(No Model.) 4 Sheets—Sheet 1.

G. HEIDLER.

STRAIGHT BAR KNITTING FRAME.

No. 490,351. Patented Jan. 24, 1893.

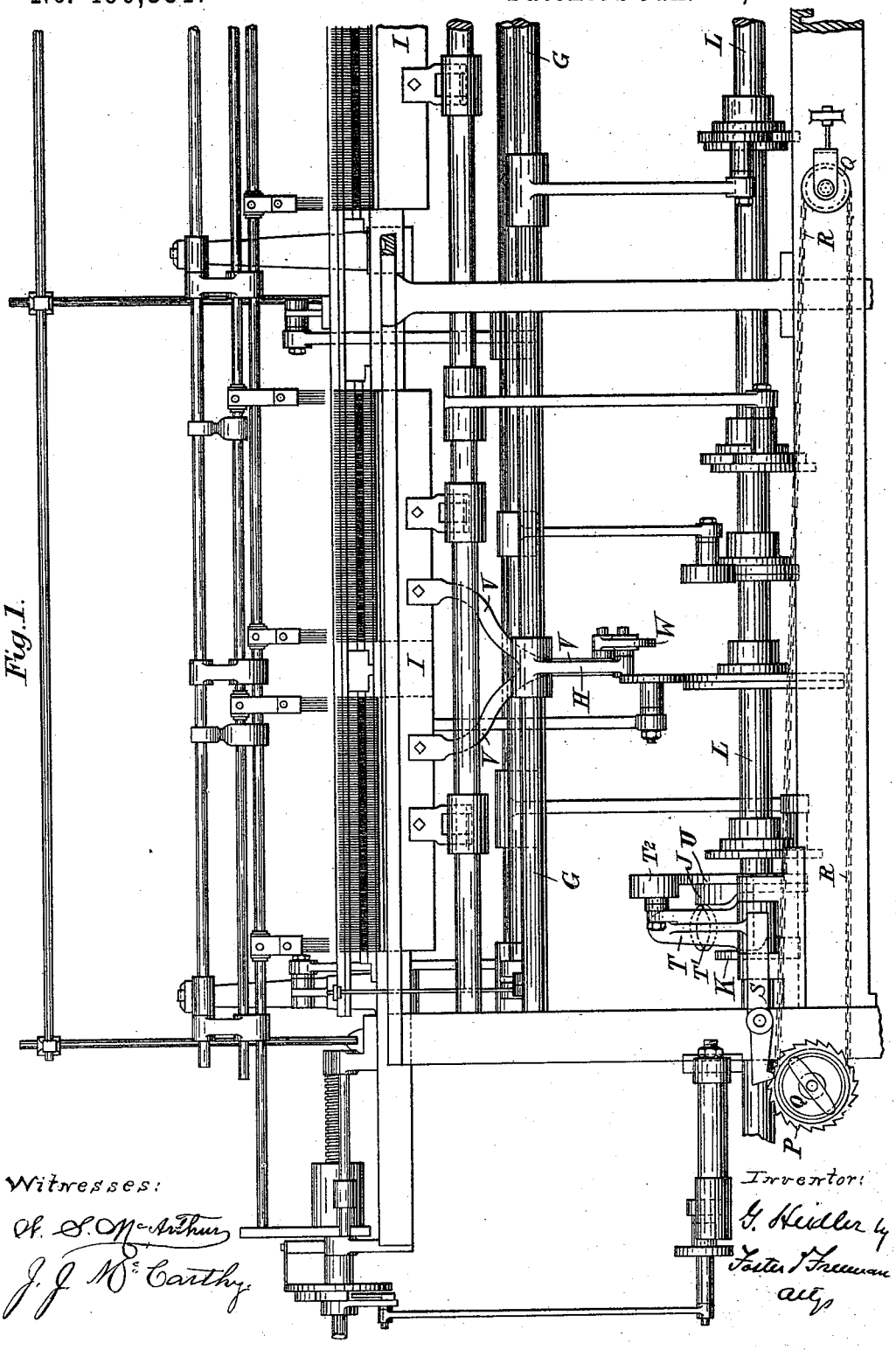

Fig. 1.

