This invention relates to knitting machine jack sinkers, especially for use with knitting machines having sinker latch bars that carry the verge plate and sinker latch latches with which the sinkers cooperate, and aims generally to improve the same. The present application is in part a continuation of my copending application Ser. No. 55,700, filed Oct. 21, 1948 (Patent No. 2,647,382, dated August 4, 1953); it also bears the same relationship to my copending application Ser. No. 163,818, filed May 24, 1950 (Patent No. 2,692,487, dated October 26, 1954); and in addition it includes improvements on the constructions disclosed in the aforesaid applications.

In said application Ser. No. 55,700 (U. S. Pat. No. 2,647,382) is disclosed a full fashioned knitting machine of the Cotton type comprising a set of jack-sinkers combined with a singer catch bar that carries a verge plate and sinker latch latches adapted to engage firmly the buttons of the sinkers for accurately positioning them, but the construction of the jack sinkers per se, as a sub-combination of features, constitutes an invention separate and divisible from the more comprehensive combinations claimed in said application, and is accordingly presented in the present case. Application Ser. No. 163,818 (U. S. Pat. No. 2,692,487) discloses a similar combination, with a modified form of jack singer, sinker latch, and latch spring, and again, the construction of the jack singer, per se, as a sub-combination, constitutes an invention separate and divisible from the combinations therein claimed, and has accordingly been made a part of the subject matter of the present case.

Among the objects of the present invention, therefore, are the provisions of a jack-sinker including special features and combinations of elements, in part divided from my copending applications, particularly adapting the sinker to be accurately and fixedly aligned when slurred against the verge plate; special features and combinations, in part divided from my copending applications, particularly adapting the sinker to be fixedly secured to the sinker latch bar for movement in exact alignment with the other jack-sinkers during those portions of the knitting and narrowing cycles in which jack-sinkers are advanced or retracted en masse, or as a group; and the provisions of special features and combinations contributing to the accuracy, ruggedness, cheapness, and compactness of the sinker.

Other objects and advantages of the several features of the invention will be apparent from the following description of an illustrative embodiment thereof.

The invention, by which these objects are obtained, resides in the new features of construction and the novel combinations and arrangements of parts hereinafter described and claimed.

In the accompanying drawings of an illustrative embodiment showing the construction and method of operation of a singer embodying features brought forward from my copending applications and further improvements:

Fig. 1 is a more or less diagrammatic view showing a preferred embodiment of the jack sinkers with the sinker catch bar, verge plate and sinker latches therefor, in association with a singer head, and with dividing sinkers and a dividing-sinker moving bar, shown in broken lines.

Fig. 2 is a plan view of the singer.

Fig. 3 is a longitudinal vertical section therethrough taken on the line 3—3 of Fig. 2 looking in the direction of the arrows.

Figs. 4 and 5 are respectively, a plan view and a side elevation of a preferred form of cooperating singer latch; and

Fig. 6 is a diagrammatic side view illustrating one mode of operating the jack singer catch bar and its associated parts.

In the embodiment of this invention shown in the accompanying drawings, as is clearly disclosed in Figs. 1 to 3, the sinkers 11 are of the short-nosed type disclosed in my U. S. Patent No. 2,436,171, but it will be apparent to those skilled in the art that the invention in its broader aspects may also be applied to sinkers of other types, for example of the conventional long nosed type, when the sinker is to be adapted to cooperate with a verge plate 15 and a singer cam-latch 20 of the type disclosed.

And it will further be appreciated by those skilled in the art that while the sinker is especially adapted to cooperate with a catch-bar 13 separate from the moving bar 12 that controls the dividers 10, certain of its features may be employed in machines without dividers.

In the machine with which the new singer is shown associated in Fig. 1, the verge plate 15, against which the sinkers 11 are individually advanced, is carried by the singer-bar or retractor 13, herein by suitably retaining the same in a fixedly positioned recess or slot 14, provided under side of the catch-bar in advance of the offset sinker butt 11c, as by retaining-screws or clamp-screws 17. In the form shown the verge plate 15 comprises a simple flat sheet of metal extending vertically from the vertical slot 16, and having a projecting depth substantially equal to the offset height of the singer butt 11c. On the forward face of the butt 11c the singer butt, as shown, is provided with an abutment 11d which affords accurate bearing against the lower end of the verge plate. By this arrangement the verge plate is afforded a sufficient overhang to impart limited flexibility to it, governable by the material and thickness of the verge plate, to accord a shock absorbing action. The verge plate 15, in the form shown, also constitutes the singer retracting element of the catch bar or retractor bar 13.

