Nov. 12, 1957 E. R. ROBINSON 2,812,937

LEADER FOR FLEXIBLE MATERIALS

Filed May 7, 1954 2 Sheets-Sheet 1

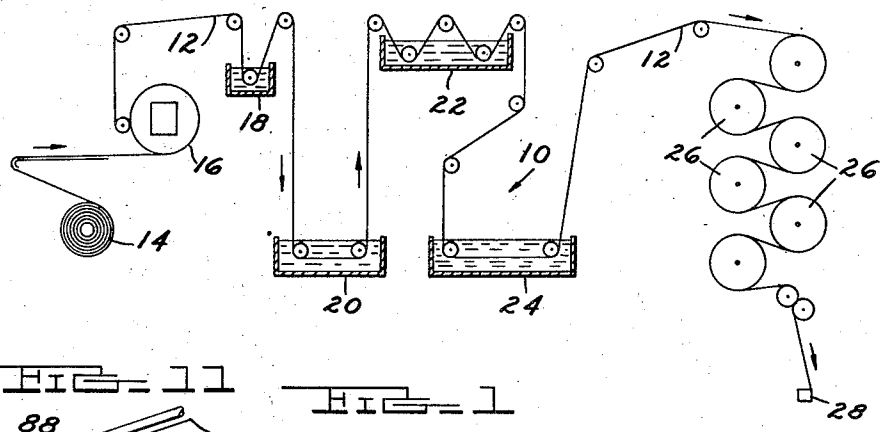


FIG. 11 FIG. 1

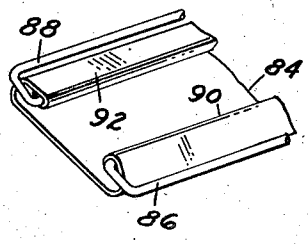
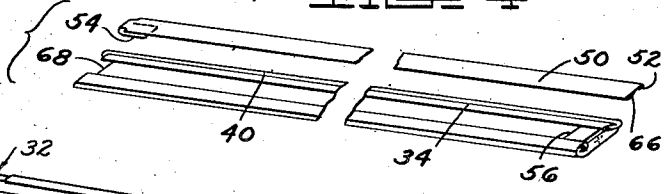


