June 7, 1955 H. W. BRUKER 2,710,045

CORRUGATED PAPER WEB GUIDING AND TENSIONING APPARATUS

Filed Feb. 6, 1953 4 Sheets-Sheet 1

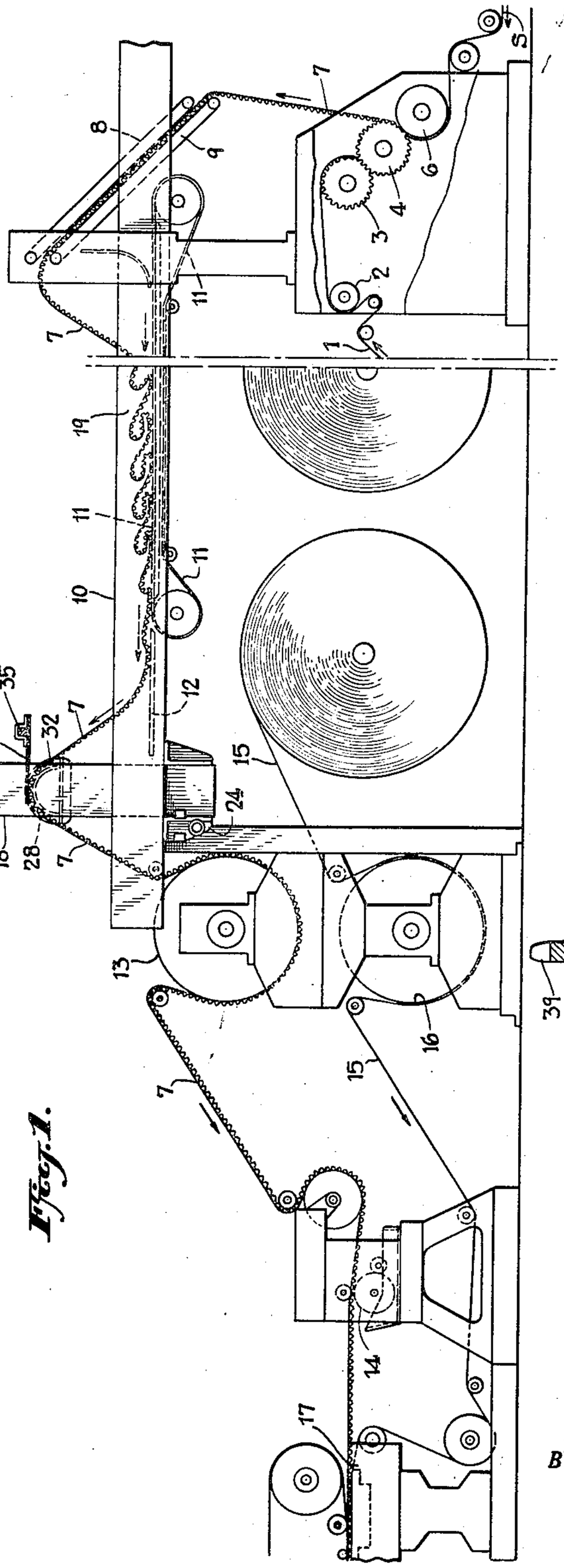


Fig. 1.

