these ends clear the side link. Only a very short working stroke is required and this not only speeds up the operation but in conjunction with the fact that the tools are themselves quite short amounts to an important safety factor which will be more readily appreciated when it is considered that, as an example, pressures in the order of one-hundred and fifty tons are used in presses of this kind. As is seen in dotted lines in FIG. 4 the forcing of the press fitted ends of the bushing and pin from the side link C causes the other side link B to move to the right but upon the return stroke of the left hand ram elements 53 the side link C will be freed so that it may be laid aside while the ensuing advance movement of the right hand ram elements 53 will first drive the side link B against the adjacent side of the jaw 58 and then the right hand tools 118—120 will push the ends of the bushing and pin from this side link so that, upon the return stroke of these right hand tools the link B, bushing E and pin D are all freed from each other and may be laid aside, completing the disassembly of this track section A. Thus two, short stroke rapid and coordinated operations are all that are necessary for separating each track section into its component parts and, of course, as soon as one section is thus disassembled the jaw 58 is retracted, the track string moved forward by the powered conveyor and the jaw then moved up again into position for bilaterally supporting the next track section against the thrust of the two ram elements as they advance in pairs from opposite sides of the track for the next disassembly operation. Use of the pin D' in the endmost bushing of the track may be desirable for guiding and supporting the parts as they are moved from side to side by the ram elements. While this operation has been described as starting at one end of the track string for complete disassembly of the track it will be readily obvious that a pin or bushing may as well be removed from any point along the length of the track without requiring complete disassembly up to that point. This feature is of particular value where a broken pin or bushing, or possibly several, must be replaced and this has been a long standing problem in the servicing of crawler tracks now solved in a satisfactory manner for the first time by our invention.

The reassembly of track section A will now be briefly described with particular reference to FIG. 5 and assuming that this is the first operation in the reassembly of the track string the jaw 58 will be moved upward and a pair of bushings E and E' laid in the grooves 63 with a pin D—D' in each bushing. For this reassembly operation the front ram elements 53 are provided with pushing tools 121 which are recessed deeply enough as seen at 122 to clear the ends of pin D' while the rear ram elements are fitted with similar pushing tools 123 but which are only shallowly recessed as seen at 124 to a depth sufficient to accommodate the projection of the pin ends outward beyond the ends of the side links as has been described. The side links B and C are then rested on edge upon the work table 17 and parallel with the right and left hand surfaces of the jaw 58 as clearly shown in FIG. 5 and fluid is supplied to both cylinders 33—34 so that the rams 35—36 advance in unison. When assembling the track the projecting ends of the pins D' may carry small tubular guides D'' (FIG. 5) to align them with their openings in the side links B—C, if so desired. As the tools 121 and 123 then meet the outer surfaces of the ends of the side links pressure is exerted upon both from opposite sides and with a squeezing action such that the links are pressed upon the ends of the pin D and bushing E in one single quick operation, after which the ram elements are retracted and this track section is completely reassembled ready for connection to the next in completing the track. The first completed section is then simply moved back until the side links of the next may be lined up with the pin D' and with another bushing and pin placed in the forwardmost groove 63 in the jaw, ready for a repeat operation. As the length of reassembled track increases it will be pulled to the rear by reversing the power roller conveyor until the operation is completed as will be readily understood, the jaw 58 being retracted and the rams advanced in proper sequence as the operator brings the track parts into position.

At this point the importance of limiting the ram travel will be evident, for in pushing or squeezing the side links upon the ends of the pins and bushings these side links must be very accurately spaced apart so that the openings H for the cap screws or bolts G will be registered with the corresponding openings in the shoes F and the shoes may be replaced without difficulty, or if any of the screws which have been removed (assuming the shoes are not taken off entirely) are to be similarly replaced. In setting up the machine, therefore, the operator carefully adjusts the nuts 77 upon the travel limit rods 76 so that these nuts will contact the end surfaces of the lugs 46 when the ram travel at each side is just sufficient to properly position the side links relative to each other and to the center line of the track as a whole, after which no further attention will be required as long as tracks of the same size are being worked upon. In

disassembling the track section the nuts 77 may likewise be positioned to limit the ram travel and to ensure that the parts are separated but at each stroke some slight over-travel of the rams may be permitted.