FIG. 4



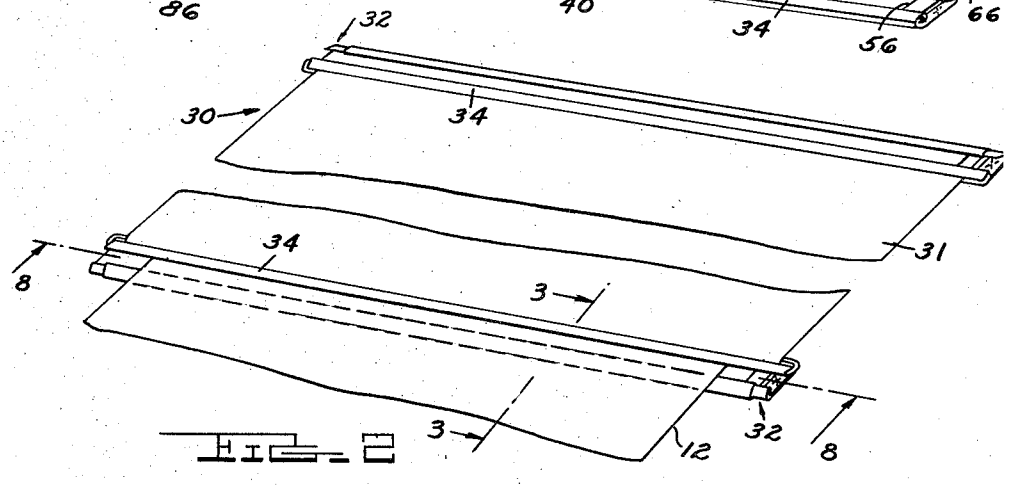


FIG. 2

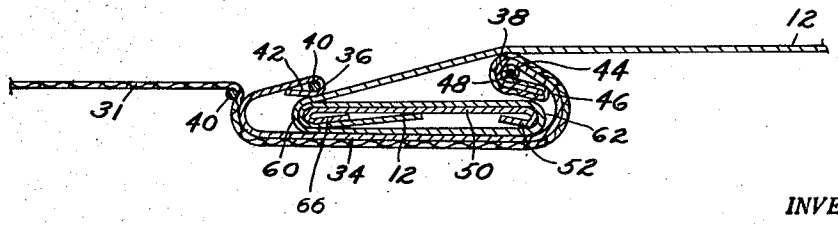


FIG. 3

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FIG. 5

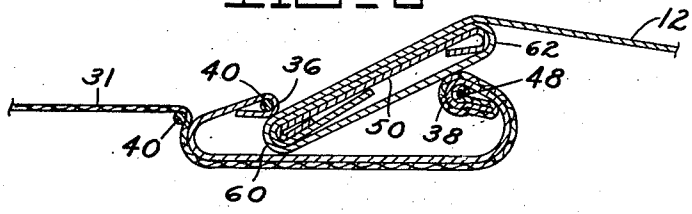


FIG. 6

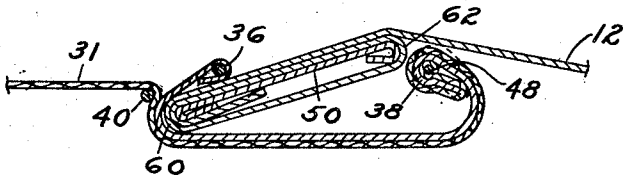


FIG. 7

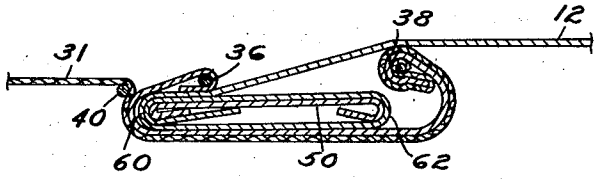


FIG. 8

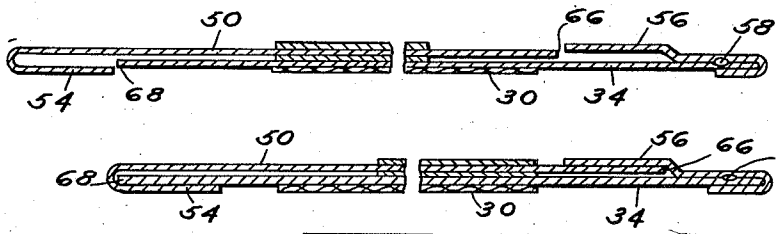
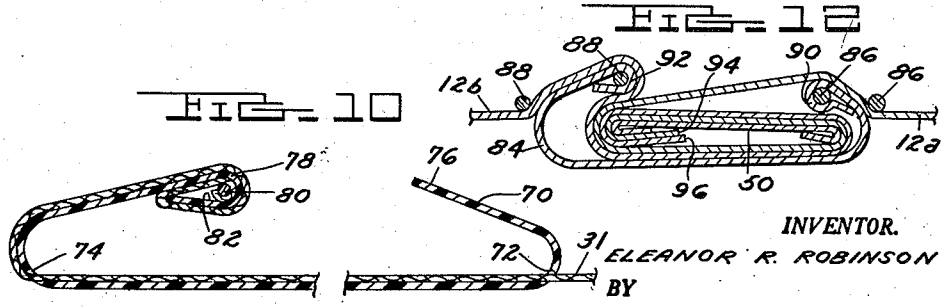


FIG. 9

FIG. 12

FIG. 10



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LEADER FOR FLEXIBLE MATERIALS

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Application May 7, 1954, Serial No. 428,159

15 Claims. (Cl. 271—2.1)

This invention relates to a leader to facilitate tractive movement of flexible materials through a predetermined path. The leader is especially adapted for use with materials having flat ribbon or sheet form.

