Nov. 11, 1941. H. HARVEY 2,262,232

TYING MACHINE

Filed Nov. 27, 1937 6 Sheets-Sheet 1

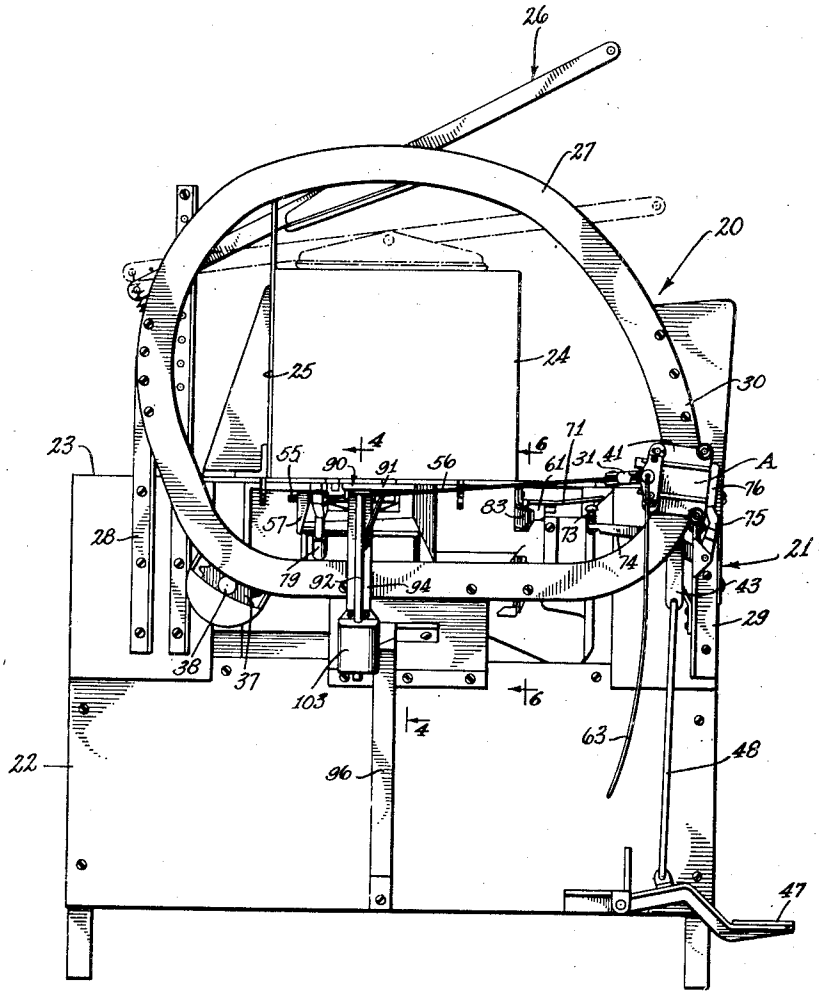


Fig. 1.

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Fig. 2

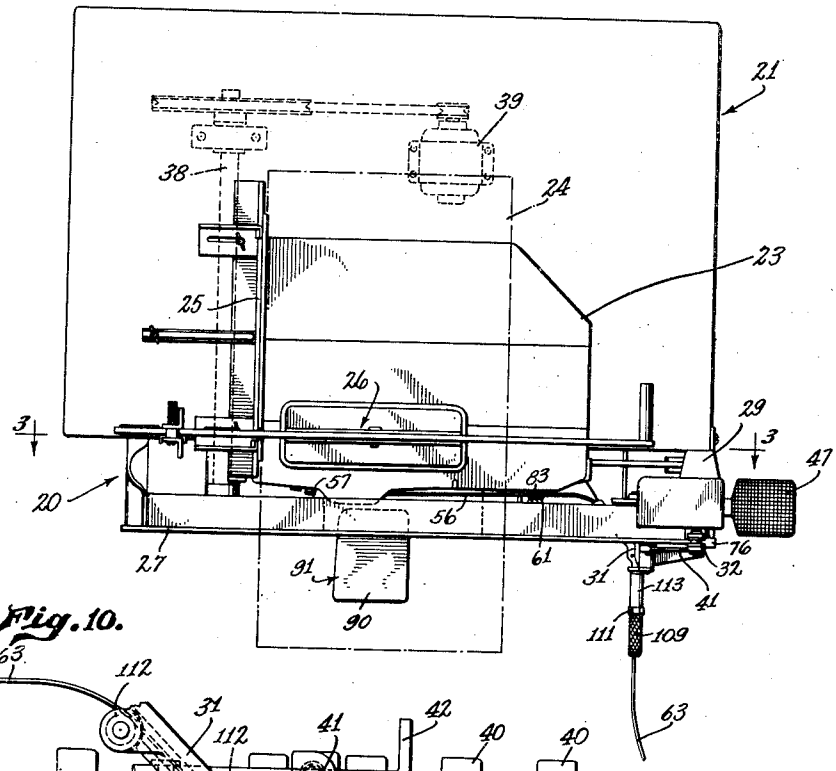


Fig. 10.

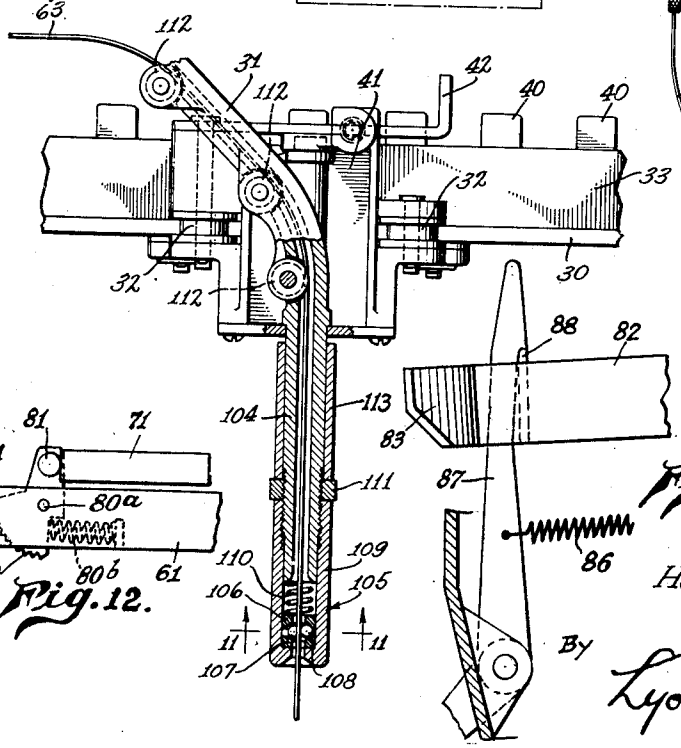


Fig. 12.

Fig. 11.

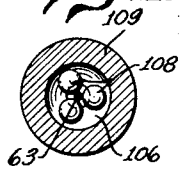


Fig. 13.

