O. H. SPENCER & F. J. OAKES.

SILENT CHAIN ASSEMBLING MACHINE.

APPLICATION FILED APR. 24, 1916.

1,256,944.

Patented Feb. 19, 1918.

4 SHEETS—SHEET 1.

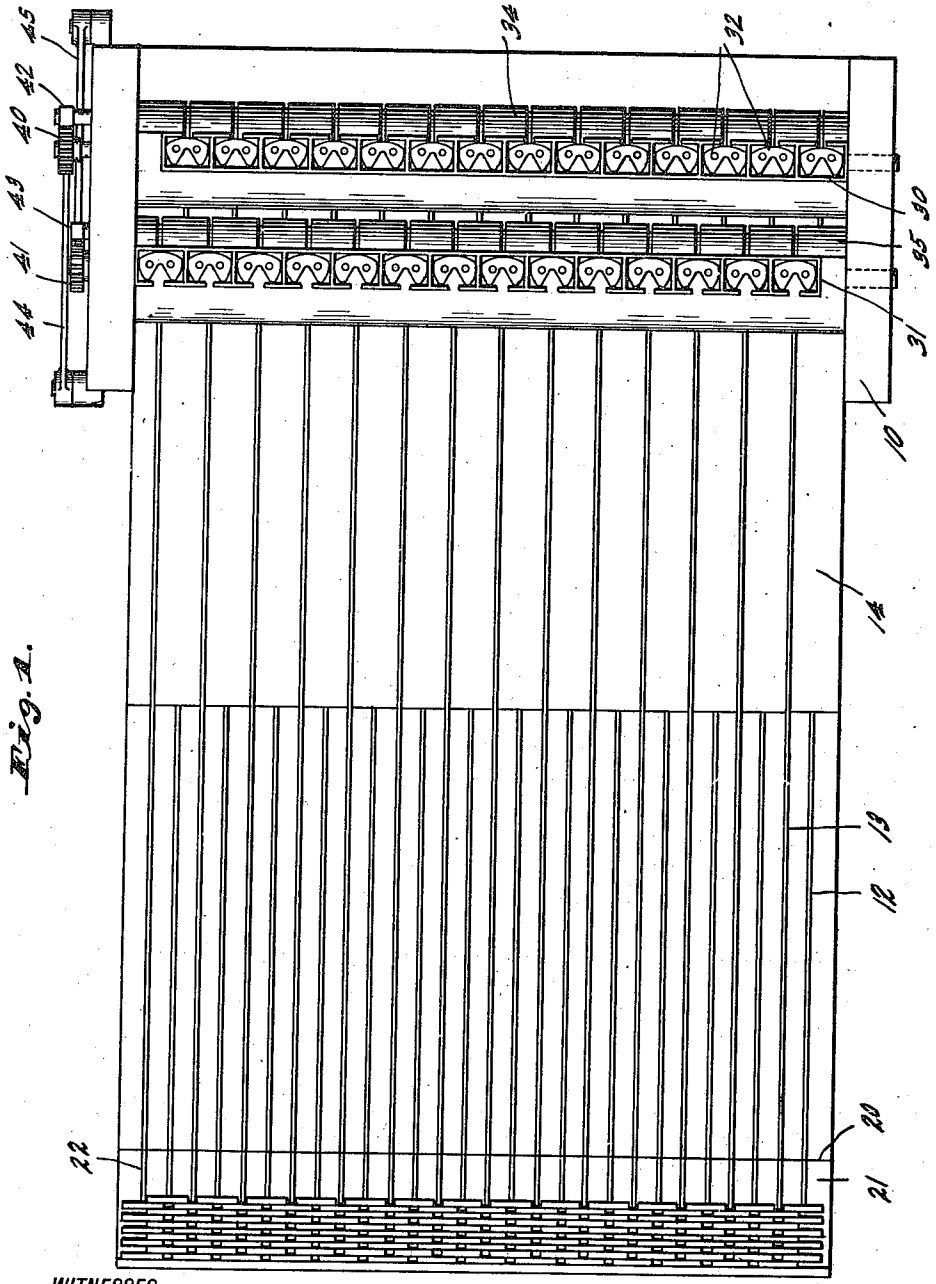


Fig. A.

