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3,488,668

TENTER CLIP

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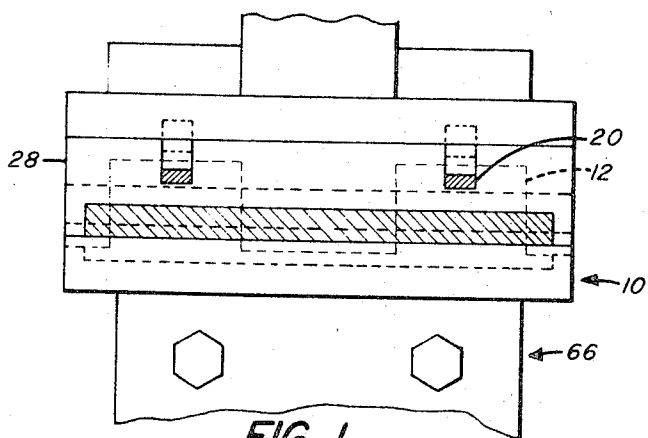


FIG. 1

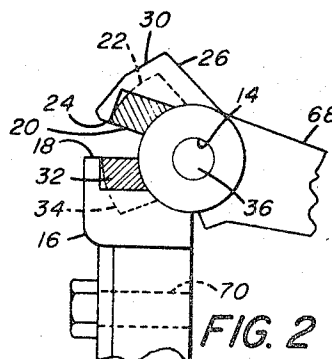


FIG. 2

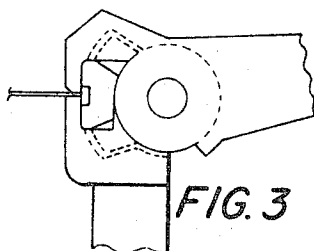


FIG. 3

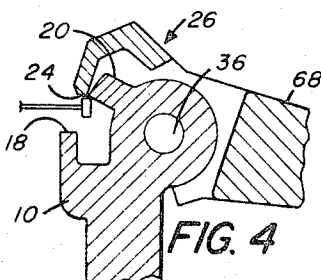


FIG. 4

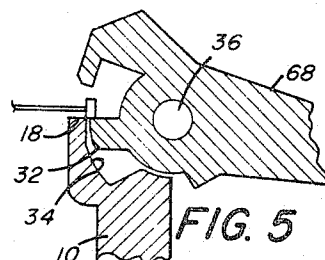


FIG. 5

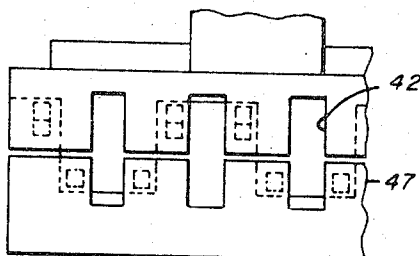


FIG. 6

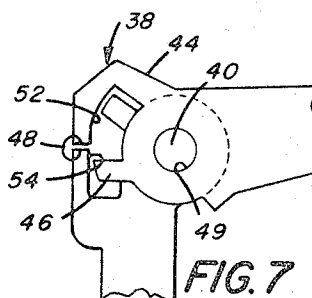


FIG. 7

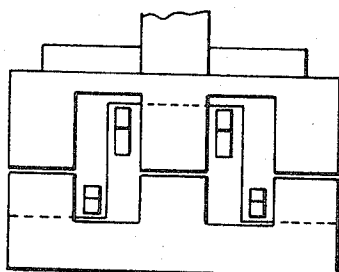


FIG. 8

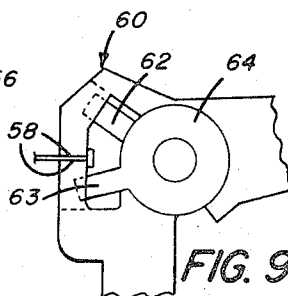


FIG. 9

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TENTER CLIP

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9 Claims

ABSTRACT OF THE DISCLOSURE

A tenter clip having a pair of coating movable jaws each having a respective web gripping surface and at least one cooperating stripping member. The stripping member of each jaw is so positioned on the jaw that when the grip is opened the stripping member of one jaw moves behind the opposite jaw to strip sheet material from the gripping surface of the opposite jaw.