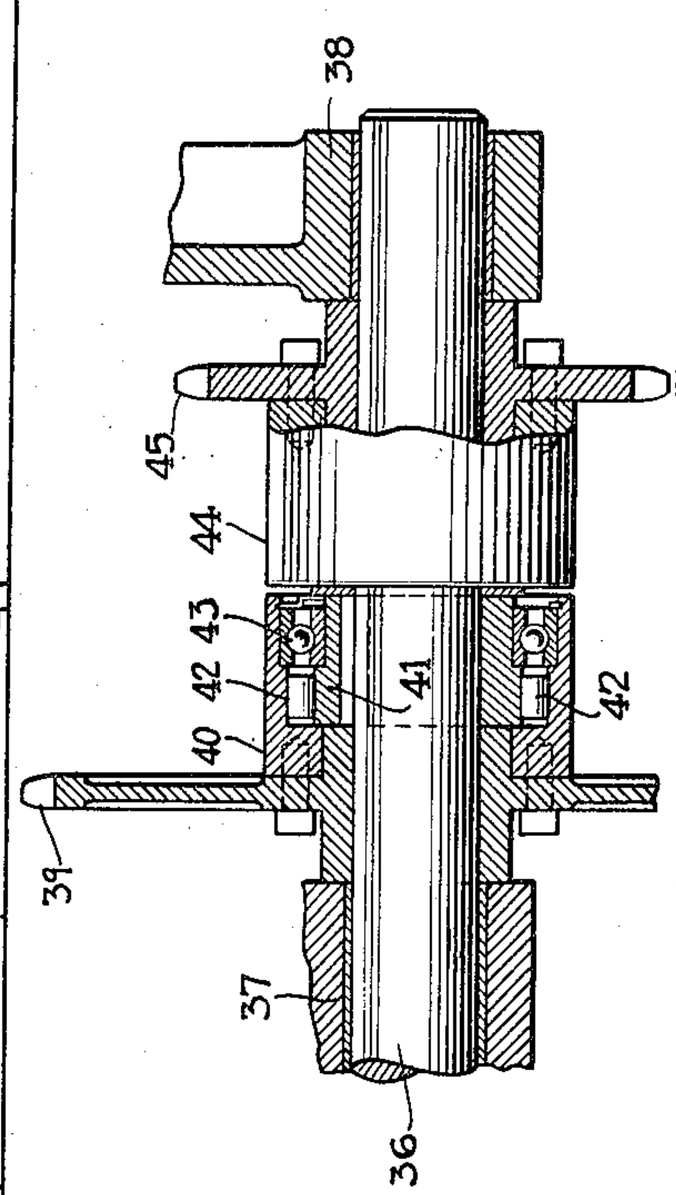


Fig. 6.

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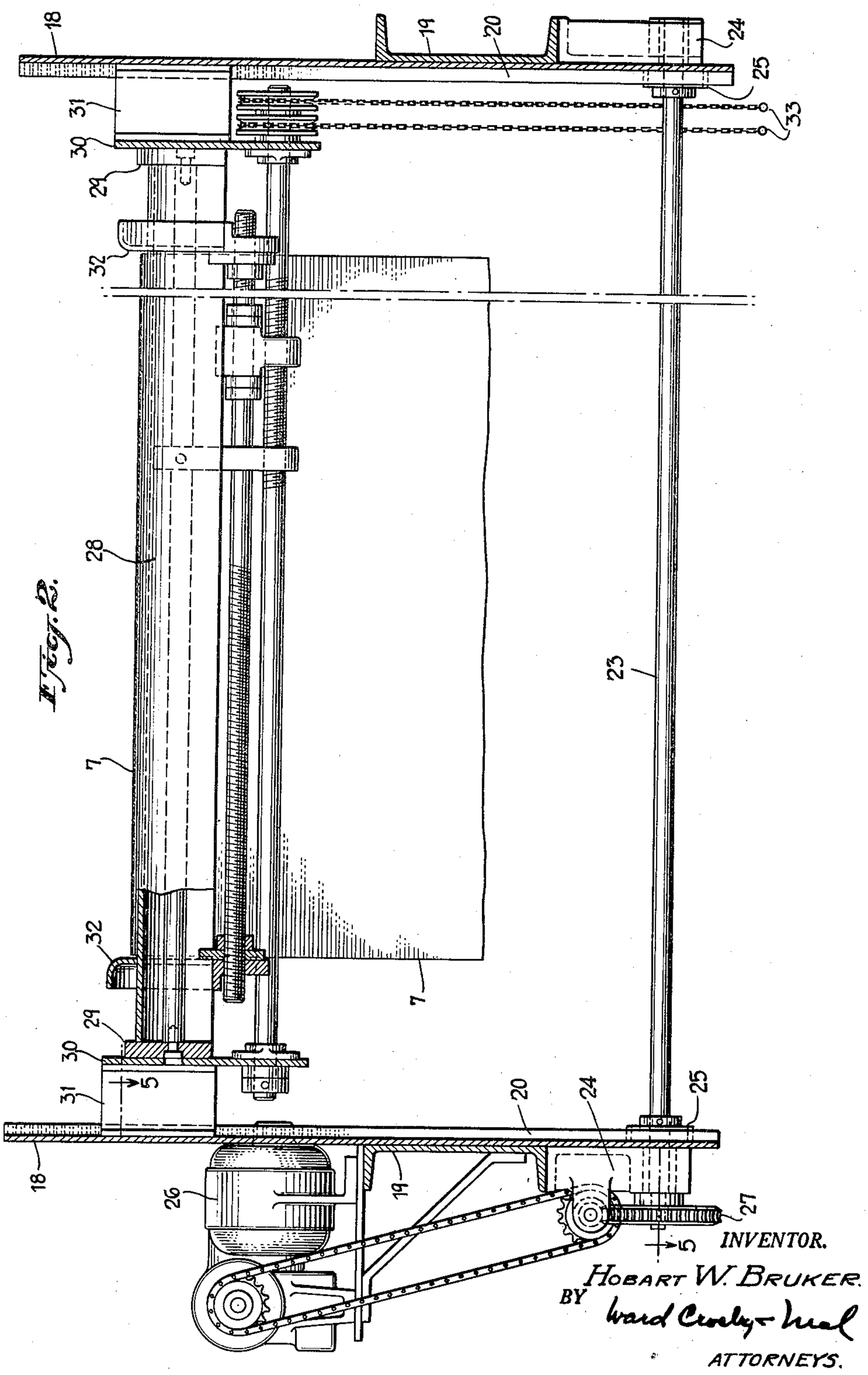


Fig. 2.