Witnesses:
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J. J. McCarthy

Inventor:
G. Heidler by
Foster Freeman
atty

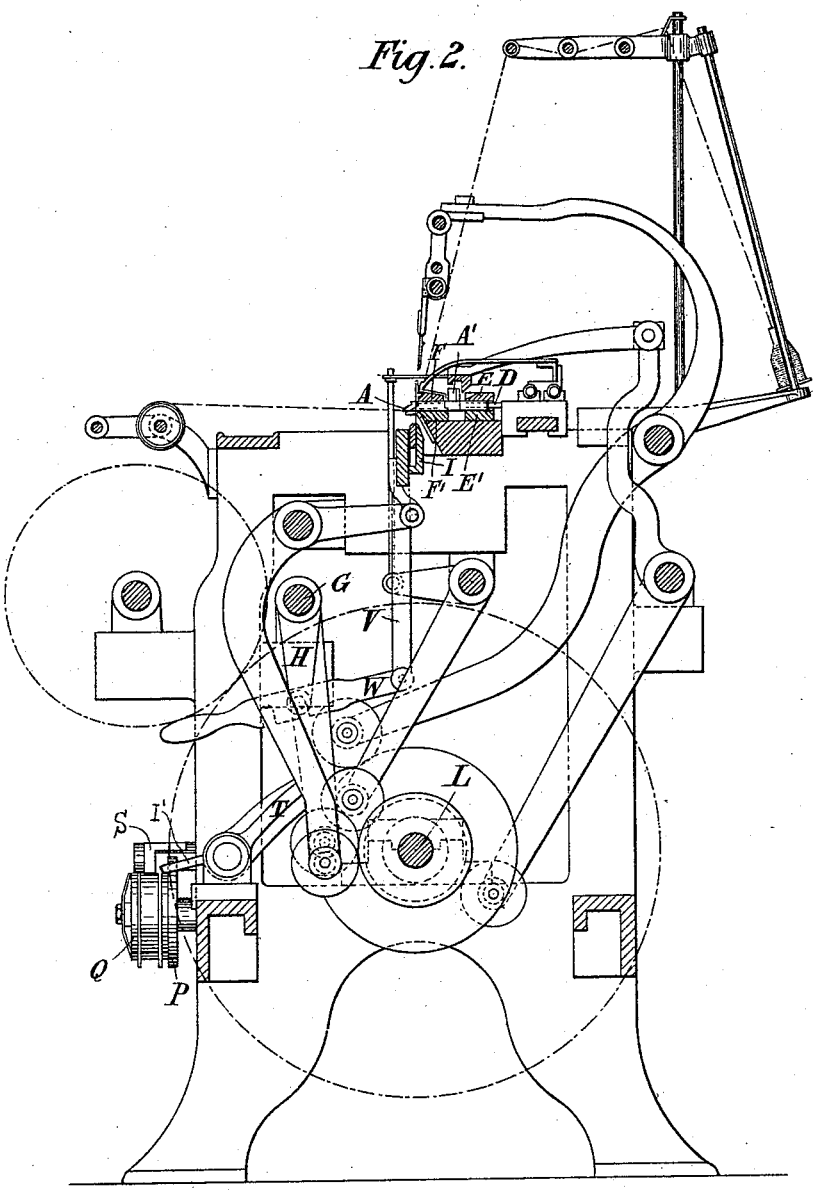
(No Model.) 4 Sheets—Sheet 2.

G. HEIDLER.

STRAIGHT BAR KNITTING FRAME.

No. 490,351. Patented Jan. 24, 1893.

Fig. 2.



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(No Model.) 4 Sheets—Sheet 3.

G. HEIDLER.

STRAIGHT BAR KNITTING FRAME.

No. 490,351. Patented Jan. 24, 1893.

Fig. 8.

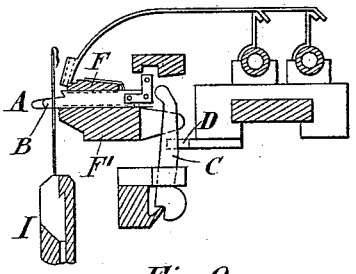


Fig. 6.