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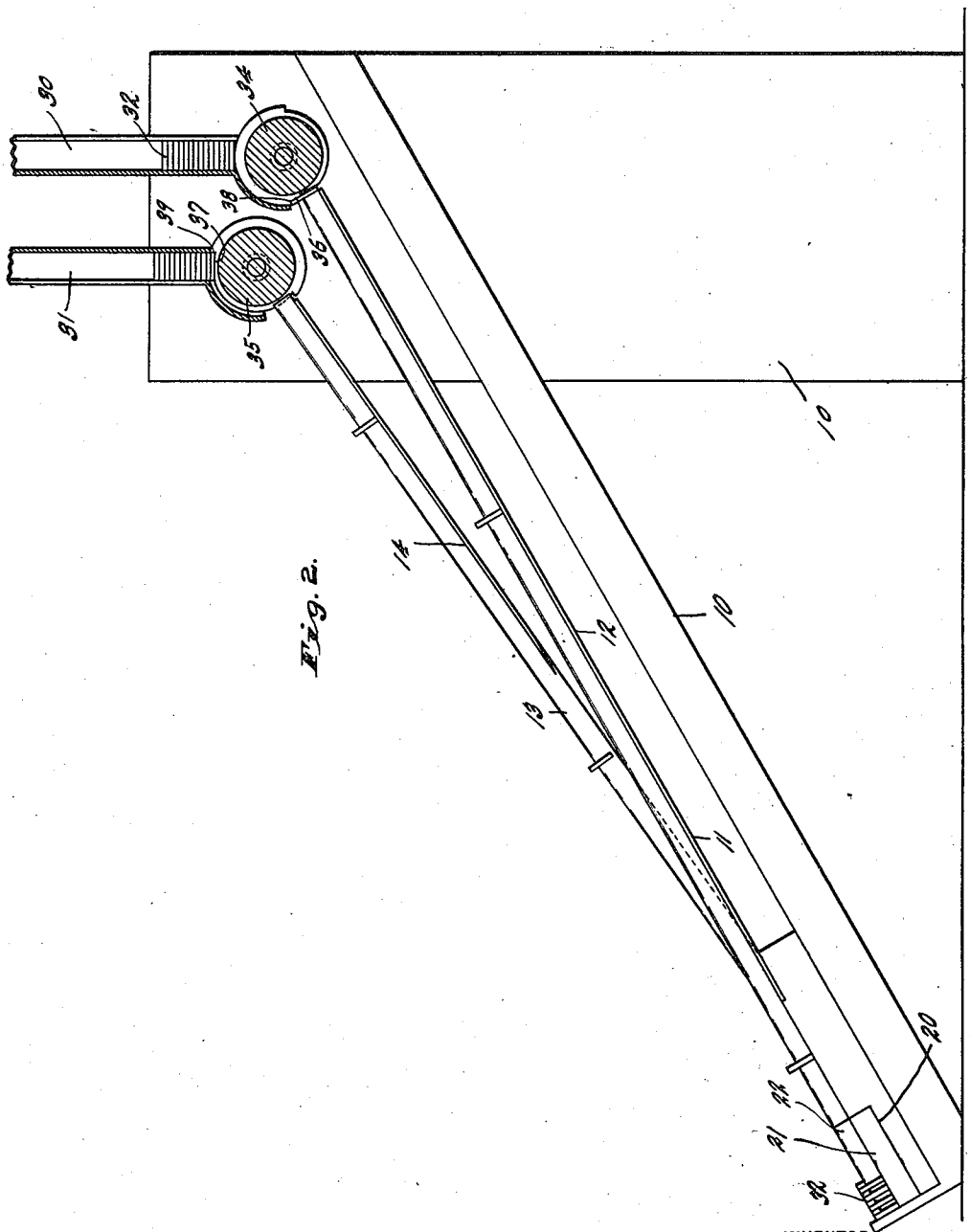


Fig. 2.