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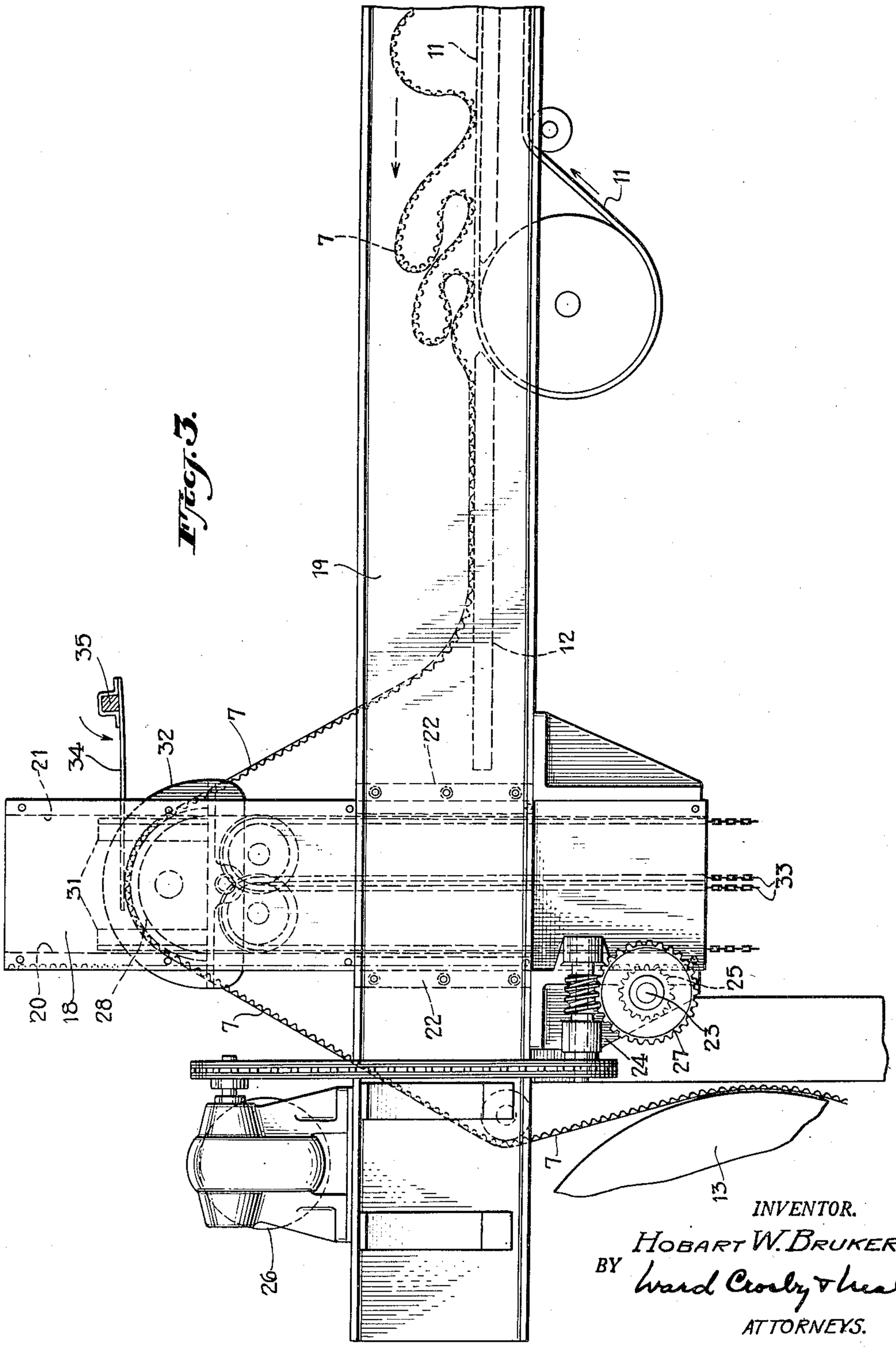
Fig. 3.