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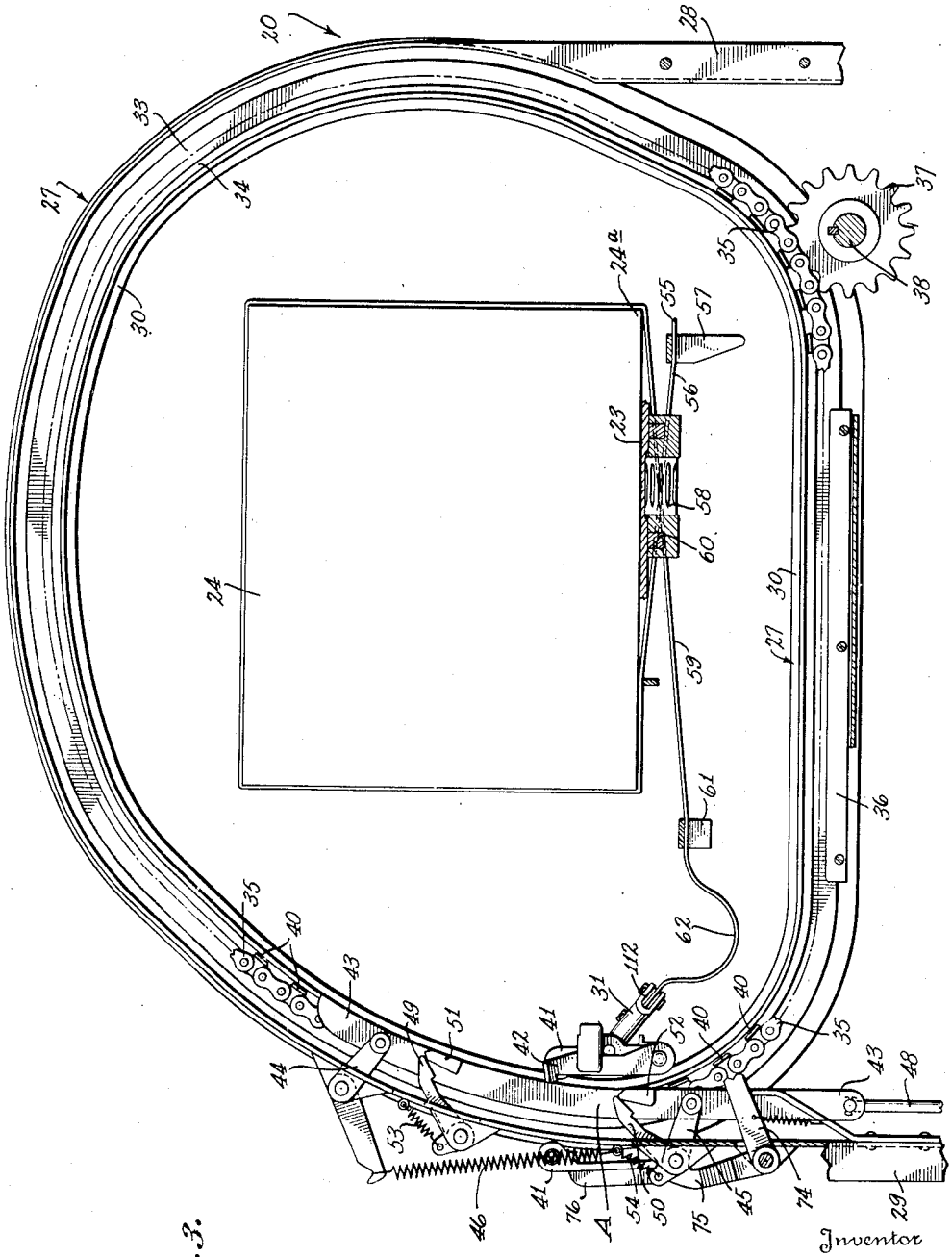


Fig. 3.

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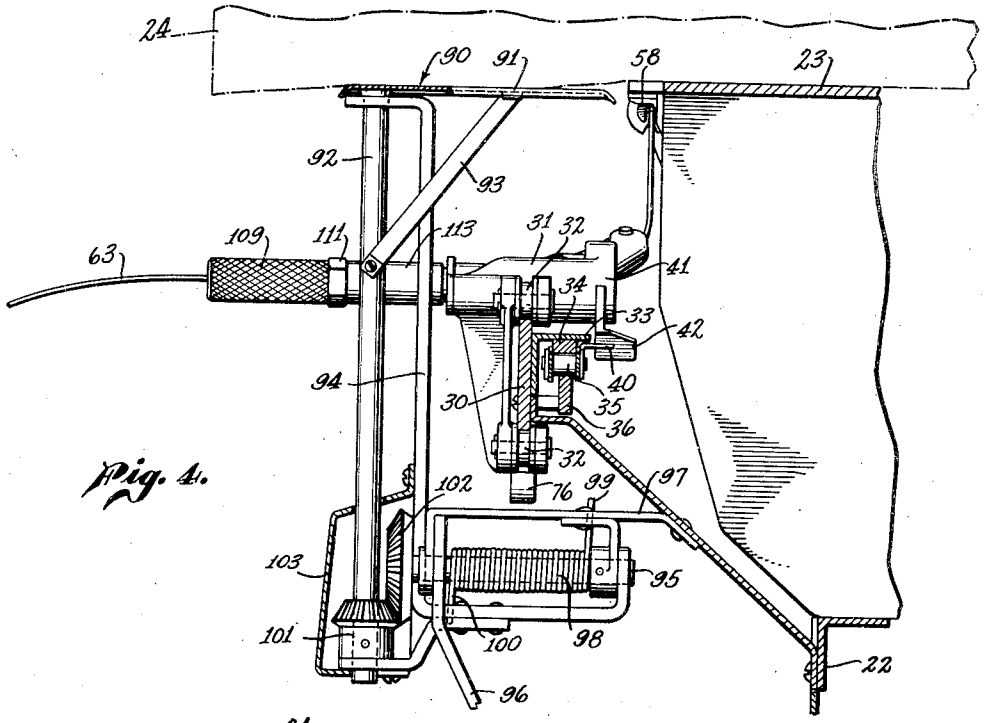


Fig. 4.

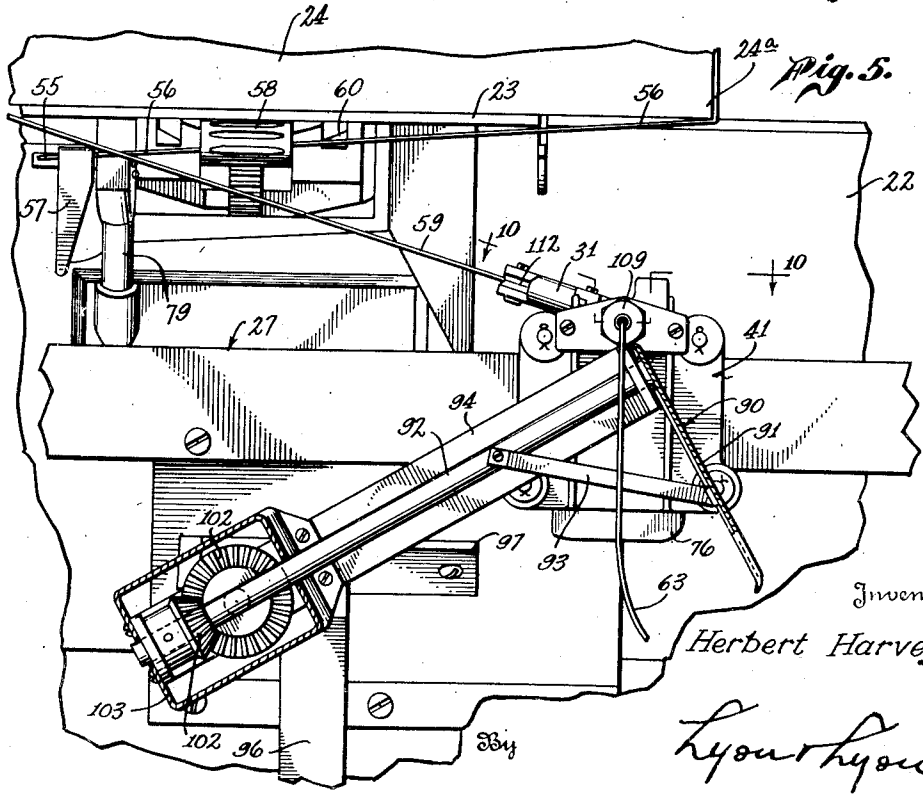


Fig. 5.