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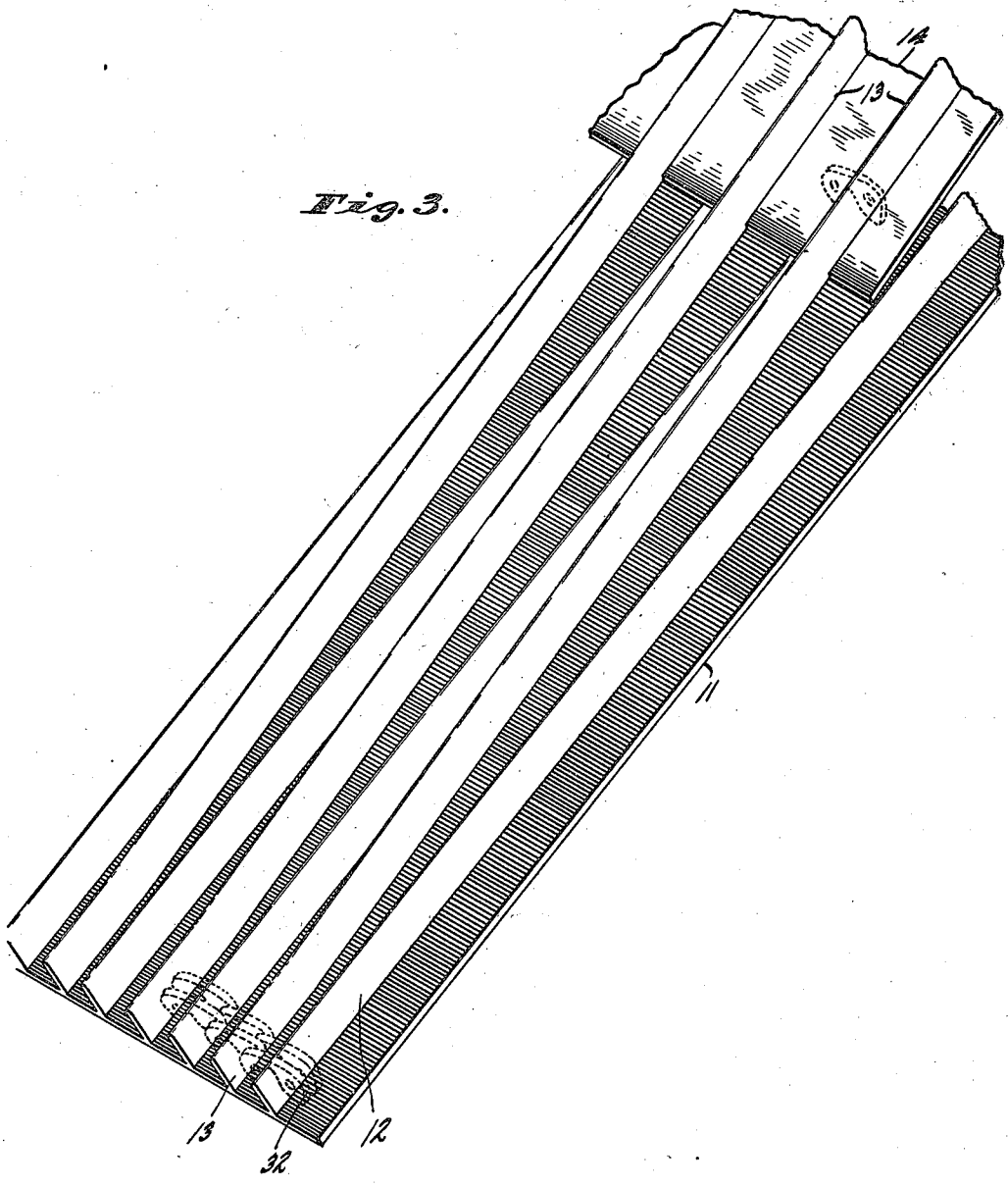
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4 SHEETS—SHEET 3.

Fig. 3.



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4 SHEETS—SHEET 4.

Fig. 4.