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CORRUGATED PAPER WEB GUIDING AND TENSIONING APPARATUS

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*Fig. 4.*

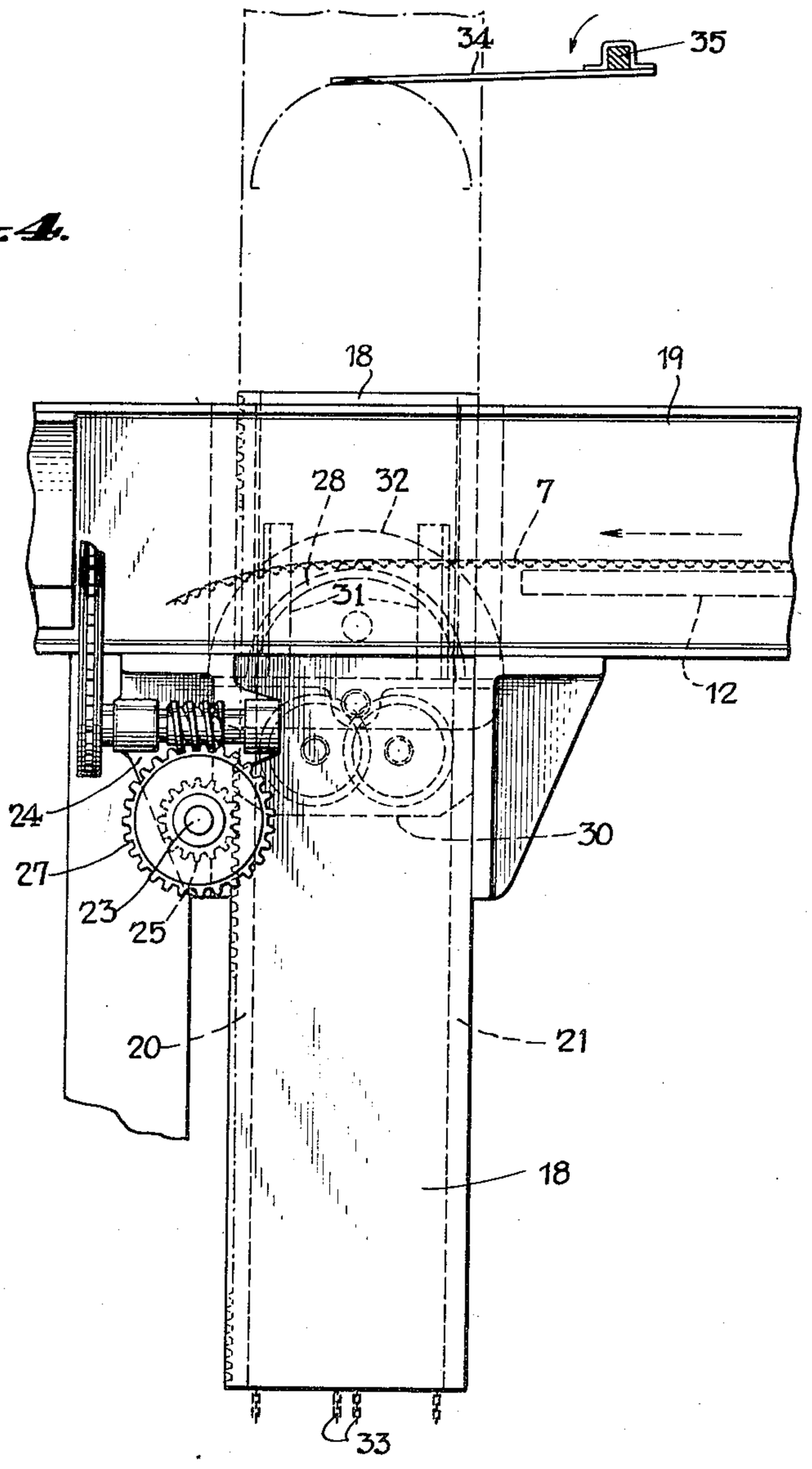
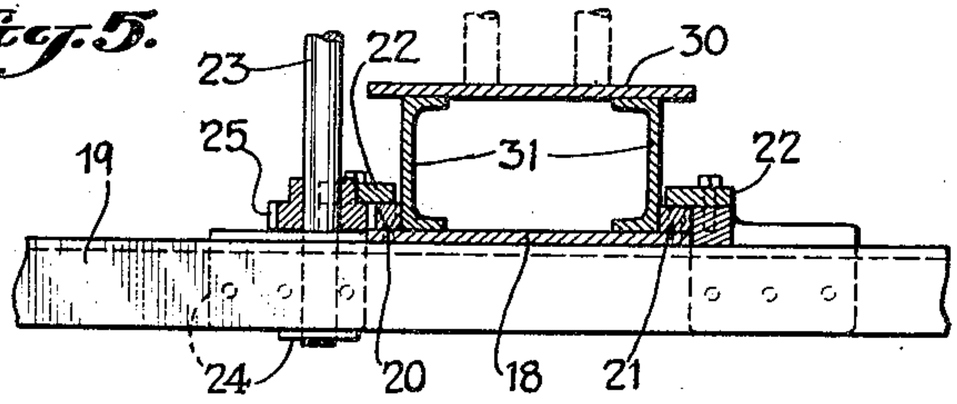