An exemplary application of the invention lies in feeding sensitized blueprint paper through a blueprint machine. Such a machine usually operates continuously during a workday, blueprint paper being drawn from rolls and passing continuously through the machine. Tracings are fixed over the sensitized surface of the paper before it enters the machine. Within the machine the paper is successively exposed to a light source, passed through several developing, fixing and rinsing baths and then dried.

A problem arises on stopping the machine such as at the end of a workday or for maintenance purposes. Prolonged contact of the blueprint paper with the chemicals of the various baths and prolonged exposure to the heat of the drier renders the paper useless. The paper is expensive and leaving it in the machine during a stoppage results in a costly waste of several yards of the paper. It is also costly in man hours and machine hours lost to run the paper out of the machine before a stoppage and rethread the machine before resuming operation.

One solution to the problem has been to feed a special leader paper through the machine and leave it there during a stoppage. However, leader paper must be discarded after brief use and sometimes it weakens and breaks in the machine, causing a costly waste of time and labor in preparing for resumed operation. Moreover, the leader paper is usually pasted to the blueprint paper and the machine must be slowed to allow the paste to dry before the paper contacts elements in the machine. The resulting overexposure of the blueprint paper to the light, heat and baths in the machine usually causes a costly waste of a number of yards of the blueprint paper. Further, storage of the leader paper is difficult in some situations.

It is an object of this invention to provide a simple, inexpensive leader device which can be used repeatedly over a long period of time without corroding and without danger of breaking in the machine. A further object of the invention is to provide a leader device which can be attached to and detached from blueprint paper by a quick simple manipulation. The invention generally contemplates the use of a woven glass fabric leader element having flat corrosion resistant fasteners at its leading and trailing edges. Each fastener includes an open sided channel member secured to the leader and an elongate insert member to be wrapped in the paper and inserted laterally into the open side of the channel. The members are locked together and unlocked by shifting them longitudinally relatively to each other.

Three forms of the invention are shown in the accompanying drawings which may be briefly described as follows:

Fig. 1 is a diagrammatic illustration of a blueprint machine with blueprint paper being processed therein.

Fig. 2 is a perspective view of a leader made in accordance with this invention and having blueprint paper secured thereto in operative position.

Fig. 3 is a sectional view on line 3—3 of Fig. 2.

Fig. 4 is a perspective of the fastener members separate from the flexible leader element.

Fig. 5 is similar to Fig. 3 except that the elements are shown diagrammatically and the insert is shown in a position preparatory to its being secured within the channel member.

Fig. 6 is similar to Fig. 5 but showing a subsequent step in securing the parts together.

Fig. 7 is similar to Fig. 6 but showing a further subsequent step in securing the parts together.

Fig. 8 is a sectional view on line 8—8 of Fig. 2 illustrating the position of the fastening members in unlocked position.

Fig. 9 is similar to Fig. 8 but showing the fastening members shifted to locked position.

Fig. 10 is an enlarged sectional view showing a modified form of the channel member.

Fig. 11 is a fragmentary perspective view of a modified form of the channel member.

Fig. 12 is a transverse sectional view of the channel member of Fig. 11 with the parts shown diagrammatically.

Shown in Fig. 1 is a blueprint machine generally indicated at **10** with blueprint paper **12** being drawn from a roll **14** and being processed therein. A rotating cylindrical light source is represented at **16**, the various processing and rinsing baths at **18**, **20**, **22** and **24** and drier rollers at **26**. A windup is represented at **28**. When the leader of this invention, shown generally at **30**, is fed through the blueprint machine **10**, it follows the path of the blueprint paper **12** as illustrated in Fig. 1.