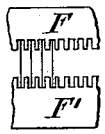


Fig. 7.

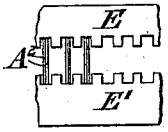


Fig. 9.

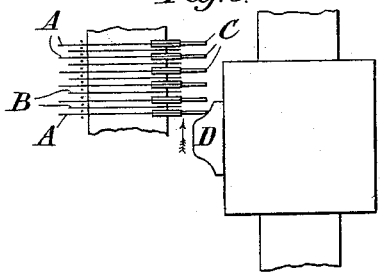


Fig. 10.

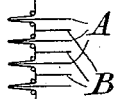


Fig. 11.

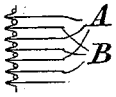


Fig. 3.

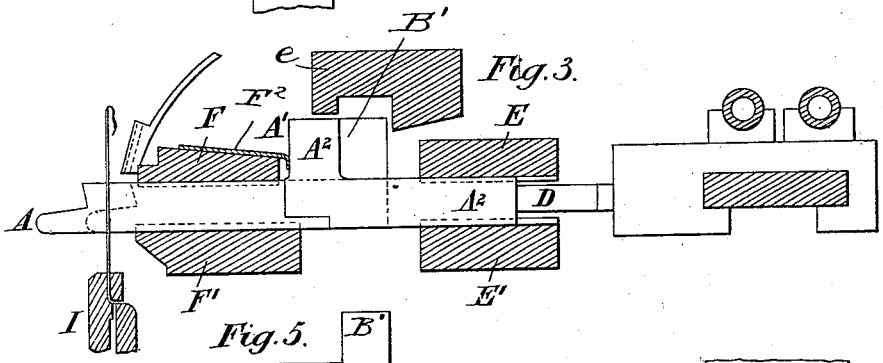


Fig. 5.

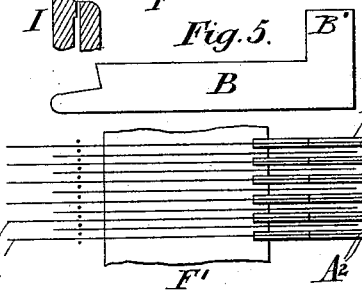
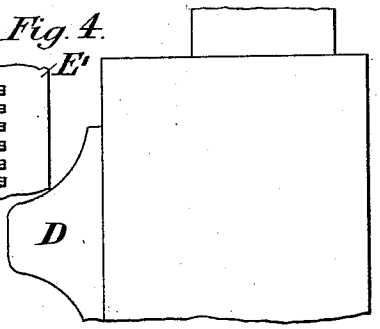


Fig. 4.



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G. HEIDLER.

STRAIGHT BAR KNITTING FRAME.

No. 490,351. Patented Jan. 24, 1893.

Fig. 12.

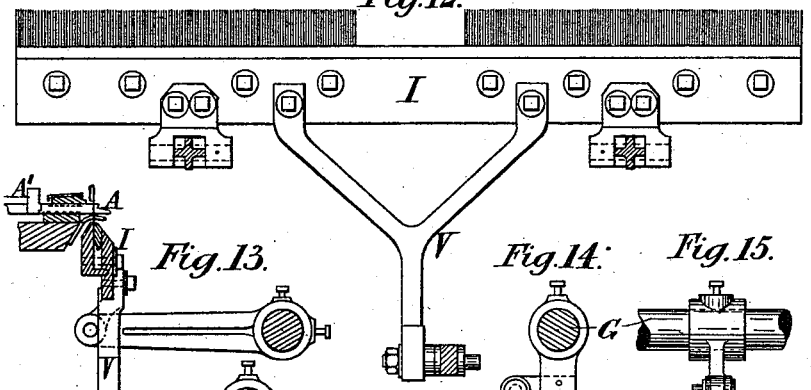


Fig. 13.

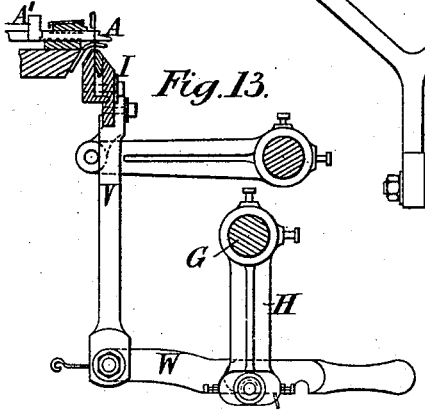


Fig. 14.

