degree of the respondent's knowledge will offer no difficulty, since the injunction, by its terms, will precisely define the respondent's duties.

There being no evidence to connect the respondent Sarah S. O'Brien with the sale complained of, no injunction will issue against her. As I am bound by the cases cited, an injunction against the respondent William O'Brien will issue, conformed as closely as may be to the injunction issued in Thomson-Houston Electric Co. v. Kelsey Electric Railway Specialty Co.

WILLCOX & GIBBS SEWING-MACH. CO. v. MERROW MACH. CO. et al.

(Circuit Court of Appeals, Second Circuit. October 26, 1898.)

No. 113.

1. PATENTS—CONSTRUCTION OF CLAIMS—LOOPER OR OVERSEAMING DEVICE FOR SEWING MACHINES.

   Claims 2 and 5 of the Willcox & Borton patent, No. 472,094, for a sewing machine, relate to a looper or overseaming device. The looper consists of a single part, having an upper and a lower jaw, which always remain in the same relative position, the part moving in a vertical plane, while the needle of the machine, in making the stitches, moves in a direction oblique to such plane; so that the looper, when seizing the needle thread below the cloth, is on one side of the needle, and, when presenting the loop above for the completion of the stitch, is on the other side. The device, by reason of its greater simplicity and the shorter distances traveled by its respective parts, which enable it to be operated at twice the speed of any prior device, is an ingenious and meritorious invention, of utility and novelty, which entitles the claims to a broad construction, and which is applicable to both single and double thread machines.

2. SAME.

   Claim 2 of the Willcox & Borton patent, No. 472,095, for a sewing machine, which claim is for a looper for overseaming, does not disclose patentable invention, the device being the same described in patent No. 472,094, to the same parties, with slight mechanical changes, which were obvious in view of the prior state of the art, to adapt it for use on machines using a double thread.

3. SAME—INFRINGEMENT.

   The Willcox & Borton patent, No. 472,094, for a sewing machine, as to claims 2 and 5, which cover a looper for overseaming, *held* infringed by a device having similar parts, and operating in substantially the same manner, though adapted for use on a double-thread machine, while the special kind of seam shown by the drawings of the patent is made with a single thread.

Appeal from the Circuit Court of the United States for the District of Connecticut.

This was a suit in equity by the Willcox & Gibbs Sewing-Machine Company against the Merrow Machine Company and others for infringement of two patents relating to sewing machines. From a decree dismissing the bill, complainant appeals.

Hubert Howson and Edmund Wetmore, for appellant.
Melville Church, for appellees.

Before WALLACE, LACOMBE, and SHIPMAN, Circuit Judges.

LACOMBE, Circuit Judge. Two patents are declared upon. The first is No. 472,094, for "Sewing Machine," dated April 5, 1892 (application filed July 23, 1887), to Willcox & Borton, assignors to complainant. The structure described is complete in all its parts, and is an elaborate piece of mechanism. The particular part involved in this action is the device known as a "looper," and the only claims relied upon are:

"(2) The combination with the needle and its operating mechanism, of a looper having an upper jaw provided with a hook and a lower jaw, said looper being arranged to oscillate in a path around the edge of the cloth plate, and means for actuating said looper to carry a loop of the needle thread around the cloth plate, substantially as described."

"(5) The combination of the double-jawed looper moving in a single plane, and a needle moving in a line oblique to the plane of the looper's movement, and intersecting the same, whereby the looper is, when beneath the cloth, on one side of the needle, and, when above the cloth, on the other side thereof, substantially as described."

The second patent is No. 472,095, for "Sewing Machine," dated April 5, 1892 (application filed May 24, 1890), to the same parties. The general form and organization of the machine are similar to that described in 472,094. Of the nineteen claims of this second patent only one is declared upon, viz.:

"(2) The looper made with two jaws, one of which is furnished with a hook, and the other with an eye, in combination with a reciprocating needle and operating mechanism for moving the looper in a plane oblique to the plane of movement of said needle, substantially as described."

The judge at circuit dismissed the bill, holding that the device of defendants did not infringe either of the three claims above quoted.