Also in said machine (Fig. 1) singer latches 20 are provided, carried by the catch bar 13, for retaining the advanced sinkers against the verge plate 15. These latches 20 are mounted on the catch bar 13 in predetermined spaced relation to the verge plate 15. In the preferred form (Figs. 4 and 5) the latches 20 are relatively thin flat sheet metal slides having generally parallel front and back edges 20a, 20b, a lower edge 20c which is fixed at an oblique angle to said front and back edges 20a, 20b, and a small portion 20d of the front edge adjacent said lower edge positioned obliquely, say at about right angles to the lower edge 20c. The edges 20c and 20d thus constitute camming elements, the one to be engaged by the top of the singer butt 11c to raise the latch and allow the advancing sinkers to pass under it, and the other to engage the back of the singer butt 11c and force the singer firmly against the verge plate 15, as shown in Fig. 1.

Referring to Figs. 1 and 5, in the form there shown the latch plate 20 further has a rounded top edge 20f, to be engaged by the latch spring 20s, and has adjacent said top edge an overhanging stop element or abutment 20h, which, as shown in Fig. 1, contacts the upper surface of the catch bar 13 to limit downward motion of the latch. In said machine also, as is apparent from Fig. 1, the catch-bar 13, rearwardly of the verge plate 15, is provided with vertical comb slots or guideways, the separat-
ing walls 21 of which extend above and rearwardly of the slide plates. The plates 20 are suitably retained in these comb-slots, as by a dove-tailed insert 22, and, together with the free ends of springs 20g, are guided thereby. The anchored ends of the springs 20g are retained by suitable clamping means 23a, carried by the catch-bar 13, the means in the form shown comprising the angle-armed comb element 23x, spring tip receiving recesses 23b, clamp plate 23c and clamp screws 23d.

The catch bar 13 of the said machine is retracted to retract the sinkers 11, is raised to move the sinker latches to inoperative position, and is then moved forwardly and dropped to restore it to the position shown in Fig. 1, ready to align the sinkers as they are advanced to the position shown. Any suitable means may be employed to impart these motions. Merely by way of example a suitable arrangement is diagrammatically shown in Fig. 6, in which the catch-bar side arms 24 are moved longitudinally by a lever system 25 and are raised and lowered by a lever system 27. The lever system 25 comprises drag link means 25a, connecting the arm means 24 to a bell crank lever 25b having a cam roller 25c running on a cam 25d carried by main cam shaft 26. The lever system 27 comprises lifting link means 27a, bearing on the underside of arm means 24, and raised and lowered by a bell crank 27b having a cam roller 27c riding on cam 27d carried by cam shaft 26. Any suitable lever system, as one generally similar to the system 25, may be employed for operating the divider catch bar 12.

Turning now to a more detailed consideration of the sinker of Figs. 1–3, forming the subject matter of the present invention, in common with the form thereof shown in my application Ser. No. 55,700 (U. S. Pat. No. 2,657,382), such sinker is provided with a jack-singer butt 11c through which the stunning of the sinker is effected, which butt in the form shown, is made up of two plates 11f embracing the rear end of the sinker blade 11g, and having upwardly extended or offset sinker controlling portions 11h that in the form shown embrace a lateral extension 11k of the blade 11g. In common with the form of my application Ser. No. 55,700 (U. S. Pat. No. 2,657,382) the offset portion of the sinker so constituted is provided with an accurately located face 11d on its forward side for engaging the verge plate 15 and with a cam-engaged portion 11m at its rear extremity that is engaged by the latch-cam 20 that not only retains the sinker against retraction, but also holds it snugly against the verge plate 15. Thus with the verge plate 15 and latch-cam 20 co-acting, the sinker butt 11c of the sinker latch bar 13, the sinker is firmly secured to the catch bar 13 by such elements and even minor misalignments of the sinkers are prevented both during the stitching measuring operation and at parts of the knitting and narrowing cycles during which the sinkers are moved en masse.

In common with the sinker of my application Ser. No. 163,818 (U. S. Pat. No. 2,692,487) the embodiment hereinafter shown employs a bevelled latch-cam-engaging portion 11m, that more smoothly cooperates with the pressing face of the cam-latch, reduces wear at the point of contact, and better converts the vertical pressure of the cam-latch into horizontal pressure of the sinker butt against the verge plate 15, and in common with the form of my application Ser. No. 55,700 (U. S. Pat. No. 2,657,382) the offset portion of the sinker butt is provided with a recessed fillet means 11f, 11p below the verge plate engaging face 11d.

Finally, in common with my aforesaid applications of which the present disclosure is a continuation, the present embodiment of the sinker butt, at the top forward portion of its offset, includes a sinker-latch raising portion 11n for engaging the face 28c of the latch 20 as the sinker is slurred, to enable the sinker to pass under the latch and engage the verge plate 15, and a jack-engaged face 11f’ that is engaged by the sinker-jack for slurring of the sinker.