From the foregoing it will be seen that disassembly of each track section requires only two quick operations whereas reassembly requires but one, and the saving in time and expense over the previous methods which have required pushing the pins and bushings one at a time from each side of the track, the reversal of the track and repeated handling of the heavy parts, can be well imagined. Furthermore the short stroke operation made possible by pushing from one side and then the other, or both, only the short distances necessary to free the press fitted portions of the parts from each other not only saves time but is much safer and saves broaching or the other mutilations or distortions of the track parts which have long been a great trouble in proper servicing of the tracks.

It will also be evident that the height of the work table 17 relative to that of the retractable jaw 58 is of great importance, particularly in assembling the track sections since the bushings are laid in the jaw grooves 63 and the side links B—C are rested upon the table and the openings in these links must be accurately aligned with the pins and bushings if broaching, breakage or distortion of the parts are not to occur when the heavy pressures are applied to squeeze the parts together. Thus the table will be adjusted by the operator, manipulating the hand wheels 24—25 as has been described, so that the parts will properly line up after which no further adjustment will ordinarily be required and the track may be assembled or taken apart without damage to any of its components. In practice where heavy crawler tractors are used in highway construction or similar work they often operate on a hillside or slope and travel the same for miles without changing direction. In such cases one side of each of the tracks will often be found to be worn off more than the other, i.e., the vertical dimensions of the side links along one side of the track will be less than the corresponding dimensions of the other links. A track worn in this way has long represented a problem, particularly in reassembly after it is taken down and the pins and bushings reset or replaced where necessary. For example and referring to FIG. 5 assume that the underside of the side link B is worn off a quarter inch more than that of side link C. Obviously if the side links are simply laid on the table without regard to this condition and squeezing pressure brought to bear the parts will not properly line up and broaching, breaking or distortion is the inevitable result. But directing attention to FIG. 6 this condition may be readily compensated for by angling or "cocking" the table 17 as indicated in dotted lines so that the more severely worn side links will in effect be raised relative to those on the other side of the track, the parts will be properly aligned and this problem will be met. Obviously the work table may be angled in either direction to suit the track being worked upon, merely by differentially adjusting the hand wheels 24—25.

The short stroke feature of our press and its compact construction in general are both of importance also in reducing the floor space necessary for a press of a given capacity. Floor space in factory or shop, and compactness and relative light weight for portable uses, are all important factors having a distinct bearing upon the expense of operation of the machine and the margin of profit. The construction of the end castings 31—32 which contain the cylinders 33—34, the manner in which these are tied together by the rods 39, 42, 74, 75, the bucker frame 65 which provides support for the retractable jaw and the manner in which this assembly is mounted upon the main frame 10 are all important features in this respect also. The forces and pressure exerted by the rams are necessarily of such magnitude that an extremely strong and heavy press structure would be required to resist them without yielding to any degree and the cost of such a structure would be prohibitive for most operators of track servicing businesses. But in our press, while the structure is more than adequately strong, there is also permitted very slight movement as the forces reach their very peaks and properly controlled as it is here this permits the parts subject to the greatest forces to in effect "roll with the punch" enough to effect a substantial saving in weights and costs of the materials going into the construction. What is meant here is that as the ultimate force is exerted by the rams 35—36 they and the end castings may move apart a very slight distance, the tie rods 39, 42, 74 and 75 all stretching a very slight amount and this will in no way interfere with nor deter from the effectiveness and overall operation of the press. It is for this reason that the end castings 31—32 are slidably mounted beneath the clips 48 upon the frame beams 11—12 and when the strain on these parts diminishes the resilient elements 50 will re-center this entire structure. The load forces as represented by the pressures exerted upon the rams 35—36 is also slightly off-center vertically on the castings 31—32 as viewed from the front (FIG. 7) creating a sort of cantilever action but regardless of how the stresses and strains on the components are analyzed experience has demonstrated that the structure will stand up to the work in a highly satisfactory manner.