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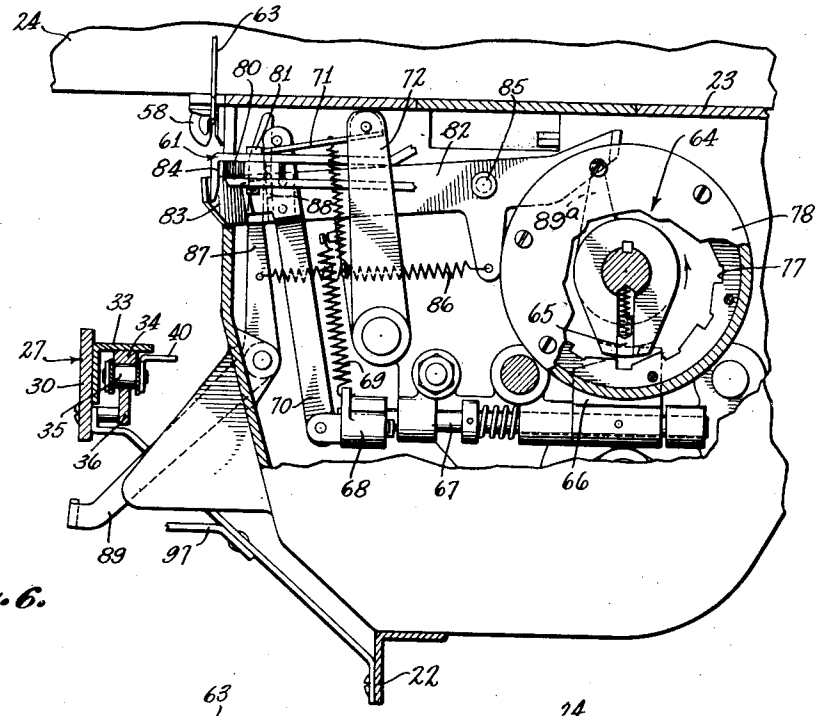


Fig. 6.

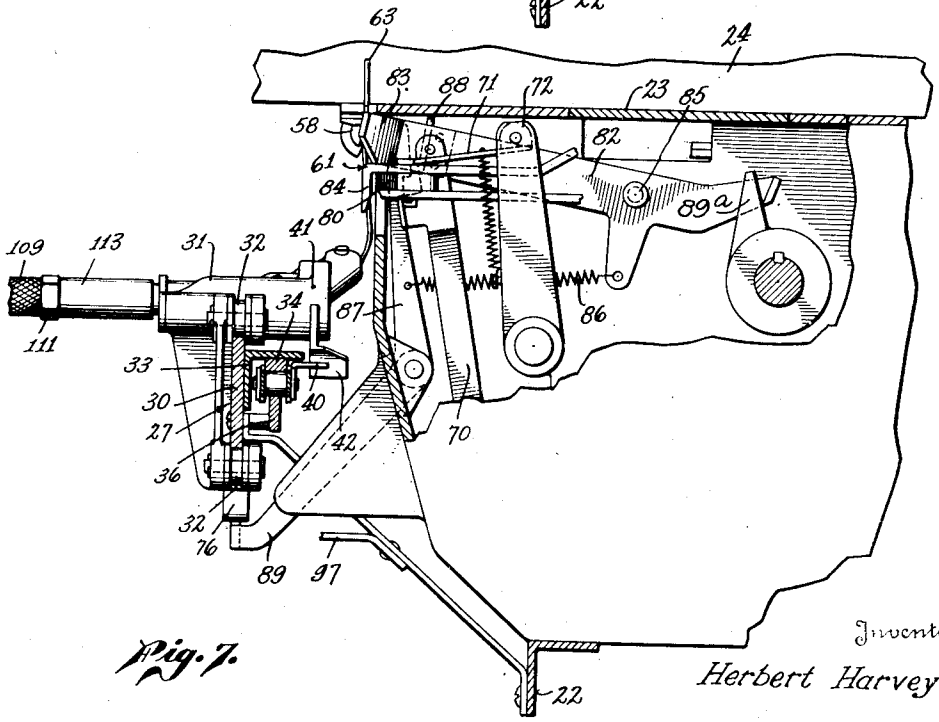


Fig. 7.

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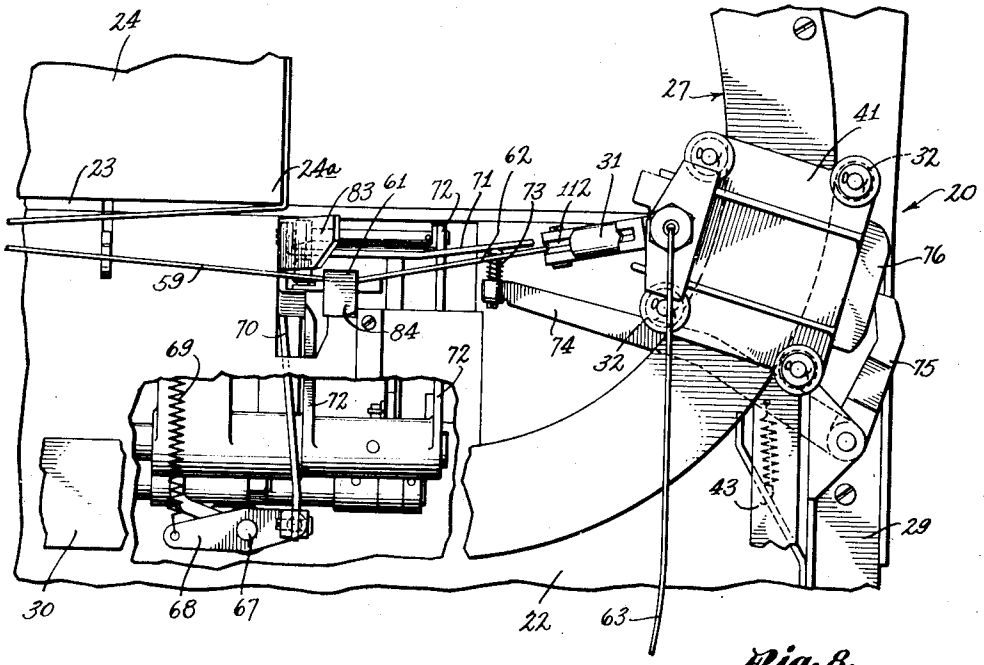


Fig. 8.