A brief reference to the genesis of No. 472,094 may be useful. The complainant introduced evidence to show that the Willcox & Gibbs Company had a machine making straight-ahead stitching, and running 2,000 to 3,000 stitches a minute, for the seaming of cut hosiery goods; but this straight-ahead stitching left a raw edge to the seam. There were also in existence so-called "buttonhole machines" which might be availed of to make an overseam, and thus avoid the raw edge, but the most efficient of these did not exceed 1,000 stitches a minute. From the manufacturer's view-point, high speed was necessary to produce knit goods economically; and the company, "in consequence, through [its] experts and mechanical engineers, took up seriously the work of getting out an overedging machine which could be successfully used for overedging cut hosiery goods, and which could be run at high speed. The matter was worked upon steadily by [its] experts and machinists; and, after four years of active, expensive work in experimenting and perfecting their inventions," the machine of patent 472,094 was produced. The circuit court found from the proofs in the case that, "prior to complainant's machine, the practical work of such machines [overseam machines] was not more than one thousand stitches per minute, while by complainant's machine more than two thousand stitches can be made." This finding is abundantly supported by the record. The result of patentees' experimenting has been to double the speed, and it might be expected that the new machine would be

found to contain some radical modification of all earlier ones to bring about such a result. Such expectation is fulfilled by the proofs showing the prior art. There were many prior patents for making overseam stitches. In all of them it was, of course, necessary to draw into proper position a loop of needle thread. Hooks of various shapes, eyelets, and jaws, and shanks are to be found in abundance; but, although the patentees have borrowed in part from the earlier art, they have so arranged the various parts as to secure a marked improvement in their operation. From the description of the patent it appears that the looper has two jaws, the upper one to seize the loop of needle thread below the cloth, and the lower one to distend the loop, and hold it distended above the cloth. The upper jaw is hooked so as to seize the loop; the looper then moves around the edge of the cloth, and, as it does so, the jaws being pushed inward, the loop releases itself from the upper jaw, and falls on the lower jaw, which then proceeds to complete the operation. The upper jaw always remains the upper jaw, and the lower jaw always remains the lower jaw. There is no revolution of the parts, nor is there any sidewise or shogging motion imparted to the looper, which remains always in the same vertical plane. The necessary shift of position from one side of the needle when below the cloth to the other side of the needle when above the cloth is accomplished by so arranging the needle and needle arm that the needle pierces the cloth, not perpendicularly, or nearly so, as usual, but at an angle less than 90 degrees. "This peculiar line of travel of the needle, in connection with a looper moving in [one plane at right angles to the line of seam], enables the looper to seize the loop below the cloth on one side of the needle (that nearest the already formed seam), and to hold the loop above the cloth on the other side of the needle, viz. that which is furthest from the already formed seam." The specification further states that the "novel and important feature of this part of the invention consists in the relative arrangement of the needle and the double-jawed looper, so that the line of the needle's motion is oblique to the plane in which the looper moves."

In the earlier art the looper had been transferred from one side of the needle to the other in a variety of ways, and, certainly in one patent (Wanzer), by moving the looper in a single plane diagonal to the path of the needle. But the Wanzer looper was not one with upper and lower jaws, but a revolving, or, as complainant's expert calls it, a "somersault," looper, and one with which high speed—the desideratum of the complainant's experts—was apparently impossible of attainment. It will not be profitable to discuss all the prior patents. Some of them are briefly referred to in the opinion in the circuit court. Assuming that the object of invention was a high-speed machine, and that patentees' machine is the first practical high-speed machine (as the evidence shows), it will be sufficient to indicate the points of divergence from the machines of the earlier art; and, if it is apparent that the changes devised by the patentees are of such a character as to permit the operator to double the speed of the overseam machine, it may fairly be concluded that they exhibit patentable novelty. All of the score or so of patents

which have been introduced as showing the prior art may be grouped under one or other of three classes, viz. somersault loopers, two-implement loopers, and compound-motion loopers.