Referring now to the preferred species shown in Figs. 1–3, in this embodiment each of the operating faces 11d, 11f, 11m and 11n, is in the form of a machined plane of extended area finished to close tolerance. The extended area of the abundant face 11d assures maintenance of alignment over an exceedingly long period of repeated impacts against the verge plate; the extended area of the cam face 11m (Fig. 3) that is engaged by the cam latch face 20d, and its parallelism thereto, reduce wear and assure a smooth conversion of the vertical pressure of the latch-cam into horizontal pressure of the sinker against the verge plate; the extended area of the latch-raising face 11n and its parallelism with the cam face 20c assures smooth raising of the latch-cam and aids in the retention of lubricant between the parts as it avoids the engagement of the cam faces by sharp edges tending to scrape lubricant therefrom like a doctor blade; and the extended area of the jack-engaged face 11f’ (it being noted that the rear arm of the T-shaped butt plate means is made wider than the forward arm thereof that has to clear the lands of the sinker head) affords better jack-engagement, while the projection of the jack-engaged portion 11f’ is raised for the jack to operate between the widened offset portions of the dividers 10 (Fig. 1) and facilitates accurate machining of the face 11f’.

In the form shown in Fig. 3, the fillet 11f’ in the sinker blade is somewhat shallower in height and of somewhat greater depth than the fillets 11p in the butt-plates. By this construction all three fissions of the face 11d are undercut so that the grinding of this face as a whole is facilitated.

Furthermore, in the form shown, because the faces 11m and 11n are inclined planes, machining of the abutment 11d or of the latch engaged face 11m to its final tolerance does not affect the plane of engagement established for the cam raising face 11n, machining of the latter to adjust its tolerance does not alter the plane of engagement of the latch-cam face 20d with the face 11m, and machining of the jack-engaged face 11f’ also entails no changes in the planar locations of the other faces, while in all instances of working engagement with other parts, accurately located and extended areas of engagement are provided, facilitating lubrication and reducing wear. In the embodiment shown in the drawings the sinkers parts are illustrated in approximately their preferred proportions, and to illustrate the compactness achieved it may be noted that the total length of the offset portion 11b in this embodiment in an actual machine has been made as low as five sixteenths of an inch, without sacrifice of full and effective locking of the sinker to the sinker catch bar by the latch-cam and verge plate shown.

Thus the present invention, in its broader aspects, and especially in the preferred embodiment, effects life-prolonging and close tolerance aiding improvements in a vital part of full fashioned knitting machines, and contributes materially to the compactness, reliability and quiet running of the machines and to the elimination of irregularities in the work produced thereby.

While there have been described herein what are at present considered preferred embodiments of the invention, it will be obvious to those skilled in the art that minor modifications and changes may be made therein without departing from the spirit of the invention. It is therefore to be understood that the exemplary embodiments are illustrative and not restrictive of the invention, the scope of which is defined in the appended claims, and that all modifications that come within the meaning and range of equivalence of the above-mentioned claims are intended to be included therein.

It is to be noted that:

1. A jack sinker for a full-fashioned knitting machine comprising a sinker-blade, butt-plate means secured to the
but end of said blade, said plate means being T-shaped with the leg of the T forming an offset portion, said offset portion having a verge-plate engaging front face and an undercut reentrant fillet between said front face and the adjacent arm portion of the T.

2. A jack sinker for a full-fashioned knitting machine comprising a sinker blade, butt-plate means secured to the butt end of said blade, said butt-plate means comprising an offset catch-bar engaged portion, said offset catch-bar engaged portion having the forward portion of its outer end inclined downwardly and forwardly to constitute a latch-cam lifting surface, and having the rearward portion of its outer end inclined downwardly and rearwardly to form a latch-cam engagement surface.

3. A jack sinker for a full fashioned knitting machine of the type in which the sinker catch bar carries a verge plate and sinker latches spaced therefrom for holding the sinkers against the verge plate and thus locking them to the catch bar; said jack sinker having a sinker butt with an offset portion for extending into the space between one of said sinker latches and said verge plate to secure the sinker to said catch bar, said offset portion having a front face for engaging the catch bar carried verge plate, and a downwardly and rearwardly inclined face opposed to said front face for camming engagement with the said sinker latch and having an upwardly and rearwardly extending top face therebetween for lifting said sinker latch as the sinker is advanced thereunder toward said verge plate.

4. A jack sinker according to claim 3, said offset portion having a reentrant fillet means at the bottom end of said front face.

5. A jack sinker according to claim 4, said sinker having a blade including a laterally offset intermediate portion and further having two T-shaped butt-plates embracing the butt end and offset portion of said blade and riveted thereto, said butt plates having less height forwardly of said offset portion than does said blade, and said reentrant fillet means consisting of a relatively narrow fillet in said blade portion and relatively wider fillets in said butt plates, said fillets all terminating at their upper ends above and in spaced relation to the top of the sinker blade forwardly of said offset portion.

6. A jack sinker for a full fashioned knitting machine of the type in which the sinker catch bar carries a verge plate and sinker latches spaced therefrom for holding the sinkers against the verge plate and thus locking them to the catch bar; said jack sinker having a single offset portion for extending into the space between one of said sinker latches and said verge plate to secure the sinker to said catch bar, said single offset portion having a front face for engaging said catch bar carried verge plate, and having at its outer extremity upwardly and rearwardly and downwardly and rearwardly sloped faces for cooperation with said catch bar carried sinker latch.

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