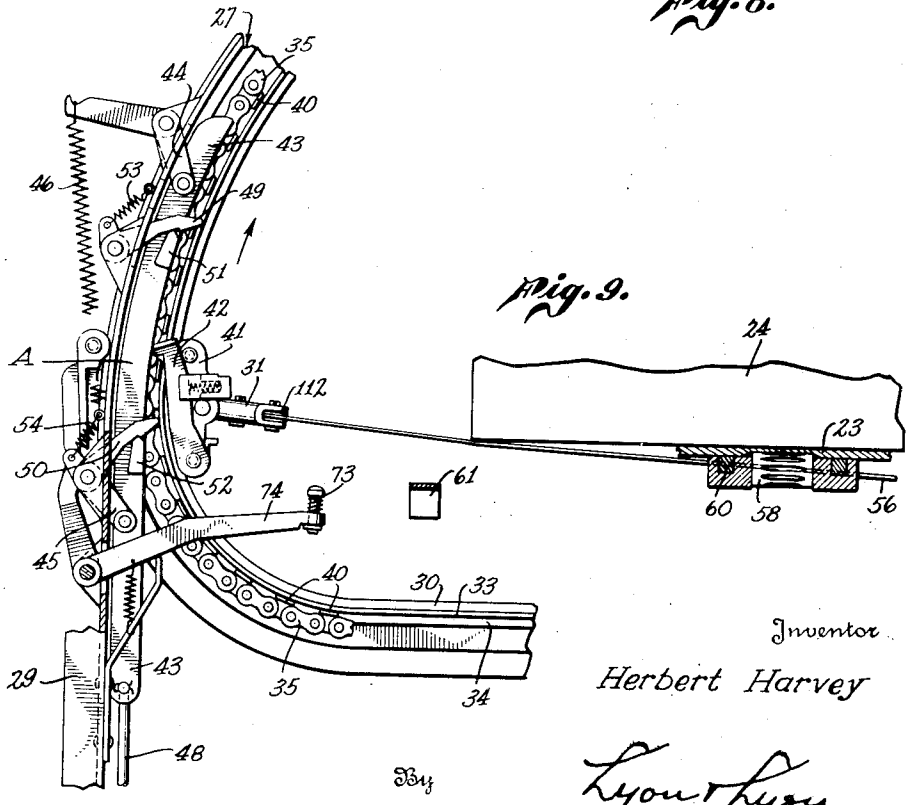


Fig. 9.

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Patented Nov. 11, 1941

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UNITED STATES PATENT OFFICE

2,262,232

TYING MACHINE

Herbert Harvey, Los Angeles, Calif., assignor, by mesne assignments, to The Gerrard Company, Incorporated, Chicago, Ill., a corporation of Delaware

Application November 27, 1937, Serial No. 176,822

19 Claims. (Cl. 100—31)

This invention relates to a tying machine and particularly to the mechanism thereof for wrapping the binding wire around the article to be tied.

It is one of the principal objects of this invention to provide a novel means for wrapping tie wire around an article to be tied and also in the provision of such means which may be attached to tying machines of the type shown in my copending application Serial Number 76,581 filed April 27, 1936, which application has since issued as Patent No. 2,134,186.

It is a further object to provide a wire wrapping mechanism with an annular frame, and a wire carrying shuttle arranged to travel around the frame, and to provide propelling means for the shuttle whereby the shuttle may operate to carry the binding wire around the object being tied.

A further object is to provide a wrapping mechanism including an annular frame of irregular outline whereby as the shuttle travels thereabout, the binding wire will be laid closely upon the sides of the object and thereby leave a minimum of slack to be taken up by the binding wire tensioning means.

A further object is to provide an annular frame having a driving chain track-way and a shuttle track-way, chain and shuttle means operating in said track-ways and means for continuously driving the chain in one direction, and means carried by the shuttle for engaging the chain which means is normally held retracted from the chain by a suitable control mechanism which mechanism when released will permit the shuttle to be connected with the chain and thereby driven around the annular frame and automatically disengaged from the driving chain upon the completion of its trip.

A further object is to provide means actuated by the shuttle during its trip around the annular frame for first causing the second gripper of the tensioning mechanism to grip the tie wire placed therein and secondly to engage means for placing the tying machine in operation.

A further object is to provide an auxiliary table for supporting the overhanging end of the article, which auxiliary table intercepts the path of travel of the shuttle and is mounted and positioned to be engaged by the shuttle during its travel around the annular frame and swung thereby out of the way.

A further object is to provide means for guiding the first portion of the tie wire during the wrapping operation past the second gripper of the tensioning mechanism and which guiding means is retracted to permit the second portion of the tie wire to be wrapped directly therein.

A further object is to cause the retraction of the second gripper guiding means by the action of the shuttle.

A further object is to provide wire wrapping attachments of different sizes for application to a tying machine whereby when a series of relatively small articles are to be tied, an attachment having a relatively small annular frame may be mounted upon the machine and when a number of articles of relatively large size are to be tied, the attachment having the smaller annular frame may be removed from the machine and an attachment having a relatively large annular frame may be mounted thereon.

A further object of this invention is to produce an automatic wire tying machine which will be rapid in operation, rugged in construction, inexpensive of manufacture and adaptable to a wide range of uses.

It will be understood that the wire wrapping means herein disclosed is illustrated as of a form which is to be attached to machines of the type like my copending application or other suitable types, and it is to be understood that the wrapping mechanism herein disclosed may be just as readily, and in many cases preferably so, permanently built into any suitable type of tying machine. It is also to be understood that the irregular annular frame may be of other irregular shapes, or, may be circular in form.

Other objects and advantages of the invention will become apparent as the nature of the same is more fully understood from the following description and accompanying drawings wherein is set forth what is now considered to be a preferred embodiment. It should be understood, however, that this particular embodiment of the invention is chosen principally for the purpose of exemplification and that variations therefrom in details of construction or arrangement of parts may accordingly be effected and yet remain within the spirit and scope of the invention as the same is set forth in the appended claims.

In the drawings:

Figure 1 illustrates a front elevational view of the wire wrapping means of this invention applied as an attachment to the tying machine of the type and form illustrated and disclosed in my copending application Serial No. 153,118 filed

July 12, 1937, which application has since issued as Patent No. 2,134,187.

Figure 2 illustrates a top plan view of Figure 1.

Figure 3 illustrates an enlarged sectional view taken substantially in the plane of line 3—3 of Fig. 2.

Figure 4 illustrates an enlarged fragmental sectional view taken substantially in the plane of line 4—4 appearing in Fig. 1 and showing the auxiliary table about to be engaged by the shuttle.

Figure 5 is a front elevational view of Fig. 4 and shows the auxiliary table swung by the shuttle during the wire wrapping operation and shows the tie wire as it would appear during the last portion of the wrapping operation.

Figure 6 illustrates an enlarged fragmental sectional view taken substantially in the plane of line 6—6 appearing in Fig. 1.

Figure 7 is similar to Fig. 6 but showing the manner in which the shuttle actuates the trip mechanism which releases the guide means for the second gripper of the tensioning means.

Figure 8 is a fragmental elevational view to show the manner in which the shuttle places into operation the driving clutch for the tying machine and also shows the shuttle as it would appear near the completion of the wire wrapping operation.

Figure 9 illustrates a fragmental sectional view of a portion of the binding wire wrapping mechanism and shows the manner in which the shuttle pawl is released into engagement with the driving chain.

Figure 10 illustrates a fragmental sectional view taken substantially in the plane of line 10—10 appearing in Fig. 5, and Fig. 11 illustrates an enlarged sectional view taken substantially in the plane of line 11—11 appearing in Fig. 10.

Figure 12 is a fragmentary plan view of the so-called second gripper; and

Figure 13 is a fragmentary elevation at the location of the latch which holds the wire deflecting guide in its operative position.