BACKGROUND OF THE INVENTION

In the process of tentering or stretching sheet members, the procedure is to grip the sheet with tenter clips at the sheet edges and by heating the sheet and moving the clips apart, stretch the sheet to the desired dimensions. In order that the sheet will not slip out of the gripping jaws of the tenter clip, it is desirable that the gripping force of the clip be sufficient to firmly hold the sheet. Because of the forces needed to hold the sheet in the jaws and because of the deformable nature of many sheet members particularly when heated, there is a tendency for the sheet member to stick to one or both of the jaws of a clip when the clip is opened. In some processes a bead is formed on the edge of the sheet member which prevents the sheet from slipping through the tenter clip jaws. The bead is positioned behind the jaws and may stick to the inner edge of the jaws because of the tension that is placed on the sheet member when it is stretched, forcing the bead onto the inner edge of the jaw.

In automatic tentering machines, where sheet members or webs are stretched in a continuous process, it is necessary for the tenter clip to automatically release the sheet at the end of the tentering operation. Otherwise, the sheet member can be torn or damaged, resulting in loss of product and loss of production time while the sheet is manually freed from the clip jaws. As the size and speed of automatic tentering machines are increased, the amount of webbing that can be automatically stretched on a continuous basis has increased accordingly, and if one or more of the tentering clips do not properly release the film at the right instant, the cost of damage to and waste of product loss can be quite substantial.

Accordingly, it is desirable to insure that the sheets or webs are completely released from the clip when the jaws are opened. As the size and speed of automatic tentering machines have increased, the need for a clip that can automatically release or strip the sheet member from the clip jaws as the clip is opened has also increased. Many attempts have been made to devise a clip that is self-stripping. However, these prior attempts have involved relatively complicated devices which are expensive and require excessive maintenance and lubrication. Also, because of their complicated natures, the clips produced dirt which increased the hazard of contamination to the sheet member. The prior stripping devices, although coordinated with the tenter clip movement, are not an integral part of the tenter clip.

SUMMARY OF THE INVENTION

The present invention provides a tenter clip which has a compact stripper construction and yet is effective in

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releasing a sheet member stuck to the clip jaws when the jaws are opened. This tenter clip is simple to construct, is relatively inexpensive, and does not require continuous maintenance and lubrication to remain operative.

The tenter clip of the present invention is comprised of a pair of coating movable jaws, each jaw having a web gripping surface and a pair of cooperating stripping members with a contact surface. The stripping member of each jaw is attached to that jaw so that it moves when the jaw is moved. The stripping members of each jaw are arranged so that when the jaws are closed, the stripping member of one jaw is immediately behind the opposite jaw. When the jaws are opened, the stripping member of one jaw moves behind the opposite jaw so that the plane of the contact surface of a stripping member moves into the plane of the gripping surface of the opposite jaw. The stripping members move close enough to the jaws so that they can strip any bead or sheet member that is stuck to the jaw.

The present invention can be easily incorporated into existing tentering apparatus. The jaw can be connected to a tentering chain by means of a bracket device or the jaw can be formed as part of a tentering chain link.

The jaws can be actuated remotely by providing extension arms on the respective jaws to allow them to be operated by cam trips or hydraulic or pneumatic devices. The flexibility of the present invention is illustrated by the fact that regardless of which jaw is operated, both jaws can be stripped by the respective stripping member of the opposite jaw. Therefore, either one or both of the jaws can be actuated, depending upon the design of the particular tentering device.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of the specification. For a better understanding of the invention, the operating advantages and the objectives obtained by its use, reference should be had to the accompanying drawings and descriptive matter in which a preferred embodiment of the invention has been illustrated.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a front view of a tenter clip incorporating a specific embodiment of the present invention.

FIGURE 2 is a side view of the tenter clip shown in FIGURE 1.

FIGURES 3 through 5 are side views of the tenter clip gripping and stripping a sheet member.

FIGURE 6 is a front view of an alternate embodiment of the present invention.

FIGURE 7 is a side view of FIGURE 6.

FIGURE 8 is a front view of another alternate embodiment of the present invention.

FIGURE 9 is a side view of FIGURE 8.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The first or lower jaw 10 has hinge lugs 12 arranged in a row so that the pin or shaft bores 14 are coaxial. FIGURE 2 shows the substantially U-shaped gripping means 16 radially extending from the outer periphery of the hinge lugs 12 at one end and the other end forming the sheet gripping surface 18. The gripping means and the gripping surface extend along the length of the jaw.

A stripper member 20 extends radially from the periphery of each hinge lug 12 of the lower jaw 10. The radial extension of each stripper member is of sufficient length so that each stripper member moves closely to the inner surface 22 of the gripping surface 24 of the upper or second jaw 26 when the jaws are actuated.