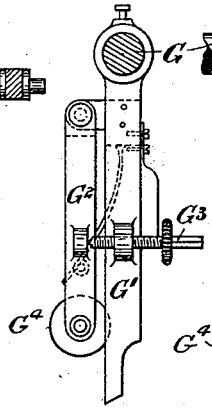


Fig. 15.

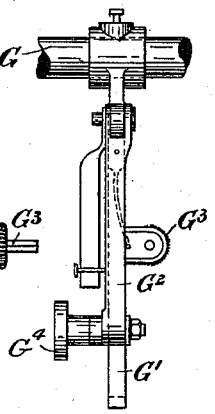


Fig. 16.

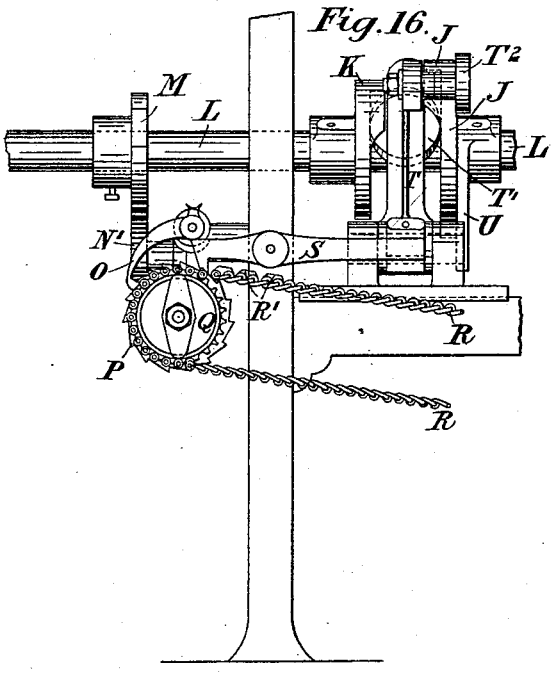
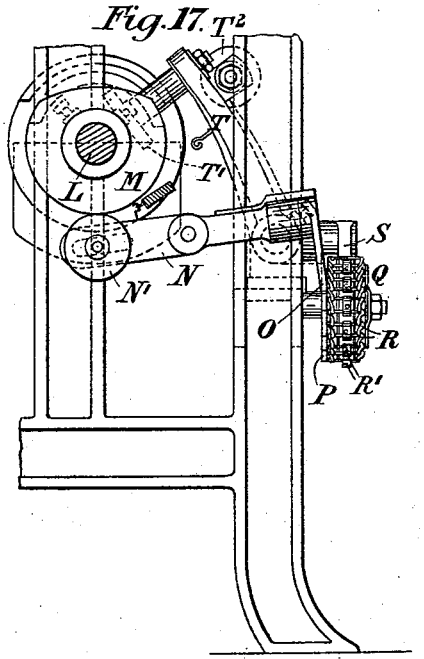


Fig. 17.



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J. J. McCarthy

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UNITED STATES PATENT OFFICE.

GUSTAV HEIDLER, OF CHEMNITZ, GERMANY.

STRAIGHT-BAR KNITTING-FRAME.

SPECIFICATION forming part of Letters Patent No. 490,351, dated January 24, 1893.

Application filed December 23, 1890. Serial No. 375,548. (No model.) Patented in Germany August 22, 1888, No. 47,251, and in Spain June 10, 1891, No. 12,040.

To all whom it may concern:

Be it known that I, GUSTAV HEIDLER, a subject of the King of Saxony, residing at Chemnitz, in Saxony, German Empire, have invented certain new and useful Improvements in Straight-Bar Knitting-Frames, (for which I have received a patent in Germany, No. 47,251, dated August 22, 1888, and in Spain No. 12,040, dated June 10, 1891,) of which the following is a specification.