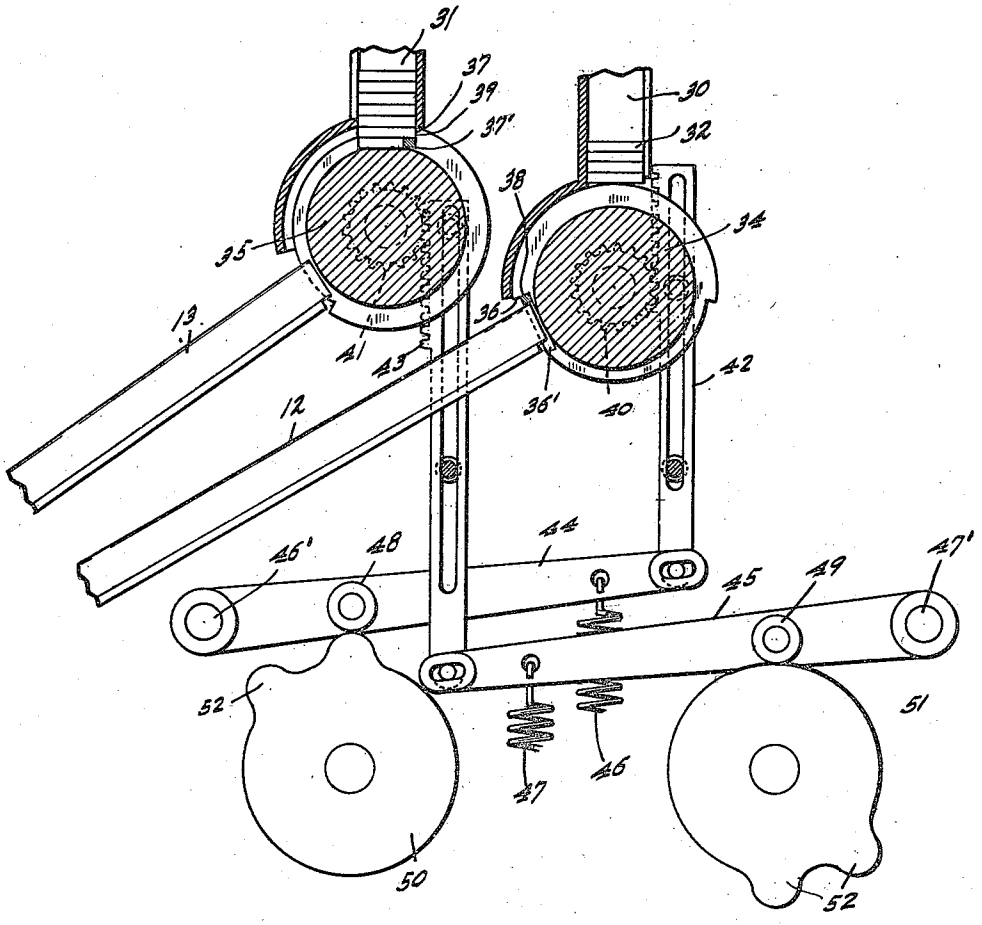
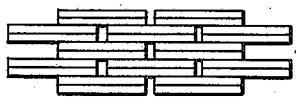


Fig. 5.



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UNITED STATES PATENT OFFICE.

OWEN H. SPENCER AND FRANK J. OAKES, OF INDIANAPOLIS, INDIANA, ASSIGNORS TO LINK-BELT COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

SILENT-CHAIN-ASSEMBLING MACHINE.

1,256,944. Specification of Letters Patent. Patented Feb. 19, 1918.

Application filed April 24, 1916. Serial No. 93,324.

To all whom it may concern:

Be it known that we, OWEN H. SPENCER and FRANK J. OAKES, citizens of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented a new and useful Silent-Chain-Assembling Machine, of which the following is a specification.

In the manufacture of silent chains, it has heretofore been necessary to assemble the chain by placing the links in position manually, so that it was necessary to handle each link individually. This required great labor and expense.

It is the object of our invention to provide means for assembling the links of a silent chain automatically so that it is only necessary to insert the pivot pins to complete the chains.

The accompanying drawings illustrate our invention. Figure 1 is a plan view of an assembling apparatus embodying our invention; Fig. 2 is a side elevation thereof; Fig. 3 is a perspective view of a fragment of the assembling slide rails and base; Fig. 4 is an enlarged detail, partly in section and partly in side elevation, showing the mechanism for depositing the links from the magazines on to the slide rails; and Fig. 5 is a fragmentary view of part of the assembled chain.

A frame 10 suitably supports an inclined slide-base 11 projecting from the upper face of which are a number of strips 12 and 13 alternating with each other. The strips 12 remain in contact with the slide base 11 for the full length of the latter, but the strips 13 are in contact with the base 11 only at their lower ends, and a short distance away from such lower ends are bent up at a slight oblique angle thereto, as clear from Figs. 2 and 3, the upper parts of the strips 13 being provided with a second slide base 14 like the base 11 but even at its lower edge sufficiently far above the tops of the strips 12 so that links which slide down astride the strips 12 clear such slide base 14, as clear from Fig. 2. The strips 12 and 13, with the slide bases 11 and 14, in effect comprise groups of slides or link conveyers such as shown in the co-pending application of Frank J. Oakes, Ser. No. 93,326, of even filing date herewith. Each strip coöperates with the adjacent part of the slide base 11 or 14 to form a conveyer down which links may slide astride the strips. Adjacent strips 12 and 13 are spaced apart by such a distance that the pitch holes for receiving the pivot pins in links astride strips 12 register with those in the overlapping links astride adjacent strips 13, when such links reach the lower end of the slide base 11, this spacing between strips being equal to the pitch of the chain.