The somersault looper performs its work by throwing a half somersault, so that the end which draws the loop and presents it travels back and forth on a circular path, of which the shank to which it is attached is the radius. In consequence, it does not keep close to the edge of the cloth when changing position from below the cloth plate to above it, or vice versâ; and, when it clutches the loop of needle thread, it is so far below the cloth plate that the stroke of the needle must be long in order to place the needle thread where it may be caught by the looper. Complainant's experts set forth several reasons why this arrangement is fatal to high speed. It hardly needs an expert to inform the court that the point of the needle can be made to reciprocate more rapidly, with less chance of distortion, if the distance it is required to travel be reduced. The looper of the patent in suit is made to travel as closely as possible around the edge of the cloth, keeping the same side up all the time, so that both looper and needle point operate on lines of travel so much shorter than those of any somersault looper of the prior art that the machine may be organized to work at double the speed attained before.

The two-implement looper is one which performs the operation of seizing the loop of needle thread below the cloth, and presenting it in proper position above the cloth, by the aid of two separate pieces of mechanism. These have to be separately operated, and the operating mechanism becomes more complicated. Not only is the improvement of the patent meritorious, as tending towards simplicity, but complainant's expert testifies—and no one contradicts him—that, the more complicated the mechanism involved, the more difficult it becomes to run at a high speed, while the multiplication of relatively moving implements, which co-operate in their action upon one thread, increases liability to skip stitches. Certainly, the device of the patent in suit is simpler, dispensing with one independently operated part. It is susceptible of high speed (apparently by reason of its greater simplicity), while the earlier two-implement machines were slow, and apparently were not susceptible of being made faster. These remarks apply equally to the compound-movement loopers, where, besides the motion in a vertical plane, a sidewise or shogging motion is also imparted, requiring a material increase in the complication of the actuating mechanism, and to that extent preventing high speed. No compound-motion overseam machine that ran or was capable of running at a speed at all comparable to complainant's has been found in the prior art.

When the increase of speed is so great as it appears to be in this instance, and that, too, in an art where increase of speed (efficiency being preserved) is of such practical importance, we are disposed to consider the changes in parts and arrangement of parts as showing meritorious invention. This capacity for high speed is not an afterthought, for at the beginning of the specification is found the statement:

"The machine has been contrived with reference to running at a very high rate of speed, the reciprocating parts being as short and light as possible," etc.

Referring to the increased speed of complainant's machine, the circuit court says:

"The advantage, complainant now insists, is due to the form of its looper, which allows the stitch to be made with a much shorter thrust of the needle. How much of this increase of speed is due to this device, and how much to other parts of the machine, does not appear."

It is undoubtedly true that, unless other parts of the machine are contrived (as they are) to drive the entire mechanism at the desired high rate of speed, the result sought for will not be accomplished; but, given mechanism organized to drive at that rate, it seems quite plain, upon the proofs, that complainant's stitch-making (looper) mechanism is so organized as to permit itself to be driven at that rate, and that it is the first stitch-making (looper) mechanism which could be so driven. We are unable to concur with the circuit court in the conclusion that patentees have not sufficiently set forth and claimed the noninverting character of their looper. As appears from the quotation above, they set out to attain high speed. They sought to achieve that end by, as they say, "[having] the reciprocating parts as short * * * as possible." They show, in fact, an arrangement which has shorter parts and shorter lines of travel, and which permits increased speed. That,—as compared with the somersault loopers,—this is accomplished by the use of a noninverting looper, is pointed out supra in this opinion; and that the looper of the patent is to be a noninverting looper seems plain from the requirement that it shall be double-jawed, having an upper jaw (which, as the description shows, always remains an upper jaw) and a lower jaw (which always remains a lower jaw). The patentees seem therefore to have made an ingenious and meritorious invention, of utility and novelty to support a broad patent, and to have sufficiently described such invention. The extent of the patent and the scope of the claims 2 and 5 are next to be considered.

As this opinion abundantly shows, the art of overseam or buttonhole stitching by machinery was an old one, and many varieties of mechanism were in use. All such machines were broadly divided into single-thread or double-thread machines. The distinction between the two is succinctly set forth in the opinion of the circuit court:

"[In double-thread machines] a sewing-machine needle having the eye near the point is first thrust through the fabric, carrying the needle thread with it. Then a hook of some kind takes hold of the needle thread below the fabric, and holds it so that the needle, in being withdrawn from the fabric, leaves a loop of needle thread on the hook and below the fabric. This loop of needle thread is then drawn out to, and lifted up around, the edge of the fabric. Then a loop of another thread is thrust through the loop of needle thread, and the needle, in making its second stroke, passes through this second loop [of looper thread]. In single-thread machines the loop of needle thread, after being lifted up around the edge of the fabric, is carried over the fabric, and the needle, in making its second stroke, passes through the needle-thread loop."