*Fig. 5.*

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# CORRUGATED PAPER WEB GUIDING AND TENSIONING APPARATUS

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5 Claims. (Cl. 154—32)

In the manufacture of double faced corrugated paperboard, it has been conventional for generations to conduct the single faced corrugated paper web as delivered by a single facing machine, upwardly to an overhead bridge leading toward a double facing machine, this bridge being provided with a conveying mechanism which feeds the single faced web toward the double facing mechanism. At the delivery end of this bridge, a web guiding and tensioning mechanism has been conventionally employed. Since the bridge usually carries an excess of single faced corrugated paper in the form of loose, more or less sinuous folds or loops, the above mentioned web guiding and tensioning mechanism has always been located several feet above the level of the above mentioned bridge to insure that the folds in the web will be eliminated before the latter passes through the tensioning mechanism. From the tensioning mechanism the web passes downwardly to the rolls and other appurtenances used in connection with the double facing operation.

The above mentioned bridge has to be located at a level higher than the operator can reach from the floor, and since the tensioning mechanism had to be located at an even higher level to insure that the folds of paper carried by the bridge would become unfolded and straightened out properly before passing through the tensioning mechanism, it has always been necessary for the operator in feeding a new paper web through the machinery from the single facer to the double facer, to climb up at the delivery end of the above mentioned bridge and then thread the forward end of the web through the tensioning mechanism until this forward end hung down to a lower level. Then the operator descended to the floor and threaded the depending forward end of the single faced web around the rolls and through the remaining appurtenances, into the double facing machine.

Accordingly in operating machinery of the above character it has been necessary for generations for the operator to climb up to the above mentioned bridge and tensioning mechanism every time a new web had to be threaded through the machinery, and the present invention aims primarily to provide web guiding and tensioning apparatus by which the above climbing activities by the operator will be avoided, so that a new web may be threaded through the machinery by the operator from floor level. Further objects and advantages of the invention will be in part obvious and in part specifically referred to in the specification hereinafter contained which, taken in conjunction with the accompanying drawings, disclose a preferred form of corrugated paper web guiding and tensioning apparatus constructed to be capable of operation in accordance with the invention; the disclosed form of apparatus however should be considered as merely illustrative of the invention in its broader aspects. In the drawings—

Fig. 1 is a schematic side view with certain parts cut away, of a single facer and double facer having associated therewith corrugated paper web guiding and tensioning apparatus constructed to be capable of operation in accordance with the invention.



Fig. 2 is a transverse sectional view of a web guiding and tensioning mechanism suitable for use as a part of the apparatus shown in Fig. 1.

Fig. 3 is a side view of the last mentioned mechanism, in normal operating position.

Fig. 4 is a view similar to Fig. 3, of the main parts of the last mentioned mechanism, but showing the same in the position assumed when the forward end of a web is to be threaded through the apparatus.

Fig. 5 is a detail section taken approximately on the broken line 5—5 of Fig. 2, looking in the direction of the arrows.

Fig. 6 is a detail sectional view of a type of conveyor driving mechanism which I prefer to provide in the machine.

Referring first to Fig. 1, the invention is shown as applied to a corrugated paperboard making machine having a single facer wherein a web **1** to be corrugated is first fed over a pre-steamer **2**, and then between corrugating rolls **3** and **4**. A facing sheet **5** passes partially around a pressure roll **6**, where it is pressed into contact with the peaks of the corrugations in web **1**, to which peaks adhesive has been applied in known manner (not illustrated). Since the single facer may be of known construction and mode of operation, it will not be described in further detail, it being understood that the web **7** of single faced corrugated paper travels upwardly from the single facer to pass between sets of feed belts **8** and **9** which deliver the web progressively into the entrance end of an overhead guide bridge indicated generally at **10** in Fig. 1. This overhead bridge **10** extends over horizontally toward the double facing section of the machine later to be described, and is provided with an appropriate number of traveling conveyor belts **11** to feed the single faced corrugated web **7** progressively from right to left as the parts appear in Fig. 1, the bridge **10** being shown as having a suitable flooring **12** which supports the web **7** beyond the travel of the conveyors **11**. As previously stated, it has long been customary in operation, to maintain in the bridge **10** somewhat of an excess of length of the web **7**, so that the web travels along bridge **10** largely in the form of more or less loose folds or loops which do not lie flat against the conveyors **11**. Since the above parts of the machine may be assumed to be of known form they are not described in greater detail herein.