The strips 12 and 13 do not extend all the way to the lower end of the base 10, but the lower end of such base is provided with a transverse groove 20 for receiving a removable assembling plate 21 which has a series of ridges or slide rails 22 registering with the strips 12 and 13 when the assembling plate is in place. Usually a number of these assembling plates 21 are provided, for interchangeable mounting in the groove 20, so that one assembling plate with a length of chain assembled thereon may be removed and another put in its place to receive another length of chain.

At their upper ends, the strips 12 and 13 receive their supplies of links from two sets of magazines 30 and 31. These magazines are conveniently vertical, and of such size that each can receive within it a pile of silent chain links 32 with the links arranged flatwise one on top of the other with their respective link points and pitch holes all registering, and the link points all pointing in the same direction—to the left in Figs. 1, 2, and 4. The mechanism for getting the links into their side-by-side arrangement forms the subject-matter of other inventions. The magazines of the group 30 are arranged so that the crotches of the links 32 within them are in the same vertical planes with the respective strips 12, and the magazines of the group 31 are arranged so that the crotches of the links 32 within them are in the same vertical planes with the respective strips 13. At the bottoms of the two groups of magazines 30 and 31 are two placing cylinders 34 and 35 rotatable on horizontal axes and provided with circumferential grooves in the planes of the strips 12 and 13, into which grooves such strips project, as clear from Figs. 2 and 4. The cylinders 34 and 35 are also provided with flattened portions or pockets 36 and 37 extending longitudinally of the cylinders and having shoulders 38 and 39 at their rear or clockwise ends (Figs. 2 and 4). These pockets 36 and 37 are of proper depth to receive single links

(or any other desired number of links), and may be varied in depth, as by shims 36′ and 37′; and may be moved to register either with the lower ends of the magazines 30 and 31, in which position the cylinder 35 is shown in Figs. 2 and 4, or to register with the strips 12 and 13, in which position the cylinder 34 is shown in such two figures. The cylinders 34 and 35 are operated alternately, so as to deposit links alternately on the slide rails 12 and on the slide rails 13; and each may be moved any desired number of times at each period of operation while the other remains at rest, so as to provide any desired final grouping of the links on the assembling plate 21.

The desired motion of the cylinders 34 and 35 can be obtained in various ways. One simple way is shown in Fig. 4. Here the cylinders 34 and 35 are provided at one end with gears 40 and 41, which mesh with vertically sliding racks 42 and 43 suitably guided in their movements and connected at their lower ends to levers 44 and 45 which may be spring-pressed downward by springs 46 and 47. These levers 44 and 45 are suitably mounted on pivot pins 46′ and 47′ and are provided with rollers 48 and 49 which cooperate with cams 50 and 51, each of which may have any desired number of cam projections 52.