In FIGS. 12 through 16 we illustrate a modification of our invention which not only relates to variations in the structure of the track press itself but shows another way in which the track may be moved a section at a time into the press. Again there is provided a main frame, here designated generally at 125, of what is commonly called C-frame construction and consisting of forwardly-rearwardly connected heavy front and rear plates 126—127 the end portions of which project upwardly as clearly shown. Thus there is an intervening work space centrally of which is a track support means or work table 128 located at a convenient height from the floor line 129. Heavy tie plates 130—131 join the front and rear plates 126—127 and extend at upper ends up to the higher ends of said plates 126—127. A longitudinal rod 132 extends horizontally through the tie plates 130—131 some distance above the lower ends thereof and heavy nuts 133 are threaded on the outer ends of this rod, bearing on the outer surfaces of the tie plates (FIG. 13). Retractable, i.e., movable upwardly and downwardly through the work table 128 is a jaw 134 in the form of a removable insert block in the upper end of a jaw carrier 135, these two parts having a mating tenon and groove or equivalent fastening as previously described and accordingly not here shown again. The jaw carrier 135 is forked to provide a vertical slot 136 slidably straddling the rod 132 and the resultant legs 137 slide in the front and rear notches 138 in a compression yoke 139 held in place by spaced apart collars 140 on the rod 132. The upper part of the jaw carrier 135 is recessed at 141 (FIG. 13) forming a horizontal surface engaged by a roller 142 on a lever 143 fulcrumed at 143a on the frame and pivoted at its lower end to a generally horizontally extending piston rod 144 connected to a piston 145 in an actuating cylinder 146 pivotally attached at 147 to the tie plate 130, said piston rod 144 when reciprocated by the admission of compressed air, for example, to one end or the other to the cylinder 146 oscillating the lever 143 and raising or lowering the jaw 134 relative to the work table 128. Heavy support bars 148 extend forwardly-rearwardly between the upper edges of the front and rear frame plates 126—127 at opposite sides of the jaw carrier 135 to support the jaw against lateral stresses and strains.

The forward and rearward extremities of the upper ends of the tie plates project over the upper edges of the front and rear plates 126—127 and bear outwardly against the upwardly projecting ends of the front and rear

plates as designated at 149 in FIG. 12. The bars 148 have oppositely extending vertically apertured lugs 150 through which are vertically slidable work table carrier studs 151, one adjacent each corner of the table 128, and at each side these studs 151 are pivoted at 152 to the upper ends of links 153 the lower ends of which are pivoted at 153a to front and rear nuts 154 threaded upon elongated adjustment screws 155 one at each side of center and below the work table. The screws 155 are reversely threaded to engage the nuts 154, are journaled through suitable bearings 156 in the front and side plates and at forward ends are provided with kerfs 157 so that by application of a suitable crank or hand wheel (neither shown) the screws may be rotated. At rear ends the screws 155 at each side are connected by sprocket and chain mechanism 158 to rotate in unison and such rotation, by varying the angle of the links 153 and thus raising and lowering the studs 151, will adjust the height of the work table 128 as will be readily understood. The upper ends of the studs 151 are attached in any suitable way to the work table 128, as by the cap screws indicated at 160.

The jaw 134, like the aforesaid jaw 58, has spaced apart transverse grooves or notches 161 to receive the bushings E—E' of two adjacent sections A—A' of track (FIG. 15) and when the work table 128 is properly adjusted the side links B—C of the track section will rest upon the table as the track is worked upon. The work is carried out by ram elements denoted collectively at 162 of which there are two at each side of the path of the track and which extend horizontally toward each other from left and right hand ram heads 163—164. The left hand ram head 163 is operated by rams 165—166 slidable in front and rear cylinders 167—168 while the right hand ram heads 164 are similarly powered by front and rear rams 169—170 operating on front and rear cylinders 171—172 (FIG. 12). The front ram elements 162 at each side are threaded at 173 into their ram heads 163—164 while the rear ram elements are arranged for forward-rearward adjustment in any suitable manner (as by T-slots and bolts as has been previously described) in order that the effective front to rear spacing of the ram elements may be adjusted according to the pitch of the track being worked. The cylinders 167—168 and 171—172 are secured by heavy cap screws 174 to the upper end portions of the tie plates 130—131 and at their outer ends the cylinders are traversed by yoke castings 175—176. Limit rods 177—178 are secured at inner ends to the center portions of the ram heads 163—164 and extend in opposite directions outward slidably through the castings 175—176, these outer ends having nuts 179—180 so that as these nuts are adjusted to properly contact the castings the travel of the ram elements 162 toward each other may be accurately limited and the track properly reassembled to fit its shoes F as has been previously described.

Each ram element 162 has an end socket as designated at 181 in FIGS. 15 and 16 and for disassembling a track section the front ram elements will be fitted with bushing pushers or pushing tools 182 (FIG. 15) while the rear ram elements will receive pin pushing tools 183, these tools being proportioned as to diameter and length so that as the ram elements move in from first one side of the track section and then the other the pins and bushings will be pushed free from the side links exactly as has been heretofore described. In assembling the track section (FIG. 16) the ram elements will be fitted with proper front and rear tools 184—185, the side links will be laid alongside the jaw and as the ram elements move inward in unison the side links will be forced back upon the bushing E and pin D supported in the jaw. Thus the operation is exactly as has been described, this press differing from that of FIGS. 1 et seq. chiefly in the use of the four cylinders 167, 168 and 171, 172 with a consequent possible added power, and in the frame 125 which is heavier and stronger.