The leader of this invention comprises a leader element **31** made of a flexible corrosion resisting sheet or ribbon of material, preferably a woven glass fabric. Fastening devices, generally designated **32**, are secured to the leading edge and the trailing edge of the leader element. The fastening devices are preferably identical. Each fastening device includes an elongate flattened channel member **34** having inwardly turned legs **36** and **38** whose ends are spaced apart to form a longitudinal opening in the channel member. Leg **36** is longer than leg **38** as shown. The channel member has a crossbar **40** adjacent but spaced slightly from inner leg **36** and extending longitudinally the length of the channel. Crossbar **40** is secured in position by such means as clamping it in a bight portion **42** of leg **36**.

An end **44** of the leader element **31** is clamped within a bight portion **46** of the outer leg **38** of the channel member and around a rod **48** within the bight, thus anchoring the channel member transversely across the end of the leader element. The leader element extends around the exterior of leg **38**, around the exterior of channel **34** and between leg **36** and crossbar **40** as shown.

The fastening device **32** also includes an insert **50** having the form of a flat elongate strip as shown. The sides of the insert may be folded inwardly as at **52** to present a smooth exterior surface. Insert **50** has a width greater than the width of the opening in the side of the channel member but is dimensioned so that it can be inserted and removed laterally through the opening by cocking it at an angle to the channel member as illustrated in Figs. 5 and 6. Insert **50** has a clasp portion **54** at one end which preferably comprises a return-bent portion as shown.

One end of channel member **34** has a return portion **56** forming a clasp and this clasp may comprise a separate piece spot welded to the channel **34** as at **58**. The return portions **54** and **56** project in opposite directions laterally

and longitudinally when the member **34** and **50** are in operative relation and the return portions of each member **34** and **50** are dimensioned to engage around an end of the other member. Channel member **34** and insert member **50** are formed of a corrosion resisting material such as stainless steel.

As to operation of the device, it may be assumed initially that blueprint paper **12** is being fed through and processed within blueprint machine **10**. When it is desired to interrupt the processing, such as at the end of a workday or for maintenance purposes, the paper is severed at a point upstream of the feed opening of the machine. The trailing edge of the paper is wrapped around an insert **50**, one or two complete turns usually being sufficient. Then the wrapped insert is cocked at an angle and trailing edge **60** is inserted laterally through the opening in channel **34** to the position illustrated in Fig. 5. Edge **60** is then forced under inwardly extending leg **36**, thereby springing leg **36** slightly upwardly and bringing the leading edge **62** of the wrapped insert against the inner edge of leg **38** as shown in Fig. 6. The pocket formed by longer leg **36** is deep enough so that when edge **60** is fully inserted therein leading edge **62** nearly clears the inner end of the shorter leg **38**. End **62**, by slight manual pressure, is then forced downwardly, momentarily springing leg **38** outwardly as illustrated in the dotted lines in Fig. 6. End **62** then drops into the channel to the Fig. 7 position with legs **36** and **38** returning resiliently to unstressed position.

The channel **34** and insert **50** are then manipulated to bring them to the relative positions shown in Fig. 8 with ends **66** and **68** thereof positioned for insertion within clasps **54** and **56**. In a further simple manipulation the channel and insert are shifted longitudinally to bring the clasps **54** and **56** into locking engagement with ends **68** and **66**, respectively. In this condition the insert may shift laterally within channel **34** when tractive force is applied to element **31**, for example from the Fig. 7 to the Fig. 3 position. When edge **62** shifts to a position under shorter leg **38** (Fig. 3) the inner end of longer leg **36** overlies edge **60** and holds the insert within the channel. The insert is thus locked within the channel and will remain there during application of tractive force applied by the blueprint paper **12** on the leader.

The leader **30** is drawn through the machine by the blueprint paper and fastener **32** passes through the machine without fouling therein because of its flat form. In this regard, engagement of crossbar **40** with leader element **31** causes fastener **32** to trail flatly behind the paper **12**; the major plane of the fastener tends to remain generally parallel to the direction of the tractive force transmitted thereby. The leader element **31** is long enough so that when the leading edge of the leader has emerged from the machine after passing through the drier **26** the trailing edge has not been drawn into the feed opening. When the leading edge emerges from the machine the machine is stopped, leaving the leader therein.