In operation, the magazines 30 and 31 are suitably filled with links 32, and an assembling plate 21 is placed in the groove 20. Then the cams 50 and 51 are rotated. As each cam projection passes under the roller 48 and 49, it first elevates such roller and then allows it to fall under the action of the springs 46 and 47, thus turning the associated cylinder 34 or 35 from the position in which the cylinder 35 is shown in Fig. 4 to the position in which the cylinder 34 is shown in such figure and return, thereby removing one link (or more than one if desired) from the bottom of each magazine of the group 30 or 31 and depositing such link astride the corresponding slide rail 12 or 13 with the points of the link downward. With two cam projections 52 on each cam 50 and 51, there will be two complete movements of the cylinder 34, then two complete movements of the cylinder 35, then two complete movements of the cylinder 34, and so on, as long as the rotation of the cams 50 and 51 continues. Thus two links are placed on each slide rail 12, then two links on each slide rail 13, then two links on each slide rail 12, and so on, groups of two links each being placed alternately on the slide rails 12 and the slide rails 13. As the cylinders 34 and 35 rotate, the links are held in the pockets 36 and 37 by guide plates 55 until the end of the counter-clockwise rotation (Figs. 2 and 4), but pass out from under such guide plates when the slide rails 12 or 13 are reached, so that the links will slide out of the pockets 36 and 37 on to the slide rails 12 and 13. The links slide down the slide rails 12 and 13, as shown in Fig. 2, and on to the registering ridges or slide rails 22 of the assembling plate 21, piling up on such ridges 22 in the same alternate arrangement in which they are deposited on the upper ends of the slide rails 12 and 13; this arrangement in the case shown in Figs. 4 and 5 being two links in a group with the groups overlapping and breaking joints. The number of links in a group may be varied by varying the number of cam projections 52 on the cams 50 and 51; if only one such cam projection is provided on each cam the alternating and overlapping groups of links each contain but one link, as illustrated in Figs. 1 and 2. In any case, the overlapping links have their pitch holes exactly registering, because of the spacing of the strips 12 from the strips 13 by the pitch distance, so that the pivot pins at the joints of the chain may at once be inserted.

When the desired number of links, automatically assembled in proper relationship, have thus been deposited on one assembling plate 21, that plate may be removed and another one put in its place; and the pivot pins may be inserted, either by hand or otherwise, in the registering holes in the assembled chain on the assembling plate thus removed.

We claim as our invention:

1. An assembling device for chains composed of crotched links, comprising a series of slide rails all of which have corresponding ends in the same plane and alternate slide rails of which have their other corresponding ends in different planes, and means for selectively depositing links astride the two sets of alternate slide rails near said last-named ends, said slide rails being inclined with their last-named ends higher so that the links placed thereon will slide down toward the first-named ends.

2. An assembling device for chains composed of crotched links, comprising a series of slide rails all of which have corresponding ends in the same plane and alternate slide rails of which have their other corresponding ends in different planes, and means for selectively depositing links astride the two sets of alternate slide rails near said last-named ends.

3. An assembling device for chains composed of crotched links, comprising a series of slide rails, adjacent slide rails being arranged so that the links thereon overlap properly to produce registration of the pitch holes, and means for selectively placing links on either set of alternate slide rails of said series, said slide rails being inclined so that links placed thereon will slide toward one end thereof.

4. An assembling device for chains composed of crotched links, comprising a series of slide rails, adjacent slide rails being arranged so that the links thereon overlap properly to produce registration of the pitch holes, and means for selectively placing links on either set of alternate slide rails of said series.

5. An assembling device for chains composed of crotched links, comprising a series of slide rails all of which have corresponding ends in the same plane and alternate slide rails of which have their other corresponding ends in different planes, means for selectively depositing links astride the two sets of alternate slide rails near said last-named ends, said slide rails being inclined with their last-named ends higher so that the links placed thereon will slide down toward the first-named ends, and a removable assembling plate having ridges which when the assembling plate is in place register with the respective slide rails so that links may slide from said slide rails on to said ridges.

6. An assembling device for chains composed of crotched links, comprising a series of slide rails all of which have corresponding ends in the same plane and alternate slide rails of which have their other corresponding ends in different planes, means for selectively depositing links astride the two sets of alternate slide rails near said last-named ends, and a removable assembling plate having ridges which when the assembling plate is in place register with the respective slide rails so that the links may slide from said slide rails on to said ridges.

7. An assembling device for chains composed of crotched links, comprising a series of slide rails, adjacent slide rails being arranged so that the links thereon overlap properly to produce registration of the pitch holes, means for selectively placing links on either set of alternate slide rails of said series, said slide rails being inclined so that the links placed thereon will slide toward one end thereof, and a removable assembling plate having ridges which when the assembling plate is in place register with the respective slide rails so that links may slide from said slide rails on to said ridges.

8. An assembling device for chains composed of crotched links, comprising a series of slide rails, adjacent slide rails being arranged so that the links thereon overlap properly to produce registration of the pitch holes, means for selectively placing links on either set of alternate slide rails of said series, and a removable assembling plate having ridges which when the assembling plate is in place register with the respective slide rails so that links may slide from said slide rails on to said ridges.