In the drawings I have illustrated my new wire wrapping mechanism 20 as applied to a tying machine 21 of the type illustrated and described in my copending applications Serial No. 76,581 filed April 27, 1936, and Serial No. 153,118 filed July 12, 1937, which applications have since issued, respectively, as Patents Nos. 2,134,186 and 2,134,187, but it is to be understood that the wire wrapping mechanism of this invention may be built into or applied to other forms or types of tying machines, in fact, it is not important to this invention which type or form of tying machine to which this invention may be applied. It is not important to arrange the wrapping means so that it will automatically place the tying machine in operation upon the completion of the wrapping operation as shown herein, as in some instances it may be advisable to maintain the two mechanisms independently of each other, that is, the operation of the wrapping mechanism may be entirely independent of the operation of the tying machine and upon completion of the wrapping operation the tying machine may be then manually brought into operation to complete the tie.

I have therefore shown only so much of the tying machine 21 as will be necessary to show the manner of operation and the cooperating features of the tying and wrapping mechanisms and will describe the tying machine only in general terms. For other details of the particular tying machine shown, reference is hereby made to the aforesaid applications and patents.

The tying machine includes a main frame 22 having a table surface 23 upon which the article 24 to be tied may be placed. In order to locate the article in correct tying position, an abutment or fence 25 is adjustably mounted upon the table surface 23 (Figs. 1 and 2). The article or bundle may be held in position by the clamping means indicated generally at 26; however, any other preferred form of clamping means may be substituted therefor.

The tie wire wrapping means 20 is mounted upon the front face of the tying machine and is spaced forwardly a short distance from the wrapping plane of the tie wire. This relation may be observed in Fig. 2. The wrapping mechanism 20 includes an annular frame 27 preferably irregular in form as shown herein. The purpose for making the frame 27 of the wire wrapping mechanism irregular is to reduce to a minimum the amount of slack produced during the wrapping operation, and as a result thereof, the tensioning means does not have to travel as far to take up the same amount of slack as would be necessary if the annular frame were of circular outline. However, in some applications of the machine, it may be advantageous to use an annular frame which is truly, or for the greater part truly, circular in form.

The annular frame may be mounted upon the front face of the tying machine by suitable brackets 28 and 29. The annular frame 27 is constructed to provide two independent trackways, the first of which is indicated at 30 (Figs. 6 and 7) upon which the shuttle 31 is operatively mounted by means of four rollers 32. Directly in back of the shuttle track 30 the frame is provided with an angle iron member 33 (Fig. 6) having securely fastened upon its inwardly extending arm a trackway 34 around which the driving chain 35 is arranged to travel. Along the lower straight run of the frame there is provided a guide rail 36 (Fig. 3) to prevent sagging of the driving chain. The driving chain receives its driving power from the sprocket wheel 37 (Fig. 3) fixedly mounted upon the forwardly extending shaft 38. The shaft 38 may be supported upon suitable bearings and driven from an electric motor 39 (Fig. 2).

By this arrangement the driving chain may be continuously driven independently of the operation of the tying machine. Alternate links of the driving chain are provided with angular driving brackets 40 (Figs. 3, 4, 6, 7, 9 and 10) and the shuttle carriage 41 is provided with a pawl 42 (Fig. 9) normally urged by suitable spring means to engage one of the driving brackets 40 and to thereby connect the shuttle to the driving chain.

At one location, designated station A, the frame of the wrapping mechanism is provided with a control plate 43 (Fig. 9), which normally acts to retain the pawl 42 of the shuttle clear of the driving brackets 40. The control plate 43 is mounted upon a pair of links 44 and 45 (Figs. 3 and 9). The control plate 43 is yieldingly maintained by means of spring 46 in position to hold the pawl clear of the driving chain brackets as shown in Fig. 3, but may be swung by means of the foot pedal 47, and link 48, to release the pawl for engagement with one of the driving brackets of the chain as shown in Fig. 9.

The control plate 43 is latched in its retracted position as shown in Fig. 9 by a pair of latch members 49 and 50 engaging a pair of latch lugs

51 and 52, respectively. Note in this figure latch 50 is tightly latched to its related lug 52 while there is some clearance between the effective portion of the latching member 49 and its lug 51.

Upon the release of the shuttle pawl 42, the shuttle will be connected thereby to the chain and will be carried around the annular frame, and during the first portion of its travel the pawl will engage the forwardly extending end of the latch member 49 lifting it clear of its lug 51, but this will not release the control plate because of the holding effect obtained by the latch member 50 with its lug 52. As soon as the shuttle passes by the latch member 49, it will swing under the influence of its spring 53 to again engage its lug 51. As the shuttle completes its journey around the annular frame, it will engage the extending end of the latch member 50 lifting it clear of its lug 52, whereupon the control plate will move toward the shuttle until the lug 51 engages the latch member 49, but this slight movement will be insufficient to disengage the shuttle from the driving chain.

The movement of the latching plate just described will prevent the latching member 50 from again swinging under the influence of its spring 54 into latching engagement with its lug 52. However, when the shuttle engages and lifts the latch member 49 from its lug 51, the control plate will be free to swing and return the shuttle pawl to its inoperative position, thus freeing the shuttle from its connection with the driving chain. By this mechanism, it will be appreciated that for each actuation of the control plate 43 by means of the foot pedal 47, the shuttle will make one journey around the annular frame and will not be released until it has engaged and released the latch member 49. In fact, the shuttle makes slightly more than one full trip around the annular frame for the purpose of drawing out sufficient tie wire to permit the threading mechanism of the tying machine to carry the cut end of the tie wire from the severing mechanism to the first gripper of the tensioning mechanism without having to pull additional wire through the shuttle.

In Fig. 3 the shuttle is shown just after it has completed slightly more than one full journey around the annular frame and has wrapped the binding wire completely around the article being tied. As may be observed in this figure, the initial portion 56 of the tie wire now extends from its cut end 55, securely held in the first gripper 57, through the twister pinion 58 around the article being tied, until it has reached the right-hand corner 24a of the article from which the second portion 59 of the tie wire extends through the twister pinion 58 for the second time and through the severing means 60 to the second gripper 61 in which it is securely clamped and from there to the shuttle.

Attention is further directed to the slack provided in the tie wire in the portion 62 which extends from the second gripper 61 to the shuttle. This slack is provided by disconnecting the shuttle from the chain at the upper end of the control plate 43 and permitting the shuttle to roll backwardly under the influence of gravity to the position indicated in Fig. 3. This slack is provided to supply sufficient tie wire between the shuttle and the cut end of the wire at the completion of the tie so that the threading device in carrying the cut end of the wire to the first gripper does not have to pull an additional supply of tie wire through the shuttle.

In Fig. 3, the first and second grippers 57, 61, respectively are shown as they would appear at the end of the tensioning operation, that is, the two grippers have been moved apart to tension the wire tightly around the article and upon completion of the tying operation, will be returned to their initial starting position as indicated in Fig. 1.