Th insert **50** and channel member **34** are unlocked from each other by manipulating them longitudinally so that clasps **54** and **56** disengage from ends **68** and **66**. The insert is then manipulated to the Fig. 7 position and then outwardly laterally through the opening in the channel member, momentarily springing legs **36** and **38** outwardly as described, and the insert is unwrapped, freeing the blueprint paper from the leader. The insert may then be returned within the channel for convenient storage thereof. The insert may be inserted and removed through the open ends of channel **34** if desired.

The insert **50** and channel member **34**, being made of corrosion resistant material, remain unaffected in passing through the various solutions in the machine. The leader element **31**, being made of woven glass fabric, can remain in contact with the various chemical solutions and baths indefinitely without being affected thereby. Moreover, prolonged exposure of the leader element to the heat of the drying rollers when the machine is stopped has no harmful effect on the leader element. The leader element **31** remains strong and will not break when the machine is restarted.

When it is desired to resume operation of the machine, the leading edge of a sheet of blueprint paper is attached to the trailing edge of the leader in the manner described and is drawn through the machine. When the leading edge of the blueprint paper emerges from the machine, it is detached from the leader in the manner described. The leader element itself has been thoroughly dried in passing over the drying rollers and the leader can be rolled up into a relatively small conveniently handled roll until its next use. The leader can be used repeatedly over a long period of time since it is not weakened or otherwise harmed by flexing around the rollers in the machine nor by the chemicals therein.

In the modification of the invention shown in Fig. 10 there is provided a channel member **70** similar to the channel member **34** of the principal form of the invention except that channel **70** is made of a form retaining plastic such as nylon. Leader element **31** extends through slotted openings **72** and **74** in the base of legs **76** and **78** and is clamped around a rod **80** within a bight portion **82** of leg **78** as shown. Operation of this channel member is similar to operation of the metal channel member of the principal form of the invention.

In the modification of the invention shown in Figs. 11 and 12 there is provided a channel member **84** similar to the channel member **34** of the principal form of the invention except that channel **84** has preferably identical crossbars **86** and **88** secured adjacent the inwardly turned legs **90** and **92** as shown. This form of the invention is used to secure the leading edge **94** of a fresh roll of blueprint paper **12*a*** to the trailing edge **96** of an expiring roll of blueprint paper **12*b***. This is accomplished by passing edges **94** and **96** of the blueprint paper between crossbars **86** and **88** and the adjacent leg portions **90** and **92** of the channel member, wrapping the end portions of both rolls of paper around the insert and securing the insert within the channel member **84** in the manner described.

The leading edge of the new roll of paper is drawn through the blueprint machine **10** by the expiring roll. The flat leader device trails flatly behind the expiring roll by engagement of the crossbars **86** and **88** with the paper. When the leader device emerges from the machine it is detached from paper **12*a*** and **12*b*** in the manner described.

I claim:

1. A leader facilitating tractive movement of flexible materials comprising, a first member, a second member, means forming an open channel conformation on said first member, said second member being adapted to be attached to flexible materials, said second member being laterally removably engageable in said channel conformation, and one end of each of said members having a return portion engaged around the other end of the other member to lock said members together, said return portions projecting in opposite directions and being slidably releasable from said other ends upon relative longitudinal shifting of said members.

2. A leader facilitating tractive movement of flexible materials comprising, a first member, a second member, said first member having flattened channel form with inwardly extending legs, the ends of said legs being spaced apart to define an opening, means on said first member forming a crossbar adjacent each of said legs such that a flexible material may pass between each of said crossbars and its adjacent leg, said second member being adapted to be wrapped in such flexible materials and being dimensioned to pass laterally through said opening when so wrapped for removable engagement within said channel, said crossbars being positioned to engage such flexible materials when said second member is engaged

within said channel, said members having longitudinally releasable means locking said members together, whereby to detachably secure the flexible materials to said leader.

3. The leader defined in claim 2 and characterized in that said first member is formed of a resilient material so that said legs may spread resiliently apart to pass said second member when so wrapped.