9. An assembling device for chains composed of crotched links, comprising a series of slide rails all of which have corresponding ends in the same plane and alternate slide rails of which have their other corresponding ends in different planes, two groups of magazines of which each magazine holds a number of links arranged flat side against flat side with their crotches registering, and means coöperating with each group of magazines and with a corresponding set of alternate slide rails of said series for removing a link from each magazine of said group and depositing it astride a slide rail.

10. An assembling device for chains composed of crotched links, comprising a series of slide rails all of which have corresponding ends in the same plane and alternate slide rails of which have their other corresponding ends in different planes, two groups of magazines of which each magazine holds a number of links arranged flat side against flat side with their crotches registering, and means coöperating with each group of magazines and with a corresponding set of alternate slide rails of said series for removing a link from each magazine of said group and depositing it astride a slide rail near one end thereof, said slide rails being inclined so that the ends at which said links are deposited are the higher ends and the links will slide down the slide rails by gravity toward the other ends thereof.

11. An assembling device for chains composed of crotched links, comprising a series of slide rails all of which have corresponding ends in the same plane and alternate slide rails of which have their other corresponding ends in different planes, two groups of magazines of which each magazine holds a number of links arranged flat side against flat side with their crotches registering, and a rotatable cylinder associated with each group of magazines and provided with a pocket which can be brought under the magazines of such group to receive a link from each of said magazines and can be moved to carry the links so received to and deposit them astride the slide rails of one of the sets of alternate slide rails of said series.

12. An assembling device for chains composed of crotched links, comprising a series of slide rails all of which have corresponding ends in the same plane and alternate slide rails of which have their other corresponding ends in different planes, two groups of magazines of which each magazine holds a number of links arranged flat side against flat side with their crotches registering, and a rotatable cylinder associated with each group of magazines and provided with a pocket which can be brought under the magazines of such group

to receive a link from each of said magazines and can be moved to carry the links so received to and deposit them astride the slide rails of one of the sets of alternate slide rails of said series at one end thereof, said slide rails being inclined so that the ends at which said links are deposited are the higher ends and the links will slide down the slide rails by gravity toward the other ends thereof.

13. An assembling device for chains composed of crotched links, comprising a series of slide rails, adjacent slide rails being arranged so that the links thereon overlap properly to produce registration of the pitch holes, a plurality of magazines of which each holds a number of links arranged flat side against flat side with their crotches registering, and means coöperating with said magazines and with said slide rails for selectively removing the links from such magazines and placing such links astride the respective slide rails of either set of alternate slide rails of said series.

14. An assembling device for chains composed of crotched links, comprising a series of slide rails, adjacent slide rails being arranged so that the links thereon overlap properly to produce registration of the pitch holes, a plurality of magazines of which each holds a number of links arranged flat side against flat side with their crotches registering, and means coöperating with said magazines and with said slide rails for selectively removing the links from such magazines and placing such links astride the respective slide rails of either set of alternate slide rails of said series near one end of said slide rails, said slide rails being inclined so that the ends at which said links are deposited are the higher ends and the links will slide down the slide rails by gravity toward the other ends thereof.

15. An assembling device for chains composed of crotched links, comprising a series of slide rails, adjacent slide rails being arranged so that the links thereon overlap properly to produce registration of the pitch holes, a plurality of magazines of which each holds a number of links arranged flat side against flat side with their crotches registering, and rotatable cylindrical means associated with said magazines and provided with pockets which can be brought under selected ones of said magazines to receive links therefrom and can be rotated to carry the links so received to and deposit them on to the slide rails of one of the sets of alternate slide rails of said series.

16. An assembling device of chains composed of crotched links, comprising a series of slide rails, adjacent slide rails being arranged so that the links thereon overlap properly to produce registration of the pitch holes, a plurality of magazines of which each holds a number of links arranged flat side against flat side with their crotches registering, and rotatable cylindrical means associated with said magazines and provided with pockets which can be brought under selected ones of said magazines to receive links therefrom and can be rotated to carry the links so received to and deposit them on to the slide rails of one of the sets of alternate slide rails of said series near one end thereof, said slide rails being inclined so that the ends at which said links are deposited are the higher ends and the links will slide down the slide rails by gravity toward the other ends thereof.

17. An assembling device for chains composed of crotched links, comprising a series of slide rails all of which have their corresponding ends in the same plane and alternate slide rails of which have their opposite ends in different planes, two groups of magazines of which each magazine holds a number of correspondingly arranged links, and means coöperating with each group of magazines and with a corresponding set of alternate slide rails of said series for removing a link from each magazine of said group and depositing it astride a slide rail.