The upper or second jaw 26 has several hinge lugs 28

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arranged in a row so that the shaft or pinholes 14 are coaxial. A substantially U-shaped gripping means 30 radially extends from the outer periphery of the hinge lugs 28 at one end and extends along the length of the jaw 26. The other end of the U-shaped gripping means 30 forms the gripping surface 24 which also extends along the length of the jaw 26.

A stripper member 32 radially extends from the outer periphery of the hinge lugs 28. The stripper member 32 of the preferred embodiment is one continuous blade that extends along the length of the jaw 26, although an alternative embodiment could have one stripper member extending from each hinge lug.

The radial extension of the upper jaw stripper member 32 is of sufficient length so that the stripper member 32 moves closely to the inner surface 34 of the lower jaw 10 when the jaws are opened.

When the two coacting jaws are assembled, the hinge lugs 28 of the upper jaw 26 fit adjacent to or between and mesh with the hinge lugs 20 of the upper jaw 10. The lugs of both jaws are coaxial and a pivot pin or hinge pin 36 is placed in the common bore 14 to hingedly or pivotally connect the jaws. Therefore, when the hinge lugs of the jaws are meshed and the pin put in the pin bore, the gripping surfaces of each jaw are opposite and adjacent to the gripping surface of the opposite jaw.

The jaws of the preferred embodiment are arranged so that when they are opened, the plane of the stripping member is in the same plane as the gripping surface of the gripping means. Any beaded edge or accumulation of sheet material that extends over the inner edge of the gripping surface is thus engaged and stripped off by the stripping member. Sometimes the beaded edge or the sheet material sticks to the gripping surface of the upper jaw and on other occasions it sticks to the gripping surface of the lower jaw. In either event, however, the sheet is stripped from the gripping surface because each jaw has a cooperating stripping member which releases the sheet stuck to the opposite jaw when the jaw is opened. FIGURE 3 shows a tenter clip gripping a sheet member. FIGURE 4 shows the stripping member 20 of the lower jaw 10 stripping a beaded edge from the gripping surface 24 of the upper jaw 26. FIGURE 5 shows the stripping member 32 of the upper jaw 26 stripping a beaded edge from the gripping surface 18 of the lower jaw 10. In both cases, the jaw is shown in the fully open position and the contact surface of the stripping member is in the same plane as the gripping surface of the jaw.

The orientation on the hinge lugs of the stripping member of each jaw may be changed such that the contact surface of the stripping member of one jaw would move into and then through the plane of the gripping surface of the other jaw. In that manner any portion of a sheet or web that extends into the space behind the gripping means of the jaws is stripped from the jaw.

The preferred embodiment of the tenter clip has a bracket 66 attached to the lower jaw 10 and a cam trip arm 68 attached to the upper jaw 26. The clip is bolted to a tenting chain through bolt holes 70 in the bracket 66. The jaws are operated by means of a cam wheel which is fixed at the release end of the apparatus to intercept and trip the cam trip arm 68 thereby opening the jaws to release a film member.

Alternate embodiments of the tenter clip described above are illustrated in FIGURES 6, 7, 8, and 9. FIGURES 6 and 7 show a tenter clip comprising a pair of similar coacting jaws 38 hingedly or pivotally connected by a common pivot or hinge pin 40. The jaws are assembled so that the hinge lugs 42 are meshed and a pivot pin 40 is placed in the common bore 49. The tenter clip of this embodiment is similar to the preferred embodiment described above in that the gripping means 44 of each jaw extends from the outer periphery of the hinge lugs 42. However, in the embodiment shown in FIGURES 6 and 7 the portion of the gripping means 44 that forms

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the gripping surface 48 is comprised of a plurality of alternately spaced gripping fingers 47 each having its own gripping surface 48 in a plane common to the gripping surfaces 48 of the same jaw.

The stripping means 46 of each jaw are comprised of a plurality of stripping members 46 which extend from the outer periphery of the hinge lugs 42. As shown in FIGURE 7 the stripping means 46 of each jaw are oriented such that each jaw has stripping means 46 which extend closely to the inner surface 52 of the gripping means 44 of the opposite jaw so that each gripping surface 48 is stripped by a separate stripping member 46. When the jaws are activated, the stripping members 46 of one jaw move behind and adjacent to the inner surface 52 of the gripping means of the opposite jaw so that when the jaws are fully opened the contact surfaces 54 of the stripping members 46 of one jaw are in the plane common to the gripping surfaces 48 of the opposite jaw. A web member held between the gripping surfaces of the tenter clip thus will be engaged by the surfaces 54 when the jaw is fully opened and released from the gripping surfaces 48. Of course, the stripping members can be oriented such that the contact surface of the stripping member of one jaw moves into and beyond the plane common to the gripping surfaces of the other jaw.