When the complainant company set its experts to work, it wanted fast-running, instead of slow, overseam machines, of which two well-known classes already existed, making, respectively, single-thread and double-thread overseams. The method by which the stitch itself was formed in each kind was well known. The company, as is testified to, started in its experiments upon the single-thread class, because it was the easiest to experiment with. When the inventors had completed their invention (472,094), and came to describe and illustrate it, they naturally used drawings of a single-thread machine, and, when they described those drawings, used language peculiarly appropriate to single-thread machines. But we do not think that they thereby restricted their invention to that single class of machines. On the contrary, the language used by the patentees at the very outset of the specifications indicates that they understood that their improvements were available for all kinds of overseam, and undertook to say so. "The machine represented in the drawings," they say, "is one which makes an overseam, and is intended specially for sewing knit goods; and our improvements are chiefly applicable to machines making some variety of overseam. The special kind of overseam made by the machine shown in the drawings is formed of a single thread," etc. When we come to examine the precise improvement under discussion,—the oblique-plane, upper and lower jaw, noninverting looper, with its simplicity of parts, its motion in a single plane, its nearness to the fabric, its securing shortness of travel to needle point and looper,—it is quite apparent that those changes from earlier structures are as valuable in giving the capacity for high speed to a double-thread as to a single-thread machine. Unless, then, the claims themselves in some way confine the patentees to the single-thread class, they should be construed so as to cover the actual improvement over the prior art, whether embodied in one or the other of the old and well-known classes.

As already seen, it was and is the distinctive mark of a single-thread stitch that the needle, on its second stroke, should go through the loop of needle thread drawn off from its former stroke; but neither claim 2 nor claim 5 demands this action from the needle. They call for an action of the combination which will draw a loop of needle thread off the needle below the fabric, and carry the same up around the edge, and above the fabric. There both claims leave the loop to have the stitch perfected in either of the two ways already well understood in the art, i. e. by driving the needle through it if it were to be single stitch, or by driving a loop of looper thread through it if it were to be double stitch. The claims, therefore, in our opinion, cover the devices of the patent, whether used in a double or in a single thread machine. Deering v. Harvester Works, 155 U. S. 286, 15 Sup. Ct. 118.

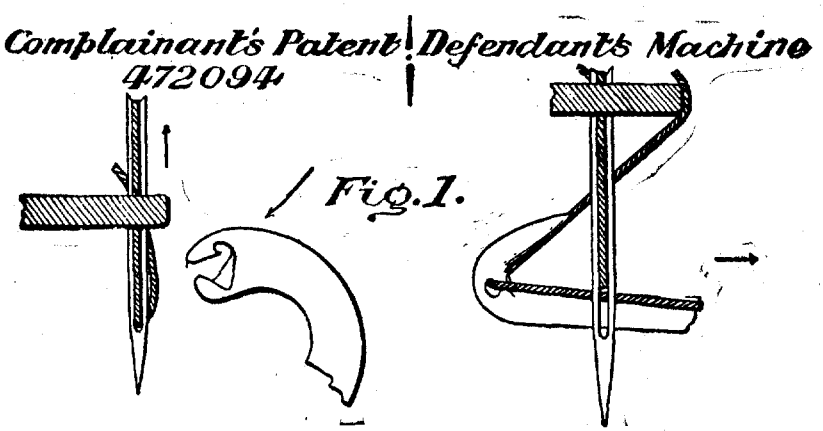
Patent No. 472,095, as already stated, is for alleged improvements on 472,094. The "object is the formation of an overseam of two threads whose successive loops interlock, and which we denominate an 'overlock seam.' In the looper, as modified to effectuate this object, the lower jaw becomes a needle for the lower thread." The

machine, as a whole, contains many parts, but we are, of course, concerned only with the subject of the second claim:

"(2) The looper made with two jaws, one of which is furnished with a hook, and the other with an eye, in combination with a reciprocating needle and operating mechanism for moving the looper in a plane oblique to the plane of movement of said needle, substantially as described."