In the operation of the machine, the operator will first manually thread a tie wire 63 through the shuttle and clamp the end 55 thereof securely in the first gripper 57 providing the machine has not been previously threaded for operation. It will be understood that it is only necessary to manually thread the machine each time the supply of tie wire has been exhausted. The first portion 56 of the tie wire will then extend from the first gripper 57 through the twister pinion 58 to the shuttle. (Figs. 1 and 9.) This is the normal condition of the machine while at rest, and the attendant may now place an article, such as 24, upon the table surface 23 of the machine and against the fence 25 in position to receive the tie and then may securely hold the article in tying position by the clamping means 26. The machine is now ready to be placed into operation, which may be brought about by actuating the foot pedal 47, thereby swinging the control plate 43 in the manner previously described to connect the shuttle with the driving chain. It will be understood that the driving chain is being driven by its motor 39. The shuttle now will start upon its journey around the annular frame carrying the tie wire around the article. During the initial portion of the travel of the shuttle, the first portion 56 of the tie wire would be wrapped into the second gripper 61 if means were not provided to guide this portion of the tie wire past the gripper; this means will be later described. However, as the shuttle completes its journey and wraps the wire into the twister pinion for the second time the guide means which prevented the tie wire from wrapping into the second gripper will now be retracted, permitting the final portion 59 to be wrapped into the second gripper in which it will be securely clamped. In the manner previously described, the shuttle will be automatically disengaged from the driving chain after completing slightly over one full journey and will thereupon return to its initial starting position as shown in Fig. 3.

The tying machine may be manually placed in operation after the binding wire has been completely wrapped around the article, or may be automatically brought into operation by the wrapping mechanism. I have shown a preferred form for automatically starting the tying machine in operation, and it will be appreciated that this may be accomplished in a number of different ways.

In Fig. 6 I have shown a standard form of one revolution clutch 64 commonly used in tying machines for driving the machine through one complete tying operation and then automatically releasing. In Fig. 6 the driving pawl 65 is maintained in a retracted position against the action of suitable spring means by a tripping plate 66; the tripping plate 66 is fastened to shaft 67 having a lever 68 (Figs. 6 and 8) mounted upon its forward end, the lever 68 being yieldingly urged by spring means 69 to rotate in a clockwise direction as viewed in Fig. 8 to hold the tripping plate in position to render the clutch

inactive. A link 70 extends upwardly from lever 68 and is connected to the front end of the second gripper tripping plate 71 (Figs. 6 and 7). The rear end of the tripping plate 71 is pivotally carried by the upper free end of the gripper resetting lever 72. The tripping plate 71 is provided with an extension (Fig. 8) arranged to be engaged by a spring weighted plunger 73 carried upon the arm 74 of a bell crank lever. The second arm 75 of the bell crank lever is positioned to be engaged by the shuttle as it completes its wire tying journey around the annular frame. This condition is illustrated in Fig. 8 wherein it will be observed the cam surface 76 extending from the outer edge of the shuttle has engaged arm 75, causing the bell crank lever to rotate in a clock-wise direction, thereby lifting its arm 74 to swing upwardly until the plunger 73 engages and lifts the second gripper tripping plate 71 thereby performing two functions, first, to release the second gripper into gripping relation with the tie wire wrapped therein, and secondly, to raise the clutch link 70, thereby rotating the clutch shaft 67 through its connection with lever 68 to swing the clutch tripping plate 66 free from the clutch driving pawl 65, whereupon under the influence of its springs, the driving pawl will be projected downwardly (Fig. 6) until it engages one of the notches 77 formed in the driving member 78 of the clutch. The driving member 78 of the clutch 64 rotates continuously. The tying machine will now operate through one complete cycle of operation to tension tie and sever the tie wire, and just prior to the completion of its operating cycle, the threading mechanism as indicated at 79 (Figs. 1 and 5) will take hold of the supply end of the tie wire before it is cut from the tie, and after the completion of the cutting operation, will carry this cut end of the tie wire to the first gripper where it will be securely gripped by the first gripper of the tensioning means.

The threading device is a part of the tying machine and any form of such device which will place the cut end of the tie wire in the first gripper or which will securely hold the cut end of the tie wire during the wrapping, tensioning, and tying operation, can be employed.

Upon the completion of the threading operation, the clutch driving pawl 65 will engage the tripping plate 66 and thereby become disengaged from the clutch driving member 78. As far as this invention is concerned, any form of tying machine clutch tripping mechanism may be employed and it is only necessary to provide means for placing the clutch in operation when the shuttle has completed its wrapping operation.

In the description of the means for placing the tying machine clutch in operation, it was also pointed out that the second gripper tripping plate 71 was lifted to release the second gripper into gripping relation with the tie wire placed therein. This is accomplished by pivotally mounting the second gripper jaw 80 on a pivot 80*a* (see Fig. 12) and providing spring means 80*b* which normally urge the jaw into gripping relation and providing the jaw with an offset pin 81 which is engaged by the forward end of plate 71 to hold the jaw 80 in its open position (Fig. 6). When the tripping plate 71 is lifted during the placing of the tying machine clutch in operation, the forward end of the tripping plate will be lifted clear of the offset pin 81, thus releasing the jaw 80 for movement into gripping relation with the tie wire placed therein.

After the second gripper has been released into gripping relation with the tie wire it will remain in such gripping relation until the tying operation has been completed, at which time it will be returned to its open position, under the control of the tripping plate 71, in readiness for the next wrapping operation. In Figs. 6, 7 and 12 the jaw 80 of the second gripper is shown in its open position, being held in that position by engagement of the tripping plate 71 with the pin 81.

It will be understood that other means may be employed for releasing the gripper jaw 80 into gripping relation with the tie wire and such releasing means can be directly actuated by the travel of the shuttle. However, I prefer to utilize the actuation of the clutch releasing mechanism for also releasing the gripper jaw 80.

The arm 75 of the bell crank lever serves a second purpose, mainly to act as a stop for locating the shuttle at station A when the shuttle returns after being released from the driving chain. In Fig. 1, the arms 75 of the bell crank lever are shown acting in this capacity.

During the travel of the shuttle around the annular frame, the first portion 56 of the tie wire would be wrapped into the second gripper unless means were provided to either retract the second gripper clear of the path of travel of the wire or a guiding means provided to guide the tie wire past the second gripper. I have found it simpler to provide a guide means for this purpose and this guide means is clearly shown in Figs. 1, 6, 7, and 8, and includes a lever 82 having its front end beveled as at 83 and projecting just beyond the downwardly extending end 84 of the second gripper 61 whereby during the wrapping of the tie wire it will be guided clear of this portion 84. This arrangement of parts is clearly shown in Fig. 6.

The lever 82 is pivotally mounted upon a suitable pivot bearing 85 and is urged to rotate in a clockwise direction by a suitable spring means 86. To hold the lever 82 in position to guide the tie wire past the second gripper, I provide a bell crank lever having an arm 87 arranged to latch over an outwardly extending member 88 (Figs. 6, 7 and 13) carried by the lever 82. The bell crank lever is yieldingly urged to rotate in a clockwise direction by connecting the opposite end of the spring 86 to arm 87. In order to release the guiding lever 82 for movement about its pivot 85 to a retracted position as shown in Fig. 7, I extend the arm 89 of the bell crank lever to intercept the path of travel of the shuttle during its journey (Figs. 6 and 7).

In Fig. 6, the guiding lever and bell crank with its two arms 87 and 89 are shown in normal position, while in Fig. 7 the bell crank lever has been rotated in a counter-clockwise direction due to the engagement of the cam plate 76 with the outer end of arm 89 of the bell crank lever thereby swinging arm 87 of the bell crank lever to free the guiding lever 82 for rotation in a clockwise direction to its retracted position, thereby permitting, as shown in this figure, the tie wire to be placed in the second gripper. The lever 82 is returned, at the proper time in the operation of the machine, to the position shown in Fig. 6, the return being effected by a cam 89*a* which rotates with the driven member of the clutch 64 into engagement with the adjacent end of the lever.