The tenter clip shown in FIGURES 8 and 9 also has a pair of coacting jaws hingedly or pivotally connected together. For this alternate embodiment that portion of the gripping means 60 that forms the gripping surface 58 is also comprised of a plurality of alternately spaced gripper fingers 56 each having its own gripping surface 58 in a plane common to gripping surfaces 58 of the same jaw. The stripping means 62 of each jaw are comprised of a plurality of stripping members 62 which extend from the outer periphery of the hinge lugs 64. However, the stripping members 62 are positioned opposite the alternate spaces between the gripping fingers 56 of the opposite jaw.

When the jaw is actuated the stripper members of one jaw move between the gripping means 60 of the opposite jaw until the contact surfaces 63 of the stripper member 62 of one jaw is in the same plane as the gripping surfaces 58 of the opposite jaw.

The stripper members, of course, can be oriented in relation to the gripping means such that when the jaws are opened, the stripper members of each jaw move into and beyond the plane of the gripping surfaces of the opposite jaw.

This latter embodiment is particularly useful whenever the sheet member does not extend fully across and beyond the gripping surface of the jaws. A sheet member that has not been gripped by the full gripping areas of a jaw is thus released by the stripping members moving between the gripping surfaces.

It should be noted that the present tenter clip will be easily adaptable to a wide spectrum of tenting machines. Very few, if any, structural changes will have to be made to incorporate the tenter clip as part of a tenting chain. The simple structure of the clip substantially reduces maintenance requirements and contamination hazards. Furthermore, the positive release action of the clip makes it readily adaptable to automatic systems and the feature of both jaws having stripper members increases the reliability of the clip and reduces chances of damage to a fragile web member.

The invention has been described in detail with particular reference to a preferred embodiment thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention as described hereinabove and as defined in the appended claims.

I claim:

1. A tenter clip comprising:

a pair of coacting movable jaws having opposed sheet gripping surfaces for clamping a sheet member therebetween; and

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means defining a sheet stripping surface fixed in spaced opposed relation to the gripping surface of one of said jaws and movable as a unit therewith for removing the sheet member from the gripping surface of the other jaw upon movement of the jaws to release the sheet member.

2. A tenter clip for holding a sheet member, said tenter clip comprising a pair of coacting movable jaws, each jaw having a sheet member gripping surface and at least one cooperating stripping member which has a contact surface spaced from the gripping surface of the other jaw, each of said stripping members moving with its respective jaw so that when the jaws are opened the plane of the contact surface of the stripping member of one jaw moves into the plane of the gripping surface of the other jaw to release the sheet member from the gripping surface.

3. A tenter clip according to claim 2 wherein each jaw has a plurality of coplanar spaced gripping surfaces and a plurality of coplanar stripping members which cooperate respectively with the gripping surfaces of the jaw and move as a unit therewith.

4. A tenter clip according to claim 3 wherein the stripping members of one jaw are arranged opposite the gripping surfaces of the other jaw.

5. A tenter clip according to claim 3 wherein the stripping members of one jaw are arranged opposite the spaces between the gripping surfaces of the other jaw.

6. A tenter clip according to claim 2 wherein said pair of coacting movable jaws comprises a first and a second jaw, said first jaw having two spaced stripping members which have contact surfaces, said second jaw having one stripping member.

7. A tenter clip according to claim 6 wherein said first and second jaws are hingedly connected by means of hinge lugs having coaxial bores and a hinge pin fitted in said coaxial bores, said spaced stripping members of said first jaw protruding from the hinge lugs of the first jaw,

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and said stripping member of said second jaw protruding from the hinge lugs of the second jaw and extending substantially along the length of the gripping surface of the first jaw.

8. A tenter clip according to claim 2 wherein the plane of the contact surface of the stripping members of one jaw move beyond the plane of the gripping surface of the other jaw.

9. A tenter clip for holding a sheet comprising: first and second coacting movable jaws, each jaw having

a substantially U-shaped profile with a sheet gripping surface on one leg of the U and at least one hinge lug having a bore formed on the other leg of the U;

a hinge pin in such bores for interconnecting said jaws for pivotable movement about the pin;

sheet stripping members arranged to cooperate with said jaws, the stripping member of each jaw being fixed at one end to the hinge lug of such jaw and extending to a position spaced from the gripping surface of such jaw, and having a sheet releasing contact surface closely adjacent to the gripping surface of the other jaw;

whereby movement of the jaws to separate the gripping surfaces moves the contact surfaces into the plane of the gripping surfaces to release the sheet held therebetween.

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U.S. Cl. X.R.