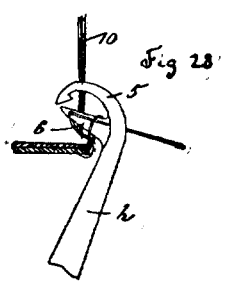
Here we have a two-jawed looper, which the specification shows to be noninverting, moving in a plane oblique to the plane of movement of the needle, one of the jaws being provided with a hook which seizes the thread from one side of the needle below the cloth, brings it up above the cloth on the other side of the needle, and then lets it drop upon the lower jaw, which has an eye in it for the looper thread. There is no change whatever from the single-thread device illustrated in the drawings of No. 472,094, except to deepen the opening between the jaws, straighten the lower jaw, and punch an eye in it, so that, when the forward thrust comes, the loop of looper thread will be pushed forward to the descending needle, instead of the loop of needle thread. We concur with the judge who tried the cause below that it is difficult to see any patentable novelty in this. It was old to have an eye at the end of the looper to carry the second thread when making a double-stitch overseam. Tarbox's somersault looper (49,803, of 1865) has one. And given the noninverting, double-jawed looper of 472,094, the mere mechanical skill of the calling would seem sufficient to so modify it that it would push a loop of looper thread forward through the loop of needle thread to take the second thrust of the needle. In our opinion, claim 2 of 472,095 cannot be sustained.

The question of infringement alone remains to be considered. Undoubtedly, the defendants' device is of a different shape from that of complainant, as the following figures show:



The hook of complainant's upper jaw moves in, catches the needle thread below the fabric, then moves out, drawing out the loop of needle thread left below the cloth by the ascending needle. It next rises, carrying the loop around the edge, and then moves forward;

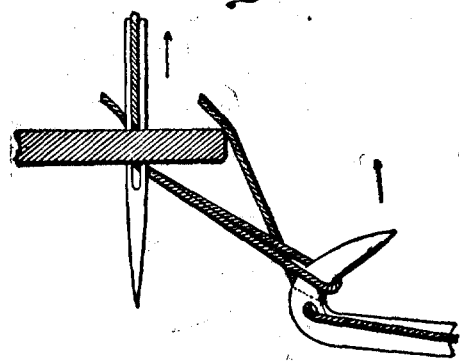
and, as it moves in over the edge of the cloth plate, the loop of needle thread is pushed off the hook dropping on the lower jaw, where (for a single thread) it lies well forward, and, as the inward motion of the looper continues, is brought under the descending needle for completion of the stitch. It will be borne in mind that the figure above marked "Complainant's" is for single stitch only, and that we concur with the circuit court in the conclusion that "a skillful mechanic, being presented with a machine of No. 472,094, and with the prior patents in evidence, and requested to adapt the machine to a double-thread stitch, would have made the change almost as a matter of course." The change must be one which will thrust a loop of looper thread through the loop of needle thread, and present the loop of looper thread to the descending needle. The phrase "double-thread overseam" implies precisely that. That the loop of looper thread could be brought forward by an eye in the looper was shown by Tarbox; and the natural place for the location of the eye is in the lower jaw, since during the forward movement of the looper towards the needle the loop of needle thread rests on the lower jaw. Finally, if the loop of looper thread is to be pushed forward through the loop of needle thread, clearance for the latter must be provided, manifestly by deepening the mouth between the jaws, so that the loop will slide along as the lower jaw carrying the looper thread moves forward towards the needle. This mechanical change is what is shown in No. 472,095, as illustrated by the following figure from that patent:



Inasmuch as claims 2 and 5 of 472,094 cover a combination which takes the loop of needle thread from the lower side of the fabric around the edge to the upper side, leaving the stitch to be completed either as single-thread or double-thread, infringement is not avoided merely by completing it as a double-thread stitch, if the functional operation of the parts performing the operation of the claim are identical, although there may be differences in form. It is apparently not disputed that defendants' looper is an "oblique-plane, non-inverting" looper. Defendants insist that it cannot infringe, because it makes a double-thread stitch. That contention has been already considered and disposed of. The other distinctive feature of the claims is a looper which is double-jawed,—having an upper jaw, provided with a hook, and a lower jaw. If defendants' device contains these elements, it infringes, for in all other respects it is the device