Here again power actuated track pushing means or mechanism designated generally at 186 is provided for moving the track to the press and includes a frame having spaced apart end plates 187—188 joined at the front by upper and lower channels 189—190 secured to the rear plate 126 by cap screws 191. At the lower rear of this assembly upper and lower bars 192—193 are welded or otherwise suitably secured to the end plates 187—188. This assembly thus forms a rearward extension of the main frame 125, in line with the work table 128 thereon and the track coming off a roller conveyor, a part of which appears at 194 in FIGS. 12 and 14, travels across a support plate 195 toward jaw 134, said plate (FIG. 14) being pivoted at 196 at its rear end to upper rear corners of the end plates 187—188 and resting at its forward edges upon a rearwardly extending ledge 197 (FIG. 14) on the rear of the work table so that this forward end of the plate will swing upwardly and downwardly as the level of the work table is adjusted.

Pivoted at a lower forward corner at 198 between the lower fore portions of the end plates 187—188 is a stirrup 199 of triangular configuration to one corner of which is pivotally attached at 200 the ram 201 of an upwardly extending cylinder 202, preferably operated by compressed air to reciprocate said ram. The upper end of the cylinder 202 is pivotally attached at 203 to a bracket 204 suspended from a cross bar 205 joining the end plates 187—188. The remaining upper forward corner of the stirrup has fixedly attached thereto the lower end of a cylinder 206 from which there upwardly extends a reciprocal ram 207. A track engaging finger 208 is secured to the upper end of the ram 207. This ram 207 is also preferably operated by compressed air. A pair of spaced arms 209 are fixed to the stirrup 199 and extend rearwardly, being joinel by a slotted connector 210 through the slot in which passes an elongated, upright adjustment stud 211 secured at upper and lower ends to the aforesaid bars 192—193. The upper and lower end portions of the stud 211 are threaded to receive upper and lower pairs of lock nuts 212—213. The support plate 195 has a forwardly and rearwardly extending slot 214 (FIG. 12) upwardly through which the finger 208 may be projected by actuating the ram 207, this slot being centered with jaw 134.

The arrangement of this track feed mechanism 186 is such that, with the track extending forwardly over the plate 195 the ram 207 may be retracted and then in the starting position of FIG. 14 the ram 201 is drawn upwardly to turn the stirrup 199 in a counterclockwise direction as is indicated by the several dotted line positions. Upward projection of the ram 207 will thrust the finger 208 upwardly between the side links of a track section and as the stirrup continues its motion the finger will engage one of the bushings and push the entire track string along. At the same time the arms 209 will rise at their rear ends until the slotted connector 210 strikes the upper stop nuts 212 putting a stop to this movement. The nuts 212 will, of course, be so adjusted that the track will be moved exactly the distance necessary to move one track section accurately into position for engagement by the jaw 134. As the stirrup 199 moves back the finger 208 will be retracted to clear the track and the lower stop nuts 213 will stop this movement at the point where a repeat of the operation just described will move another track section accurately into place, as will be understood. Once the nuts 212—213 are adjusted no further attention will be required as long as track of the same pitch is worked upon.

It is understood that suitable modifications may be made in the structure as disclosed, provided such modifications come within the spirit and scope of the appended claims. Having now therefore fully illustrated and described our invention, what we claim to be new and desire to protect by Letters Patent is:

1. In a press for assembling and disassembling the tracks of crawler tractors which tracks include a series of

pivoted sections each comprising a pair of spaced apart side links into which are press fitted the ends of transversely extending telescoped bushings and pins, the combination comprising a frame, a support on the frame for adjacent track sections, a jaw positionable between the side links of a track section and having at two sides thereof upright parallel side walls for its entire height to support each side link against lateral thrust from opposite sides of the track and for upwardly supporting the bushings and pins of one pivoted section, two pairs of ram elements on the frame respectively facing one of said two sides of the jaw, means for selectively reciprocating the ram elements toward and away from the track section engaged by said jaw, said ram elements having means for selectively and detachably attaching means for engaging the pins, bushings and side links the pins and bushings engaging means being operative upon movements of the ram elements on one side of the jaw toward the track to force the pins and bushings first in one direction and then in the opposite direction upon movements of the ram elements on the other side of the jaw to free them from first one side link and then the other in disassembling the track the side links engaging means being operative upon simultaneous movements of all ram elements to press the side links from opposite directions back upon the opposite ends of the pins and bushings in reassembling the track, the means for engaging the pins, bushings and side links being on the ram elements only at different times for respectively disassembling and assembling a tread, the said jaw being retractable from the path of the track section after it has been worked upon, first stop means attached to said ram elements and reciprocable therewith, second stop means on said frame extending transversely across the paths of reciprocation of said first stop means and coacting therewith to limit movements of said ram elements, one of said stop means being adjustable, means for advancing the track over said support while the jaw is retracted to position the next track section for work, said last mentioned means including a conveyor having rollers supporting the track for movement toward the press, and manually controlled power actuated means for revolving said rollers to feed the track toward the press.

2. A track press for assembling and disassembling the tracks of crawler tractors and which tracks include a series of pivoted sections each comprising a pair of spaced apart side links into which are press fitted the ends of transversely extending telescoped bushings and pins, said press comprising a frame, a support on the frame for receiving track sections, a jaw positionable between the side links of a track section and having at two sides thereof upright parallel side walls for its entire height to support each side link against lateral forces exerted from opposite sides of the track and the pins and bushings in an upward direction, a pair of ram elements on the frame on one side of the jaw and a pair of ram elements on the frame on the opposite side of the jaw, said pairs of ram elements facing respectively a different one of said two sides of the jaw, means for selectively reciprocating the ram elements toward and away from the track section engaged by said jaw, said ram elements having means for selectively and detachably attaching means for engaging the pins, bushings and side links the pins and bushings engaging means when on the elements being operative upon short stroke movements of the ram elements on one side of the jaw toward the track to force the pins and bushings first in one direction and then in the opposite direction upon short stroke movements of the ram elements to free them from first one side link and then the other in disassembling the track, the side link engaging means when on the elements being operative to press the side links from opposite directions back upon the opposite ends of the pins and bushings in reassembling the track, the said jaw being retractable from between each track section after it has been worked upon, first stop means attached to said ram elements and reciprocable therewith, second stop means on said frame extending transversely across the paths of reciprocation of said first stop means and coacting therewith to limit movements of said ram elements, one of said stop means being adjustable, means for advancing the track over said support while the jaw is retracted to position the next track section for work, said last mentioned means including a conveyor having power operated rollers supporting the track for movement toward the press, and a winch for pulling the track onto said conveyor.

3. A track press for operation upon the treads of crawler tractors and which treads include a series of pivoted sections each comprising a pair of spaced apart side links into which are press fitted the ends only of transversely extending telescoped and relatively rotatable bushings and pins, said press comprising a frame, a support on the frame for adjacent tread sections, a jaw retractably positionable between the side links of a tread section and having upright side walls to support each side link against lateral thrust from opposite sides of the tread, thrust reaction guide means rigidly affixed to said frame and operatively associated with said jaw to support said jaw on each side thereof against transverse movement in either lateral direction, said thrust reaction guide means including a bucker frame extending beneath said support longitudinally of said frame and rigidly connected to said frame at opposite ends thereof, spaced parallel plate means joined to and extending downwardly from said bucker frame, yoke means joining said plate means beneath said bucker frame, said jaw having a pair of upwardly opening spaced apart transverse grooves to receive the telescoped pins and bushings of the tread, a pair of ram elements on the frame at each side of the jaw, means including a fluid cylinder and a fluid driven element connected for reciprocating each pair of ram elements toward and away from the tread section engaged by said jaw, and said ram elements having means for engagement with outer sides of the links and operative upon short stroke movements of the ram elements at the same time toward the jaw to force the links upon the ends of the pins and bushings.

4. For disassemblying a tractor tread consisting of a plurality of paired and transversely spaced-apart side links pivotally and respectively interconnected by telescoped pins and bushings, a frame, tread support means on the frame, a selectively actuatable hydraulic cylinder on each side of said frame, each such cylinder having work element support means adapted to move toward and away from the tread support means in response to said cylinder, a vertically retractable jaw operatively associated with the tread support means and adapted to upwardly support the pins and bushings, said jaw having upright parallel side walls adapted to abut the inner sides of said side links, thrust reaction guide means rigidly affixed to said frame and operatively associated with said jaw to support said jaw on each side thereof against transverse movement in either lateral direction, said thrust reaction guide means including a bucker frame extending beneath said support longitudinally of said frame and rigidly connected to said frame at opposite ends thereof, spaced parallel plate means joined to and extending downwardly from said bucker frame, yoke means joining said plate means beneath said bucker frame, each work element support means adapted to support two work elements which are respectively aligned with a like work element on the other of said work element support means, the first aligned work elements being adapted for engaging a bushing, the second aligned work elements being adapted for engaging a pin, the elements on each side being spaced apart such that one pin and one bushing are simultaneously engaged thereby for pushing the engaged pin and bushing from one side link, and the jaw supporting the side link against lateral movement thereof.