This invention consists in the employment of sinkers of a novel construction in two-needle-frames with vertical needles arranged upon a movable needle-bar, such sinkers being so combined and guided that when the loops are sunk they act in a far more satisfactory manner upon the threads than the sinkers provided with a jack-arrangement for which they form substitutes, thereby not only simplifying but also improving the knitting frames to a considerable degree, and the invention further consists in means for enabling the length of the loops to be varied, and in improvements in the narrowing or fashioning mechanism.

In the accompanying drawings;—Figure 1 is a front elevation of the left hand portion of a knitting frame constructed according to this invention; Fig. 2 is a transverse section of the same; Figs. 3 and 4 are respectively a transverse section and a plan of a portion of the apparatus drawn to an enlarged scale showing the new manner of arranging the sinkers; Fig. 5 is a side elevation of one of the lead sinkers; Fig. 6 is a face view of a portion of the lead and jack-sinker guide; Fig. 7 is a similar view of the rear jack sinker guide; Figs. 8 and 9 are views respectively similar to but drawn to a smaller scale than Figs. 3 and 4 showing the old manner of arranging the sinkers and jacks; Figs. 10 and 11 are views illustrating the regularity of the meshes produced by the apparatus shown in Figs. 1 to 7; Figs. 12, 13, 14 and 15 are views of the mechanism by which the length of the loops may be instantaneously varied so as to obtain more or less closely knitted fabrics; Figs. 16 and 17 are respectively a front and an end elevation of the improved means for operating the narrowing or fashioning mechanism.

Like letters indicate like parts throughout the drawings.

In frames hitherto used as shown in Figs. 8 and 9 the jack-sinkers A are of the same size as *i. e.* not longer than the lead sinkers B and both move in short guide grooves. Each sinker A is struck by a jack or lever C moved by the slur-cock D. This method of conveying motion was first applied to hand frames a long time since with a view to submitting the sinkers and the thread to the action of a heavier body so as to obtain more neatly formed loops and prevent hard yarn when so looped, from again forcing back the sinkers after the sinking is completed. This latter very important condition remains unfulfilled, however, by the jacks or levers C which fall back after the sinking when the slur-cock D has passed. It is therefore possible and comparatively speaking of frequent occurrence for the light sinkers A to yield to the pressure of the loops which become deformed and uneven. The jacks or levers C labor moreover under the great disadvantage that owing to the pressure of the slur-cock D they very frequently are bent or forced on one side and pressed or wedged in between the jack and sinker guide and thereby damage the guide more or less if they do not make it altogether unfit for use which causes considerable loss of time and interruption in the working of the machine. To obviate these numerous drawbacks and at the same time to simplify the construction of the frame I extend the jack sinkers A as shown in Figs. 3 and 4 in the backward direction by about one half of their length. To this extension and also to the upwardly projecting portion A′ I rivet on each side a plate A^2 Figs. 3, 4, and 7; and lastly I provide a special guide or guide grooves E E′ for these stiffened portions. The lead sinkers B, one of which is shown detached in Fig. 5, only reach as far back as the normal position of the projections A′ and retain the old form as their arrangement is immaterial as regards the object in view. The slur-cock D now acts directly upon the jack sinkers A and strikes them at their strengthened portions where they are capable of resisting the shock and friction of the slur-cock.

When sinking the loops by the jacksinkers A, the sinkers A, are driven by the slur-cock D, until they strike with their projections A′, the falling-bar F², Fig. 3, which may be a piece of sheet iron or brass fastened to the sinker guide F. The loops are formed over two needles as shown in Fig. 10. After this operation the bar *e*, pushes against the projections B′, of the lead sinkers otherwise called dividing sinkers B, in Figs. 3 and 5, driving these sinkers B, all at once against the threads lying over two needles, forming loops between these two needles and moving the jack-sinkers A, a little backward by the thread itself (Fig. 10) so that all the projections A′, and B′, stand in one row, as illustrated in Fig. 11. In the subsequent operations of advancing and withdrawing the dividing sinkers and the jack sinkers the bar *e*, takes the projections A′, and B′, in its groove and moves them to and fro. The projection A′, which is shown in Fig. 3, is part of one of the sinkers A, all of which are shown in their forward position between the needles, while the lead-sinkers B, are shown in their rearward position.