At the delivery end of the guide bridge **10**, is located a web guiding and tensioning mechanism indicated generally at A in Fig. 1, and a preferred form of which is later described in detail. From this mechanism A, the web **7** is shown as passing partially around a pre-heater roller **13** used in connection with the double facing section of the machine. The web **7** is then fed past an appropriate adhesive applying mechanism **14** where adhesive is applied to the peaks of the corrugations of web **7**. A second facing sheet **15** is shown as fed partially around a pre-heater roll **16** to the entrance end **17** of the double facer section of the machine, where the second facing sheet is pressed into contact with the adhesive-coated peaks of the corrugations of web **7**. Since elements **13–17** above described may be assumed to be of known construction, they are not further described in greater detail.

In threading the forward end of a new corrugated web **7** through the machine from the single facer to the double facer, in the case of machinery which has been conventional for generations as above described, the only threading or web guiding operation which the operator has had to perform at a level higher than could be reached from the floor, has been at the delivery end of bridge

10, where in normal operation the web guiding and tensioning mechanism A has to be positioned at a level of several feet above the floor 12 of bridge 10, in order to insure that the folds and undulations of the web 7 will be eliminated before the web 7 passes through the tensioning mechanism, the web being maintained taut from then on through to the double facer. Thus in starting up the mechanism to operate upon a new web of single faced corrugated paper, it has been necessary for the operator to climb up to the level of the bridge 10 and tensioning mechanism A, to feed the forward end of the new web through the tensioning mechanism and down to the level of the roll 13 or equivalent roll, from whence the remainder of the threading operation through to the double facer was carried out by the operator at ground level.

In accordance with the present invention, this web tensioning mechanism A is so constructed that during the threading operation above referred to, it may be lowered down approximately to the level of the floor 12 of bridge 10 and the upper flights of conveyors 11, the parts of this mechanism which produce the tension on web 7 in normal operation, being at this time spread apart. With the tension producing parts thus spread apart and the mechanism A in lowered position as above described, the forward push of the conveyors 11 is sufficient to advance the forward end portion of a new web 7 past the mechanism A and the delivery end of bridge 10, even though the forward end of the web be in the form of undulating folds as above described. Then after the forward end of the web 7 has passed the delivery end of bridge 10, it will drop down by gravity to a position where the operator, working from ground level, may thread the forward end of web 7 through the remaining parts of the machine over to the double facer 17. Then the tensioning mechanism A is raised up to its elevated position several feet above the floor 12 of bridge 10, and its tension producing members are brought into frictional engagement with the opposite surfaces of web 7 to maintain the web taut between the mechanism A and the double facer, during normal operation of the machine. The raising of the mechanism A, as just described, also raises up the portion of web 7 adjacent the delivery end of bridge 10, to a level high enough to insure that no undulating folds of web 7 as carried along bridge 10, will reach the tension applying members of mechanism A.

A preferred form of guiding and tensioning mechanism for the web 7 is shown in Figs. 2–5, the main parts of this mechanism being supported between upright plates 18 at the opposite sides of the machine and which are adjustable vertically with respect to the channel beams 19, which latter constitute parts of the guide bridge 10 previously mentioned. As shown, the plates 18 carry vertical rack members 20 (Figs. 4 and 5) and guide flanges 21 (Fig. 5) which are slidably held in position by gibs 22 (Fig. 5) fixed to the beam 19. A cross shaft 23 rotatably supported in brackets 24 respectively fixed to the beams 19, carries gears 25 (Fig. 2) respectively engaging with the racks 20 to simultaneously adjust the uprights 18 between the upper positions shown in Figs. 2 and 3, and the lower position shown in Fig. 4. The cross shaft 23 may be rotated for example by a motor 26 which drives a worm gear 27 on one end of shaft 23 through appropriate intermediate driving connections not necessary to be described in detail.

The guiding and tensioning mechanism for web 7 includes a web supporting member 28 extending transversely across the path of travel of the web and mounted between the uprights 18 previously described, this member 28 being shown as having the inverted trough-like shape indicated in Figs. 3 and 4, so that in the normal operating position shown in Fig. 3, the web 7 passes partially around the member 28 in frictional contact with the upper surface of the latter. The member 28 is shown as fixed at its opposite ends to plates 29 (Fig. 1) which



latter are in turn fixed to plates 30 fixed to the uprights 18 by channel plates 31. Thus as the uprights 18 are adjusted between their upper and lower positions above described, the level at which the cross member 28 is positioned is correspondingly altered.