The tying machine of this invention may be advantageously employed for the binding of newspapers or bundles composed of flexible ma-

terial and for this purpose I have found it to be of great advantage to provide an auxiliary supporting table 90 (Figs. 1 and 4) for supporting the end of the bundle which will overhang the table portion 23 of the tying machine. This supporting means for the auxiliary table will of necessity have to intercept the path of travel of the shuttle and for that reason must be made to swing when engaged by the shuttle so as to permit the shuttle to pass thereby as shown in Fig. 5. The construction of the auxiliary table 90 is most clearly shown in Figs. 4 and 5, wherein it will be observed the auxiliary table includes a supporting surface 91 carried upon the upper end of a supporting shaft 92 and braced thereto by a diagonal brace member 93. The shaft 92 is journaled upon a swing frame 94, which frame in turn is journaled upon a fixed shaft 95 carried by brackets 96 and 97 extending from the tying machine frame 22. Coiled around shaft 95 is a torsional spring 98 having one end 99 engaging the supporting bracket 97 and its opposite end 100 engaging the swing frame 94 to yieldingly maintain the swing frame in a vertical position and to return the swing frame and its auxiliary table to its upright position after it has been swung by the shuttle as shown in Fig. 5. It is also desirable to rotate the auxiliary table during the time it is swung by the shuttle in order for the supporting portion 91 thereof to clear the shuttle while the shuttle is passing thereby. In this connection note the position of the supporting surface 91 of the auxiliary table as it appears first in Fig. 4 and then in Fig. 5.

To bring about the rotation of the table, a bevel pinion 101 is fixed to the lower end of the supporting shaft 92 and meshes with a bevel gear 102 fixed upon the outer end of shaft 95. It will be understood that the bevel gear 102 is maintained fixed against rotation whereby as the frame 94 swings the bevel pinion 101 will travel around the bevel gear 102 causing the shaft 92 and supporting surface 91 carried thereby to rotate from its normal position as shown in Fig. 4 to its displaced position as shown in Fig. 5. A shield 103 is provided to enclose the gears 101 and 102.

Any suitable means may be provided for directing the tie wire 63 through the shuttle; however, I prefer to provide a tubular member 104 having mounted on its outermost end a friction means 105 for applying a limited amount of friction to the free passage of the tie wire therethrough. This friction means may be of any preferred form for accomplishing this purpose. In Figs. 10 and 11 I have shown one form of such friction means which includes mounting between two annular members 106 and 107 three ballbearings 108. The opposed surfaces of the bearing members 106 and 107 are tapered to urge the balls into frictional engagement with the tie wire. This portion of the mechanism is mounted within the outer end of a sleeve 109 which is threadedly mounted upon the outer end of the tubular member 104. Interposed between the end of the tubular member 104 and the annular member 106 is a compression spring 110 actuating to yieldingly urge the member 106 against the three ballbearings. When the sleeve member 109 is adjusted to give the proper tension to the movement of the wire through the shuttle, it is locked in position by a lock nut 111. It is desirable to so arrange the lock nut, sleeve and threaded end of the tubular member 104 so that the sleeve cannot be adjusted to a position which will completely collapse the spring 110 and thereby clamp the balls so tightly against the tie wire as to prevent the tie wire from being drawn through the shuttle. To reduce wear and to facilitate the feed of the tie wire through the tubular member 104, it is preferable to provide three rollers 112 and to generally direct the tubular member to feed out the tie wire more directly in the plane of travel of the shuttle.

Located upon the tubular member 104 between the lock nut 111 and the shuttle carriage 41 is a sleeve 113 arranged to engage the swing frame 94 of the auxiliary table 90 and to rotate upon the tubular member 104 during the travel of the shuttle past the auxiliary frame, thereby reducing to a minimum the wear between these respective parts.

The operation of the machine may be summed up briefly as follows: An article to be tied is placed in tying position held therein by the clamping means 26 and the wrapping means placed in operation by depressing the pedal 47 whereupon as described the shuttle will be connected to the driving chain and thereby carried around the annular frame. During the first portion of this journey of the shuttle, the guiding lever 82 will direct the initial portion 56 of the tie wire past the second gripper. The continued travel of the shuttle will tightly lay or wrap the tie wire around the three sides of the article and during the final travel of the shuttle the second portion 59 of the tie wire will be wrapped into the twister pinion and the severing means, the guiding lever 82 will be retracted in the manner previously described, permitting this portion of the tie wire to be wrapped into the second gripper and at about this same time the shuttle will engage the clutch control means for the tying machine, thereby releasing the second gripper jaw to take hold of the tie wire wrapped and also to place the tying machine in operation. The shuttle will continue until it has tripped the upper latch member 49, whereupon the control plate 43 will be released to bring about the disengagement of the shuttle from the driving chain and the shuttle will return to its initial starting position providing slack in the tie wire as indicated at 62. The tying machine will first in its normal course of operation tension the tie wire surrounding the article, form the tie and cut the binding wire from the tie, and will finally thread the cut end of the supply portion into the first gripper in the manner previously described. The slack provided by the over-travel of the shuttle and that provided during the tensioning operation will supply sufficient wire for the threading operation without requiring additional wire to be drawn through the shuttle and in this way making more positive the threading of the machine in readiness for the following operation.

During the travel of the shuttle around the annular frame, the auxiliary table will be swung clear of the shuttle in the manner described. The bundle having been tied may now be removed from the machine or moved to receive a second tie and the operation repeated.

In operation the machine has been found to be extremely fast and reliable and to tightly bind boxes, bundles of papers, of various sizes and shapes. It is extremely useful in binding loose bundles composed of flexible material such as newspapers and the like, and in this connection, the auxiliary table has been found to

be of material assistance in properly supporting the bundle during the tying operation.

As previously stated, where a run of a quantity of small articles are to be tied, a wrapping mechanism having a relatively small annular frame may be mounted upon the machine, and where a quantity of large articles are to be tied, a wrapping mechanism having a relatively large annular frame may be mounted upon the machine, in this way rendering the machine flexible for a great variety of uses.

Having fully described my invention, it is to be understood that it is not to be limited to the details herein set forth, but the invention is of the full scope of the appended claims.

I claim:

1. A wire wrapping attachment for a tying machine including an annular frame arranged for mounting upon the tying machine, shuttle means mounted upon the frame for travel therearound, continuously operating means for propelling the shuttle around the frame, and control means normally retaining the shuttle propelling means ineffective and operable for rendering the propelling means active for driving the shuttle to wrap a binding wire around an article to be tied.

2. A wire wrapping attachment for a tying machine including an annular frame arranged for mounting upon the tying machine, a shuttle mounted upon the frame for travel therearound, continuously operating means for propelling the shuttle for wrapping a binding wire around an article to be tied, said shuttle being releasably coupled with the propelling means, and means actuated by the attachment when the article has been wrapped for placing the tying machine in operation.

3. A wire wrapping attachment for a tying machine including an annular frame arranged for mounting upon the tying machine, shuttle means mounted upon the frame for travel therearound, continuously operating means for propelling the shuttle around the frame, control means normally retaining the shuttle propelling means ineffective and operable for rendering the propelling means active for driving the shuttle to wrap a binding wire around an article to be tied, and means for placing the tying machine in operation when the article has been wrapped.

4. A wire wrapping attachment for a tying machine including an annular frame arranged for mounting upon the tying machine, a shuttle mounted upon the frame for travel therearound, a continuously movable endless band mounted on the frame for propelling the shuttle for wrapping a binding wire around an article to be tied, a releasable connection between the shuttle and the band, and means for releasing the shuttle from the band and placing the tying machine in operation when the article has been wrapped.