In the guide grooves E E′ and also at the stiffened portions the jack sinkers A are comparatively wide apart as the lead sinkers B do not extend far enough to enter these guides. The walls of these guides can therefore be made very strong and are not liable to get twisted. The grooves for the sinkers are not liable to get widened or wear out and the sinkers themselves are securely retained in place and guided accurately which greatly facilitates the sinking.

Owing to the extension and the stiffening or strengthening of the jack sinkers A they also acquire more weight and in consequence of the provision of a double guide F F′ and E E′ their motion is attended by more friction so that they oppose a more powerful resistance or weight to the thread and cannot be driven back by the elasticity of the loops after the slur-cock has ceased to press upon the sinkers. It will thus be seen that the working capacity of the sinkers is increased since their pressure or weight alone equals in its effect the total pressure of the jacks and sinkers of the old construction, while at the same time their efficiency is enhanced as they prevent the loops from getting out of shape, the elasticity or stiffness of the thread being no longer sufficient to push back or repel these new heavy sinkers. The result is that as shown in Fig. 10 loops of exactly the same length are formed in the sinking and after the dividing of the loops as in Fig. 11 these loops produce perfectly regular meshes. The knitted fabric obtained by means of this frame shows this effect clearly in the uniformity of the rows of meshes, the same being all that can be desired. The increased simplicity of the loom enables it to be operated or worked, at a much greater speed and thus to produce a far greater quantity of material which at the same time is also of better quality.

In. Figs. 13, 14 and 15 is illustrated an extremely simple and readily manageable lever arrangement for the adjustment of the needle-bar enabling the length or size of the meshes to be varied and thus to cause the machine to produce more or less closely (stiff or loose) knitted goods or fabrics.

The shaft G, called the pressure-shaft is in connection with the needle-bar I, by means of the arm H, link W, and fork or yoke V. Another lever formed in two parts G′, G², is fastened to the same shaft G, and bears with its roller or truck G⁴, against a cam of the cam-shaft or main-shaft L, Figs. 14 and 15. This cam moves the parts G², G′, G, and H, W, V, in such a way as to press the needles against the sinker-guide F, but during the sinking of the loops, the needles are held by the circular portion of the cam in a position which is shown in Fig. 8, viz: the sinker-web stands at a certain distance say to the right hand side of the needle. The slur-cock D, then pushes the jack-sinkers A, through the needle row as in Fig. 3, and then their webs are a certain distance to the left hand side of the needle as shown such distance being as great as the loop or mesh is long. Now, if the position of the needles relative to the sinkers is altered, if the needles stand (Fig. 8), more or less distant from the sinker-webs, these sinker-webs will go through the needle-row, *i. e.* reach beyond it, a less or greater distance, and consequently form shorter or longer loops. This alteration in the position of the needle-row during the "sinking of the loops" is the object of the construction of Figs. 14 and 15. By turning the screw G³, the lever G′, is moved nearer to or farther from the lever G², which bears with G⁴, against the cam of the main-shaft L, and in this manner a little movement is given to the shaft G, and by means of the parts H, W, V, to the needle-bar I, so that the needle row is placed nearer to or farther from the sinkers, the loops becoming longer or shorter and the fabric more loosely or closely knitted.

In knitting frames as hitherto constructed there is generally a narrowing chain provided with studs or projections which actuate by pressure a lever carrying a roller thereby setting in motion the cam shaft and the eccentrics or cams mounted thereon which in their turn operate the narrowing or fashioning mechanism. The arrangements hitherto known were attended by the inconvenient feature that the studded chain had to be drawn underneath the lever with considerable force and therefore the chain as well as the studs suffered considerably through wear, in addition to which the chain was liable to get twisted thereby subsequently rendering the narrowing or fashioning mechanism irregular and unreliable. To avoid this fault the following construction has been invented. Before