The web supporting member 28 is shown as having guide members 32 adjustable therealong to engage and guide the side edges of the web 7 as the latter travels over the member 28. These side edge guides 32 may be per se of construction known in the art, and therefore will be described only briefly. Two sets of pull chains 33 (Figs. 2 and 3) are provided, one for the purpose of adjusting the side guides 32 toward and from each other to conform to web 7 of different widths, and the other to simultaneously adjust the side guides 32 transversely of the machine, to properly aline a web 7 of given width with the double backer and appurtenances to which the web 7 travels after passing the guiding and tensioning mechanism. As previously stated, appropriate lateral adjustments of the above nature for the side guides 32 are known in the art, and therefore are not described or illustrated in full detail.

To assist in maintaining adequate tension in the web 7 as it is pulled over the surface of the web and supporting member 28, one or more pressure applying members 34 (Figs. 3 and 4) are provided, which in normal operation of the machine press downwardly upon the upper surface of web 7 as it travels over the surface of member 28 and thereby impose an additional drag on the forward movement of the web to tension the latter. These members 34 may be in form of more or less resilient plates supported by a cross bar 35 (Figs. 4 and 5), this cross bar being carried by appropriate fixed framework (not illustrated) and the bar 35 being preferably angularly adjustable to regulate the pressure of the plate or plates 34 on web 7. When the web supporting member 28 is lowered from the normal running position shown in Fig. 3, down to approximately the level of the floor 12 as shown in Fig. 4, a substantial gap between the members 28 and 34 is formed as appears in Fig. 4, this gap being closed when the member 28 moves back to normal operating position.

So long as a continuous web is being run through the machine, the parts remain in the positions shown in Fig. 3. When the forward end of a new web is to be threaded through the machine, the web guiding and tensioning mechanism is moved down to the level shown in Fig. 4, and a single facing section of the mechanism, including the conveyors 11, is run sufficiently to provide a length of single faced corrugated paper 7 running along the length of the bridge 10 to the tension mechanism. Under these conditions the forward push of the conveyors 11 will be sufficient to move the forward end portion of the web over and beyond the web supporting member 28, even though the web be undulated or looped as previously mentioned. After passing the web supporting member 28, the forward end portion of the web will drop down by its own weight to a level where it is accessible to the operator working at floor level, so that he may pass the forward end of the web partially around the preheater roll 13 (Fig. 1) and thread it through and into the remaining parts entering into the double facing operation. When this threading operation is completed, the web supporting member 28 and associated parts are raised up to the level shown in Fig. 3, where the pressure members 34 acting in conjunction with the web supporting member 28, cause tension to be maintained in the portion of the web 7 which is entering the double facing section of the machine. Also the portion of the web 7 which is about to pass over the web supporting member 28 is lifted up so as to clear itself of any folds or loops in the web which may be present elsewhere in the bridge 10. Thus the operation of threading a new web through the machine may be properly completed without requiring the operator to climb up to the level of the bridge 10

in order to thread the new web trough the web guiding and tensioning mechanism which is located at the delivery end of the bridge, in other words, the threading operation may be completed by the operator while working at floor level.

In normal operation, the conveyors **11** are usually driven from the single facer section of the machine, and these conveyors usually travel at a somewhat slower surface speed than the paper travels to the bridge **10** from the single facer. When the forward end of a new web is being threaded through the machine as above described, I prefer to increase the speed of travel of conveyors **11**, for which purpose as shown in Fig. 6, an overrunning clutch device may be provided, in conjunction with a motor so that by throwing the motor into operation, the speed of the conveyors **11** may be temporarily accelerated until the web tensioning mechanism has been moved back to its elevated, normal operating position. The shaft **36** shown in Fig. 6 should be understood as the driving shaft for the conveyors **11**, located at the entrance end of bridge **10** and running in a bearing **37** in the framework of the bridge and an outboard bearing **38** shown at the right of Fig. 6. In normal operation the shaft **36** is driven by a sprocket wheel **39** fixed to a collar **40**, which latter drives a collar **41** through the medium of cams **42**, a roller bearing indicated generally at **43** being preferably provided between the collars **40** and **41**. The above parts **40—42** should be understood as typifying an appropriate form of overrunning clutch such as is known in the art, whereby the sprocket normally drives the shaft **36** and the conveyors **11** as above described, but permitting the shaft **36** to turn at faster rate than the sprocket **39** if desired. The sprocket **39** may be understood as driven in appropriate manner (not illustrated) from one of the corrugating rolls **3**, **4** previously described.