4. The leader defined in claim 2 wherein said members are formed of stainless steel.

5. A leader facilitating tractive movement of flexible materials comprising, a flexible leader element and fastening means for fastening a flexible material to said leader element, said fastening means including a first member secured to said leader element and a second member adapted to be attached to the flexible material, means forming a channel conformation on said first member, said channel conformation being defined in part by spaced apart legs, said legs defining a lateral opening, said opening being narrower than adjacent portions of said channel conformation, said channel conformation being deeper on one side of said opening than on the other side thereof, said second member having such a width that when one side thereof is positioned within the deeper side of said channel conformation the other side thereof can pass laterally through said opening, said second member being shiftable toward said other side of said channel conformation responsively to tractive force applied by said leader element, said legs being operative to retain said second member within said channel conformation when said second member is so shifted toward said other side.

6. A leader facilitating tractive movement of flexible materials comprising, a flexible leader element and fastening means for fastening a flexible material to said leader element, said fastening means including a first member secured to said leader element and a second member adapted to be attached to the flexible material, said first member having an elongate flattened channel form and having legs extending inwardly generally parallel to the direction of tractive movement of said leader, the ends of said legs being spaced apart to define an opening, one of said legs being longer than the other so that said channel has a deeper portion on one side of said opening and a shallower portion on the other side thereof, said second member having generally flat strip form, said second member having a width generally as great as the combined width of said opening and depth of said deeper portion of said channel so that when one side of said second member is positioned within the deeper portion of said channel the other side thereof can pass through said opening, said second member being shiftable toward said shallower portion responsively to tractive force applied by said leader element, said legs being operative to retain said second member within said channel when said second member is so shifted toward said shallower portion.

7. A leader facilitating tractive movement of flexible materials comprising, a flexible leader element and fastening means for fastening a flexible material to said leader element, said fastening means including a first member secured to said leader element and a second member adapted to be attached to the flexible material, said first member having an elongate flattened channel form and having legs extending inwardly generally parallel to the direction of tractive movement of said leader, the ends of said legs being spaced apart to define an opening, one of said legs being longer than the other so that said channel has a deeper portion on one side of said opening and a shallower portion on the other side thereof, said second member having generally flat strip form, said second member having a width generally as great as the combined width of said opening and depth of said deeper portion of said channel so that when one side of said second member is positioned within the

deeper portion of said channel the other side thereof can pass through said opening, said second member being shiftable toward said shallower portion responsively to tractive force applied by said leader element, said second member having a width greater than the combined width of said opening and depth of said shallower portion so that the longer of said legs overlies said second member when shifted into said shallower portion, whereby to retain said second member within said channel.

8. The leader defined in claim 7 wherein said second member has a width slightly greater than the combined width of said opening and depth of said deeper portion, said legs being resiliently outwardly distortable to enlarge said second opening for passing said second member laterally therethrough.

9. A leader facilitating tractive movement of flexible materials comprising, a flexible leader element and fastening means for fastening a flexible material to said leader element, said fastening means including a first member secured to said leader element and a second member adapted to be attached to the flexible material, means forming a channel conformation on said first member, said channel conformation being defined in part by spaced apart legs, said legs defining a lateral opening, said opening being narrower than adjacent portions of said channel conformation, said channel conformation being deeper on one side of said opening than on the other side thereof, said second member having such a width that when one side thereof is positioned within the deeper side of said channel conformation the other side thereof can pass through said opening, said second member being shiftable toward said other side of said channel conformation responsively to tractive force applied by said leader element, said legs being operative to retain said second member within said channel conformation when said second member is so shifted toward said other side, and means forming a clasp on each of said members, the clasp on each member engaging an end portion of the other member to lock said members together, said clasps being releasable upon relative longitudinal shifting of said members, whereby to detachably secure the flexible material to said leader element.