the beginning of narrowing (fashioning) the whole main-shaft L, Figs. 1, 2, 16 and 17, has to slide longitudinally with all its cams, so as to take them away from their levers and to throw out of action those cams which produce the fabric and bring into action those which actuate the narrowing mechanism. This sliding of the shaft L, is performed by a lever T, the roller T′, of which bears against or strikes one of the two cams K and J. In its lowered position the roller T′, gets into the way of the cam K, which, during the revolution of the shaft L, rubs against the roller T′, and as the lever T, is immovable in the direction of the length of the shaft L, the cam K, is driven sidewise to the left, taking the shaft L, with it. In the raised position of the lever T, the cam J, strikes against its roller T′, and is pushed to the right, taking the shaft L, with it to the right. The rear end I′, of the lever T, (Fig. 2) lies loosely (freely) under one end of the lever S, as is clearly shown in Fig. 2, the other end of S, bears upon the pattern chain R, and is lifted by the studs R′, of the same, thus pressing the end I′, of T, down, lifting T and T′, and performing the alteration of the position of the lever T, (lowered or raised) and the shifting of the main shaft longitudinally to the left or to the right either for narrowing or for making rows of loops. The chain R, passes round the chain-wheel Q, which is connected with the ratchet-wheel P, and turned by the hook or pawl O, of the lever N. A cam M, of the main shaft L, gives motion to the lever N.

In common arrangements the studs R′, in the chain R, have to do heavy work in lifting one end of the lever S, and pressing down the other end and with it the rear end of the lever T. To overcome this inconvenience I give to the lever T, a side roller T^2, Figs. 16 and 17 and to the shaft L, a cam U, which strikes the roller T^2, at each revolution and lifts it and the lever T, (the rear end of which sinks down and with it the longer and heavier end of the lever S, Figs. 2 and 16, while the short and light end of S, rises) just when the chain R, is to be moved. Consequently if a stud is coming on it has not to lift the lever S, itself, as the same is already lifted as above mentioned; the stud takes up its position under S, and holds S and T, for performing the shifting of the shaft L, after the cam U, has left the roller T^2. When there is no stud coming on the levers sink back into their former positions. By this arrangement all the wear and tear of the chain-studs and levers is avoided.

I claim;—

1. In a straight bar knitting frame the combination with the needles vertically arranged upon a movable needle bar, of lead sinkers and jack sinkers, the latter extending back farther than the former and a slur-cock arranged to act directly upon the rear ends of the jack sinkers, substantially as described.

2. In a straight bar knitting machine the combination with the lead sinkers, of the jack sinkers having their rear ends thickened and extending back of the lead sinkers, guides F, F′, grooved to receive both the lead and jack sinkers and guides E, E′, having grooves to receive the rear or thickened portions of the jack sinkers, substantially as described.

3. In a straight bar knitting frame the combination with the lead sinkers and guides F, F′, therefor, of jack sinkers having their forward ends sliding in the grooves of the guide bars, F, F′, and their rear ends thickened, grooved guide bars E, E′, for the thickened ends of the jack sinkers and a slur-cock D, arranged to contact with the thickened or rear ends of the jack sinkers, substantially as described.

4. In a straight bar knitting machine the combination with the chain R having studs R′, and means for moving the chain intermittently, of the lever S, having one end arranged to bear upon the studs, the lever T, having one end in engagement with the lever S, and a cam U, upon which the opposite end of the lever T, bears, said cam and levers being constructed to raise the lever S, from the studs R′, at each movement of the chain, substantially as described.

5. In a straight bar knitting frame the combination with the presser shaft of a jointed arm $G' G^2$ and set screws G^3 substantially as described and illustrated in the accompanying drawings.

6. In a straight bar knitting frame the combination with the presser shaft G, and needle bar I, of a jointed arm carrying an anti-friction roller or truck and an adjusting screw, an arm H, link W and yoke V, substantially as described and illustrated in the accompanying drawings.

7. In a straight bar knitting frame the combination with the cam shaft, of the chain R, having the studs R′, the cam M, and connections for intermittently moving the chain, the lever S, having one end arranged to bear upon the studs R′ the lever T, having one end in engagement with the lever S, and having at its other end the rollers T′, T^2, cams J and K, arranged upon either side of the rollers T′ and a cam U, upon which the roller T^2, bears, substantially as described.

In testimony whereof I have hereto set my hand in the presence of two subscribing witnesses.

GUSTAV HEIDLER.

Witnesses:
WILLIAM R. MATTHES,
R. E. JAHN.