To increase the surface speed of the conveyors **11** when a new web is being threaded through the machine, I have indicated generally in Fig. 6, a second overrunning clutch device **44** which may be understood as having parts similar to the parts **40—43** above described, and which is idle in normal operation. However when it is desired to speed up the surface speed of the conveyors **11**, a sprocket wheel **45** (Fig. 6) is rotated from a suitable source such as a motor (not illustrated) to temporarily rotate the shaft **36** at a faster rate so long as the sprocket **45** is in operation.

While the invention has been disclosed as carried out by apparatus of the above described specific construction, it should be understood that changes may be made therein, without departing from the invention in its broader aspects, within the scope of the appended claims.

I claim:

1. The method of guiding and tensioning a single faced corrugated paper web passing from a single facer to a double facer, which includes conducting the said single faced web from the single facer to an overhead conveyor extending toward the double facer, adjusting a web tensioning mechanism to a lower position adjacent the delivery end of said conveyor to cause the forward end portion of the web as fed forwardly by the overhead conveyor to pass over and drop down beyond said web tensioning mechanism, threading the web into feed mechanism of the double facer, and raising said web tensioning mechanism into an upper tension applying position with respect to the web passing over said last mentioned mechanism.

2. Apparatus of the character described for assisting in threading a corrugated paper web from a corrugator to a double facer, including a bridge located above the level of the corrugator, means for progressively feeding along said bridge from its entrance end, a corrugated paper web traveling from the corrugator, means accessible adjacent the delivery end of said bridge for feeding corrugated paper therefrom to the double facer, tensioning mechanism disposed at the delivery end of said bridge, said last mentioned mechanism having a web supporting member around which the web partially passes in normal operation to tension the web, and means for raising and lowering said web supporting member between a lower position near the level of said bridge, in which lower position the forward end portion of a corrugated web to be threaded through the appartus to the double facer can pass freely along the bridge, over and beyond said web supporting member, and an upper position substantially above the level of the bridge, in which upper position the web is tensioned as it moves over said web supporting member.

3. Apparatus of the character described for assisting in threading a corrugated paper web from a corrugator to a double facer, including a bridge located above the level of the corrugator, means for progressively feeding along said bridge from its entrance end, a corrugated paper web traveling from the corrugator, means accessible adjacent the delivery end of said bridge for feeding corrugated paper therefrom to the double facer, tensioning mechanism disposed at the delivery end of said bridge, said last mentioned mechanism having a web supporting member around which the web partially passes in normal operation to tension the web, and means for raising and lowering said web supporting member between a lower position near the level of said bridge, in which lower position the forward end portion of a corrugated web to be threaded through the apparatus to the double facer can pass freely along the bridge, over and beyond said web supporting member, and an upper position substantially above the level of the bridge, said apparatus also having a pressure applying member mounted above the web supporting member and positioned to bear against a web passing partially around the web supporting member when the latter is in its above mentioned upper position.

4. Apparatus of the character described for assisting in threading a corrugated paper web from a corrugator to a double facer, including a bridge located above the level of the corrugator, means for progressively feeding along said bridge from its entrance end, a corrugated paper web traveling from the corrugator, means accessible adjacent the delivery end of said bridge for feeding corrugated paper therefrom to the double facer, tensioning mechanism disposed at the delivery end of said bridge, said last mentioned mechanism having a web supporting member around which the web partially passes in normal operation to tension the web, and means for raising and lowering said web supporting member between a lower position near the level of said bridge, in which lower position the forward end portion of a corrugated web to be threaded through the apparatus to the double facer can pass freely along the bridge, over and beyond said web supporting member, and an upper position substantially above the level of the bridge, and means for pressing a corrugated paper web against said web supporting member when the latter is in its upper position above mentioned.

5. Apparatus of the character described for assisting in threading a corrugated paper web from a corrugator to a double facer, including a bridge located above the level of the corrugator, means for progressively feeding along said bridge from its entrance end, a corrugated paper web traveling from the corrugator, means accessible adjacent the delivery end of said bridge for feeding corrugated paper therefrom to the double facer, tensioning mechanism disposed at the delivery end of said bridge, said last mentioned mechanism having a web supporting member around which the web partially passes in normal operation to tension the web, and means for raising and lowing said web supporting member between a lower position near the level of said bridge, in which lower position the forward end portion of a corrugated web to be threaded through the apparatus to the double facer can

pass freely along the bridge, over and beyond said web supporting member, and an upper position substantially above the level of the bridge, in which upper position the web is tensioned as it moves over said web supporting member, and means adjustable to temporarily increase the speed of travel of said first mentioned web feeding means.



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