5. A track press for assembling and disassembling the

components of a track or tread including pivotally related track links and cross members in the form of pins and bushings wherein said pins and bushings are separated from the track links by separately pressing the pins and bushings inwardly of the side links, first from one side link of a track section and then from the other side link of the same track section, comprising a frame including a supporting table for supporting the tread, a vertically retractable jaw operatively associated with said table for upward supporting engagement with said cross members and for engaging the inner sides of said side links to support said side links against lateral movement, said jaw including a pair of horizontally disposed spaced apart recesses to receive said cross members, a first and second cylinder secured to the frame at opposite sides of the table, a fluid pressure actuated ram movable in each said cylinder toward and away from opposite sides of said tread, each such ram having a work element connected thereto to move toward and away from the jaw as the rams are moved and adapted to operatively engage and adjust said tread components with respect to each other for assembling or disassembling the same, adjustable means for controlling the movement of said rams and positively regulating said adjustment of said tread components, a conveyor for supporting the tread at substantially the level of the table, a power source connected to said conveyor to drive the same, said conveyor comprising a plurality of horizontally disposed rotatable elements, said power source being reversible to selectively move the tread toward or away from said table, means supporting said table for upward and downward movement with respect to the frame for properly adjusting the tread into position for engagement with the work elements, said supporting means for the table including means for raising one side of the table more than the other to place unevenly worn treads into position for engagement with the work elements.

6. A track press for assembling and disassembling the components of a track or tread including pivotally related track links and cross members in the form of pins and bushings wherein said pins and bushings are separated from the track links by separately pressing the pins and bushings inwardly of the side links, first from one side link of a track section and then from the other side link of the same track section, comprising a frame including a supporting table for supporting the tread, a vertically retractable jaw operatively associated with said table for upward supporting engagement with said cross members and for engaging the inner sides of said side links to support said side links against lateral movement, said jaw including a pair of horizontally disposed spaced apart recesses to receive said cross members, a first and second cylinder secured to the frame at opposite sides of the table, a fluid pressure actuated ram movable in each said cylinder movable toward and away from opposite sides of said tread, each such ram having a work element connected thereto to move toward and away from the jaw as the rams are moved and adapted to operatively engage and adjust said tread components with respect to each other for assembling and disassembling the same, adjustable means for controlling the movement of said rams and positively regulating said adjustment of said tread components, a conveyor for supporting the tread at substantially the level of the table, a power source connected to said conveyor to drive the same, said conveyor comprising a plurality of horizontally disposed rotatable elements, said conveyor being reversible to selectively move the tread toward or away from said table, means supporting said table for upward and downward movement with respect to the frame for properly adjusting the tread position for engagement with the work elements, said supporting means for the table including means for raising one side of the table more than the other to place unevenly worn treads into position for engagement with the work elements, said work elements comprising a pair of work members connected to each of said rams, each of said work members being aligned with a similar work member, the first pair of aligned work members being adapted to engage a bushing, the second aligned work members being adapted to engage a pin, the work members secured to the same ram being spaced apart such that one pin and one bushing are simultaneously engaged thereby for pushing the engaged bushing and pin from one side link with said jaw supporting said side link against lateral movement.

References Cited in the file of this patent

UNITED STATES PATENTS

385,371	Patterson	July 3, 1888
1,054,557	Jensenius	Feb. 25, 1913
1,946,911	Lindberg et al.	Feb. 13, 1934
2,268,225	Rodgers	Dec. 30, 1941
2,392,251	Matthews	Jan. 1, 1946
2,499,336	Leerlink et al.	Feb. 28, 1950
2,500,791	Baldwin	Mar. 14, 1950
2,593,588	McDonald	Apr. 22, 1959
2,895,289	Wognum	July 21, 1959

FOREIGN PATENTS

383,415	Great Britain	Nov. 17, 1932

OTHER REFERENCES

Germany, H 16432 (II/63d), December 15, 1955.