5. A wire wrapping attachment for a tying machine including a stationary annular frame arranged for mounting upon the tying machine, a shuttle mounted upon the frame for travel therearound, and flexible shuttle propelling means extending about the frame and arranged to drive the shuttle bodily around the frame one trip in but one direction each time said propelling means is rendered effective for wrapping a binding wire around an article to be tied.

6. A wire wrapping attachment for a tying machine including a stationary annular frame arranged for mounting upon the tying machine, a shuttle mounted upon the frame for travel therearound in a non-circular path, flexible shuttle propelling means extending about the frame and arranged to drive the shuttle around the frame one trip in but one direction each time said propelling means is rendered effective for wrapping a binding wire around an article to be tied, and means for placing the tying machine in operation when the article has been wrapped.

7. A wire wrapping attachment for a tying machine including an annular frame arranged for mounting upon the tying machine, a shuttle mounted upon the frame for travel therearound, shuttle propelling means arranged to drive the shuttle around the frame one trip in but one direction each time said propelling means is rendered effective for wrapping a binding wire around an article to be tied, and means actuated by the shuttle when the article has been wrapped for placing the tying machine in operation.

8. A wire wrapping attachment for a tying machine including an annular frame arranged for mounting upon the tying machine, a shuttle mounted upon the frame for travel therearound, and a flexible shuttle propelling means extending about the frame and arranged to drive the shuttle around the frame one-and-a-portion trips in but one direction each time the propelling means is rendered effective for wrapping a binding wire around an article to be tied, said shuttle traveling in the same direction during each successive wrapping operation.

9. A wire wrapping attachment for a tying machine including an annular frame arranged for mounting upon the tying machine, a shuttle mounted upon the frame for travel therearound, and a shuttle propelling means including a flexible portion movable in but one direction around the frame and arranged to drive the shuttle around the frame one-and-a-portion trips in the same direction from an initial starting position each time the propelling means is rendered effective for wrapping a binding wire around an article to be tied, said shuttle propelling means permitting the shuttle to return a portion of one trip to its initial starting position, said shuttle traveling in the same direction during each successive wrapping operation.

10. A wire wrapping attachment for a tying machine having tensioning, tying, severing and threading means including an annular frame arranged for mounting upon the tying machine, a shuttle mounted upon the frame for travel therearound, and a shuttle propelling means including a flexible portion movable in but one direction around the frame and arranged to drive the shuttle around the frame one-and-a-portion trips in the same direction from an initial starting location each time the propelling means is rendered effective for wrapping a binding wire around an article to be tied, said shuttle propelling means permitting the shuttle to return a portion of one trip to its initial starting position for providing slack in the tie wire to be taken up during the threading operation of the tying machine, said shuttle traveling in the same direction during each successive wrapping operation.

11. A wire wrapping attachment for a tying machine having tensioning means of the two gripper type, tying and severing means and threading means for presenting the cut end of the tie wire after the formation of a tie to the first of the tensioning grippers; including an annular frame arranged for mounting upon the

tying machine, a shuttle mounted upon the frame for travel therearound and operable for wrapping the binding wire around an article to be tied and for moving the wire into the tying means and second gripper of the tensioning means, shuttle propelling means including a portion movable in but one direction around the frame arranged to drive the shuttle around the frame one-and-a-portion trips in the same direction from an initial starting location, said shuttle propelling means permitting the shuttle to return a portion of one trip to its starting location to provide slack in the supply portion of the wire for use during the threading operation, means for tripping the tensioning means second gripper when the tie wire is placed therein, and means for placing the tying machine in operation when the article has been wrapped.

12. A wire wrapping attachment for a tying machine having tensioning, tying, severing and threading means, including a stationary annular frame arranged for mounting upon the tying machine, a shuttle mounted upon the frame for travel therearound and operable for wrapping the binding wire around an article to be tied and for moving the wire into the tensioning, tying and severing means, flexible shuttle propelling means arranged to drive the shuttle around the frame one trip in but one direction for each actuation thereof, and means for placing the tying machine in operation when the article has been wrapped.

13. A wire wrapping attachment for a tying machine having tensioning means of the multiple gripper type, tying, severing and threading means including an annular frame arranged for mounting upon the tying machine, a shuttle mounted upon the frame for travel therearound and operable for wrapping the binding wire around an article to be tied and for moving the wire into the tying means and second gripper of the tensioning means, shuttle propelling means arranged to drive the shuttle around the frame one trip in but one direction for each actuation thereof, means for tripping the tensioning means of the second gripper when the tie wire is placed therein, and means for placing the tying machine in operation when the article has been wrapped.

14. A wire wrapping attachment for a tying machine having tensioning means of the two gripper type, tying, severing and threading means including an annular frame arranged for mounting upon the tying machine, a shuttle mounted upon the frame for travel therearound and operable for wrapping the binding wire around an article to be tied and for moving the wire into the tying means and second gripper of the tensioning means, said shuttle traveling in the same direction during each successive operation, means for guiding the first strand of the tie wire past the tensioning means second gripper, means for actuating said guiding means to permit the second strand of the tie wire to enter the said second gripper, means for tripping said second gripper when the tie wire is placed therein, means extending about the frame for driving the shuttle, and means for disconnecting the shuttle from the driving means and placing the tying machine in operation when the article has been wrapped.

15. In a wrapping and tying machine, a horizontal support for an article to be tied, an irregular annular frame disposed in a vertical plane, with one or more of the sides of the frame inclined toward the sides of the article, a shuttle mounted upon the frame for travel therearound, and means for propelling the shuttle for wrapping a binding wire around the article, the said inclination toward the sides of the article being in the direction of movement of the shuttle, whereby to enable the shuttle to wrap the wire about an article of rectangular shape with the least amount of slack.

16. In a wrapping and tying machine, an annular frame having a driving chain trackway and a shuttle trackway, an independently rotating driving chain operatively mounted in the chain trackway of said frame, a wire-placing shuttle operatively mounted upon the shuttle trackway of said frame, pawl means carried by the shuttle normally active for connecting the shuttle to the driving chain, and a control means for normally maintaining the pawl clear of the chain, and operative for releasing the pawl for engagement with said driving chain.

17. In a wrapping and tying machine, a main frame having an article supporting surface and tying means mounted adjacent the forward edge thereof, means for wrapping a tie wire around an article supported upon said surface, and a swinging table having a bundle supporting surface beyond the tying means for supporting the overhanging end of the article and intercepting the path of travel of the wire wrapping means and arranged to be engaged by said wrapping means and swung thereby clear thereof.

18. In a wrapping and tying machine, a surface for supporting an article in tying position, means for wrapping a tie wire around the article while so positioned, a second supporting surface spaced from the first-mentioned surface for supporting the overhanging end portion of the article, a swinging bracket intercepting the path of travel of said wrapping means, means for journally supporting the said second surface upon said bracket, and gear means arranged to rotate the second surface when swung with its bracket by the tie wire wrapping means during the final portion of the wire placing operation.

19. A wire wrapping mechanism for a wire tying machine, including an open frame arranged for mounting upon the tying machine, a shuttle mounted upon the frame for travel therearound, and continuously operating means extending about the frame for propelling the shuttle for wrapping a binding wire around an article to be tied, said shuttle being releasably coupled with the propelling means, and means for uncoupling the shuttle from the propelling means after each wrapping operation.

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