of the claims; and, indeed, with a mere change of timing, defendants' commercial looper may be substituted in complainant's machine, and does the work. Comparing the two loopers,—defendants' and complainant's,—as mechanically modified to make a double stitch, we find a mouth with its opening turned forward (towards the fabric) in complainant's, and back (away from the fabric) in defendants'. The mouth is formed by two jaws opened at one end, and connected together at the other. The upper jaw or member in complainant's device inserts its hook or barb between needle thread and needle, and pulls away from the line of the needle's play; and the loop of needle thread goes with it, even when it rises above the edge of the fabric, because it is still retained in the curved forward (i. e. nearest the seam) portion of the metal jaw which caught it. Precisely this is the action of defendants' device, as may be seen from Fig. 1, ante, and from the figure immediately below, which (except for the dotted line) is taken from defendants' brief.

Fig. 3.



Here, too, the upper jaw or member inserts its hook between needle and needle thread, and pulls away from the line of the needle's play; and the loop of needle thread goes with it even when it rises above the edge of the fabric, because it is still retained in the curved forward portion of the metal jaw which caught it. Defendants' looper, below the dotted line, might be cut away (in which case, of course, the remaining part would have to be connected with the operating mechanism by some prolongation of the upper member), and the operation so far described would still be performed. Indeed, up to this point it is apparent that the operative instrumentalities are substantially identical,—for it surely makes no difference by which end the upper member is connected with the operating mechanism,—performing the same functions, in precisely the same way. Having now raised the loop of needle thread above the fabric, the next step of the process (in complainant's machine) is a forward movement of the looper. This causes the loop of needle thread to slip off the curved portion of the jaw which held it, whereupon it falls upon the lower jaw, which pushes it forward for a sin-

gle-thread stitch, and pushes a looper thread forward through it for a double one. The same action is found in defendants' machine. As the looper moves forward, it reaches a position when the curved metal of the upper jaw (down to the dotted line) no longer holds it. It slips off that portion of the metal. It does not fall upon the lower jaw, since the jaws are here united, but slides down on it, and the further forward movement of the lower jaw completes the stitch. From the moment the loop slides down on to the lower portion of the looper (below the dotted line), the upper portion of said looper (above the dotted line) plays no further part in the operation. Evidently, then, the defendants' looper is composed, as is complainant's, of two parts or members (which, as they form a mouth, may properly be called "jaws"), which, although united together, do not act concurrently, but successively, and the upper one of which has a hooked portion to engage the needle-thread loop. Although there is a difference of form, we are unable to find any substantial difference of parts or of functions, between the two stitch-forming mechanisms, and are therefore of the opinion that defendants' machine infringes claims 2 and 5 of No. 472,094, permitting a high rate of speed to be attained in taking off the loop of needle thread, and bringing it up into position above the fabric (a rate of speed not known to the art before patentees' application), by substantially the same combination of parts disclosed in the patent, and covered by these claims.

The decree of the circuit court is reversed, and cause remitted, with instructions to dismiss the bill as to No. 472,095, and to enter the usual decree as to claims 2 and 5 of No. 472,094. Since appellant prevails as to one patent, and fails as to the other, the decree should be without costs to either side.

WILLCOX & GIBBS SEWING-MACH. CO. v. MERROW MACH. CO. et al.

(Circuit Court of Appeals, Second Circuit. March 1, 1899.)

No. 113.

PATENTS—VALIDITY AND INFRINGEMENT—SEWING MACHINES.

The Willcox & Borton patent, No. 472,094, for improvements in sewing machines intended especially for making overseams in sewing knit goods, construed, and *held* valid, and infringed as to claims 2 and 5.

Appeal from the Circuit Court of the United States for the District of Connecticut.

This cause was submitted upon oral argument May 17, 1898, and an opinion reversing decree of the circuit court and directing the usual decree as to claims 2 and 5 of United States letters patent No. 472,094 was filed October 26, 1898. 93 Fed. 206. An application for rehearing was made by defendants November 18, 1898, and reargument was allowed upon the single "question of similarity of equivalency of defendants' hook looper to complainant's double-jawed looper." After rehearing upon briefs and oral arguments (January 30, 1899), the following memorandum of decision is now filed.