18. An assembling device for chains composed of crotched links, comprising a series of slide rails, adjacent slide rails being arranged so that the links thereon overlap properly to produce registration of the pitch holes, a plurality of magazines of which each holds a number of correspondingly arranged links, and means coöperating with said magazines and with said slide rails for selectively removing the links from such magazines and placing such links astride the respective slide rails of either set of alternate slide rails of said series.

19. An assembling device for chains, comprising a series of guiding slide bars arranged to engage the chain links and spaced apart at one end by distances equal to the pitch of the chain, and means for selectively placing the links on said slide bars at their other ends, said slide bars being arranged so that the links slide along them by gravity toward their first-named ends.

20. An assembling device for chains, comprising a series of guiding slide bars arranged to engage the chain links and spaced apart at one end by distances equal to the pitch of the chain, and means for selectively placing the links on said slide bars at their other ends.

21. An assembling device for chains, comprising a series of slides for receiving the chain links, said slides being so spaced at one end that links thereon overlap with their pitch holes registering, and means for selectively placing chain links upon said slides near their opposite ends, said slides being inclined so that links tend to slide

along them by gravity toward said first-named ends.

22. An assembling device for chains, comprising a series of slides for receiving the chain links, said slides being so spaced at one end that links thereon overlap with their pitch holes registering, and means for selectively placing chain links upon said slides near their opposite ends.

23. An assembling device for chains composed of crotched links, comprising a series of slide rails, adjacent slide rails being arranged so that the links thereon overlap properly to produce registration of the pitch holes, and means for automatically feeding links on to and astride said slide rails.

24. An assembling device for chains composed of crotched links, comprising a series of slide rails, adjacent slide rails being arranged so that the links thereon overlap properly to produce registration of the pitch holes, means for automatically feeding links on to and astride said slide rails, and a removable assembling plate having ridges which when the assembling plate is in place register with the respective slide rails so that links may slide from said slide rails on to said ridges.

25. An assembling device for chains composed of crotched links, comprising a series of slide rails, adjacent slide rails being arranged so that the links thereon overlap properly to produce registration of the pitch holes, a plurality of magazines of which each holds a number of correspondingly arranged links, and means coöperating with said magazines and said slide rails for removing links from said magazines and placing them astride such slide rails.

26. An assembling device for chains composed of crotched links, comprising a series of slide rails, adjacent slide rails being arranged so that the links thereon overlap properly to produce registration of the pitch holes, a plurality of magazines of which each holds a number of correspondingly arranged links, and rotatable cylindrical means associated with said magazines and provided with pockets which can be brought under said magazines to receive links therefrom and can be rotated to carry the links so received to and deposit them on said slide rails.

27. An assembling device for chains, comprising a series of guiding slide bars arranged to engage the chain links and spaced apart at one end by distances equal to the pitch of the chain, and means for placing links on said slide bars at their other ends, said slide bars being arranged so that the links slide along them by gravity toward their first-named ends.

28. An assembling device for chains, comprising a series of guiding slide bars arranged to engage the chain links and spaced apart at one end by distances equal to the pitch of the chain, and means for placing links on said slide bars at their other ends.

29. An assembling device for chains, comprising a series of slides for receiving the chain links, said slides being so arranged that links correspondingly arranged on the slides are in side-by-side relationship with their pitch holes registering, and means for automatically placing chain links upon said slides, said slides being inclined so that links tend to slide along them by gravity away from the place at which they are deposited.

30. An assembling device for chains, comprising a series of slides for receiving the chain links, said slides being so arranged that links correspondingly arranged on the slides are in side-by-side relationship with their pitch holes registering, and means for automatically placing chain links upon said slides.

31. An assembling device for chains, comprising a series of slides spaced properly for receiving the chain parts, and automatic means for selectively placing said chain parts upon said slides, said slides being inclined so that said chain parts tend to slide along them by gravity away from the places at which they are deposited.

32. An assembling device for chains, comprising a series of slides spaced properly for receiving the chain parts, and automatic means for selectively placing said chain parts upon said slides.

In witness whereof we have hereunto set our hands at Indianapolis, Indiana, this 21st day of April, A. D. one thousand nine hundred and sixteen.

OWEN H. SPENCER.
FRANK J. OAKES.