10. A leader facilitating tractive movement of flexible materials comprising, a flexible leader element and fastening means for fastening a flexible material to said leader element, said fastening means including a first member secured to said leader element and a second member adapted to be attached to the flexible material, said first member having an elongate flattened channel form and having legs extending inwardly generally parallel to the direction of tractive movement of said leader, the ends of said legs being spaced apart to define an opening, one of said legs being longer than the other so that said channel has a deeper portion on one side of said opening and a shallower portion on the other side thereof, said second member having generally flat strip form, said second member having a width generally as great as the combined width of said opening and depth of said deeper portion of said channel so that when one side of said second member is positioned within the deeper portion of said channel the other side thereof can pass through said opening, said second member being shiftable toward said shallower portion responsively to tractive force applied by said leader element, said legs being operative to retain said second member within said channel when said second member is so shifted toward said shallower portion, and means forming a bar fixed longitudinally adjacent said longer leg, said leader element engaging over said bar and beneath said first member to stabilize said fastening means substantially flatly in the trail of said leader element.

11. A leader facilitating tractive movement of flexible materials comprising, a first member, a second member, means forming a channel conformation on said first member, said channel conformation being defined in part by

spaced apart legs, said legs defining a lateral opening, said opening being narrower than adjacent portions of said channel conformation, said channel conformation having a deeper portion on one side of said opening and a shallower portion on the other side of said opening, said second member having such a width that when one side thereof is positioned within said deeper portion of said channel conformation the other side thereof can pass laterally through said opening, said second member being shiftable toward said shallower portion, said second member having a width greater than the combined width of said opening and depth of said shallow portion so that said legs overlie said second member when shifted into said shallower portion, whereby to retain said second member within said channel.

12. A leader facilitating tractive movement of flexible materials comprising, a first member, a second member, said first member having an elongate flattened channel form and having legs extending inwardly generally parallel to the direction of tractive movement of said leader, the ends of said legs being spaced apart to define an opening, one of said legs being longer than the other so that said channel has a deeper portion on one side of said opening and a shallower portion on the other side thereof, said second member having generally flat strip form, said second member having a width generally as great as the combined width of said opening and depth of said deeper portion, so that when one side of said second member is positioned within said deeper portion the other side thereof can pass laterally through said opening, said second member being shiftable toward said shallower portion, said legs being operative to retain said second member within said channel when said second member is so shifted toward said shallow portion.

13. A leader facilitating tractive movement of flexible materials comprising, a first member, a second member, said first member having an elongate flattened channel form and having legs extending inwardly generally parallel to the direction of tractive movement of said leader, the ends of said legs being spaced apart to define an opening, one of said legs being longer than the other so that said channel has a deeper portion on one side of said opening and a shallower portion on the other side thereof, said second member having generally flat strip form, said second member having a width generally as great as the combined width of said opening and depth of said deeper portion, so that when one side of said second member is positioned within said deeper portion the other side thereof can pass laterally through said opening, said second member being shiftable toward said shallower portion, said second member having a width greater than the combined width of said opening and depth of said shallower portion so that the longer of said legs overlies said second member when shifted into said shallower portion, whereby to retain said second member within said channel.

14. The leader defined in claim 13 wherein said second member has a width slightly greater than the combined width of said opening and depth of said deeper portion, said legs being resiliently outwardly distortable to enlarge said opening for passing said second member laterally therethrough.

15. A device facilitating tractive movement of flexible materials comprising, a first member, a second member adapted to be wrapped in flexible material, said first member having elongate channel form and having legs extending inwardly, the ends of said legs being spaced apart to define an opening, said opening being narrower than adjacent portions of said channel, said channel having a deeper portion and a shallower portion on opposite sides of said opening, said second member having a thickness less than the width of said opening, said second member having a width greater than the combined width of said opening and depth of said shallower portion, the width of said second member being generally as great as the width of said opening and depth of said deeper portion so that said second member can pass laterally at an angle through said opening and into said deeper portion for removable engagement in said channel, said legs engaging said second member to retain the same within said channel when said second member is disposed at least partially within said shallower portion.

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