Feb. 18, 1936. P. E. KLEINEBERG 2,030,879

WRAPPING MACHINE

Filed June 13, 1934 5 Sheets-Sheet 1

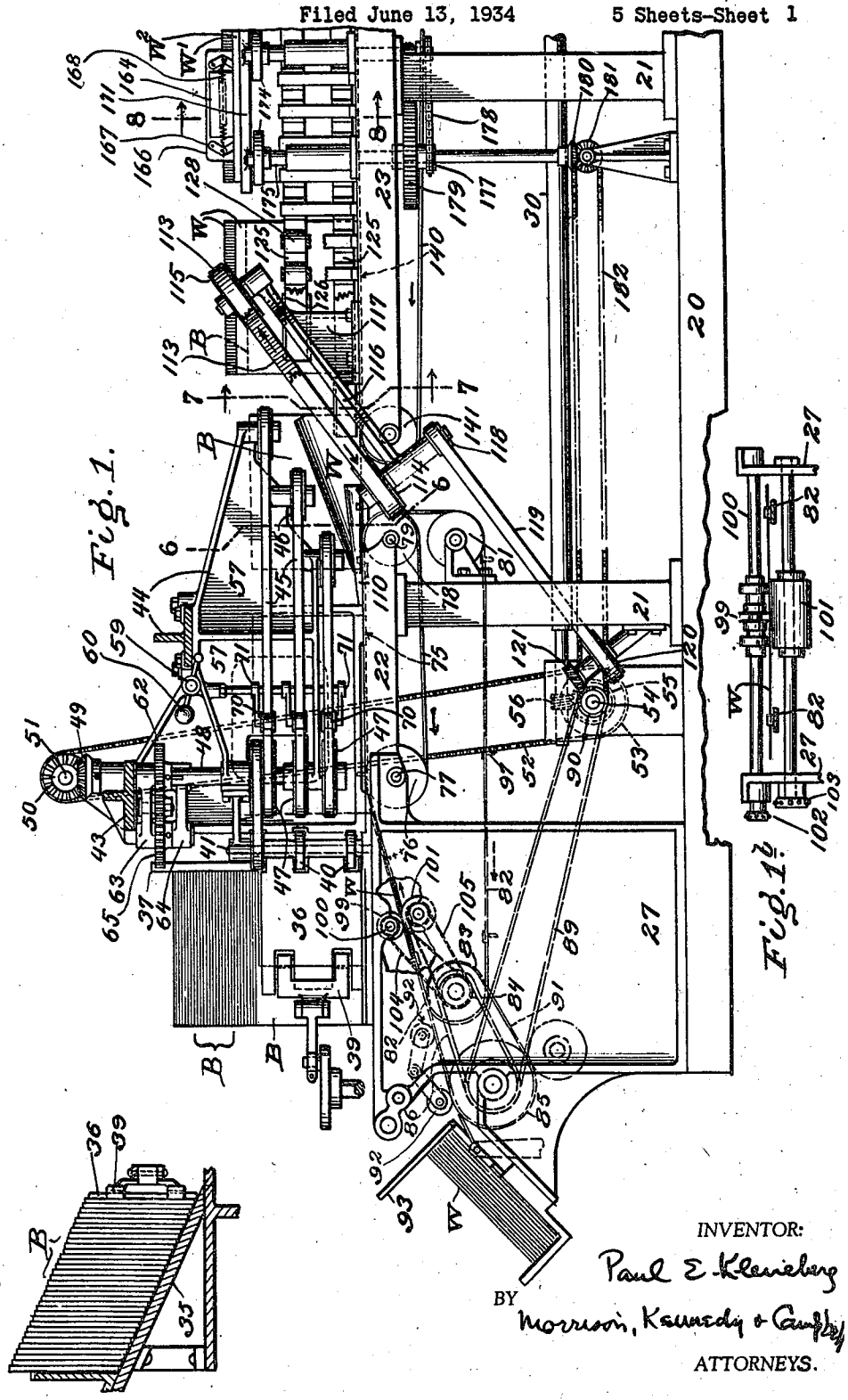


Fig. 1.



Fig. 1a



Fig. 1b

INVENTOR:
Paul E. Kleineberg
BY
Morrison, Kennedy & Campbell
ATTORNEYS.

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WRAPPING MACHINE

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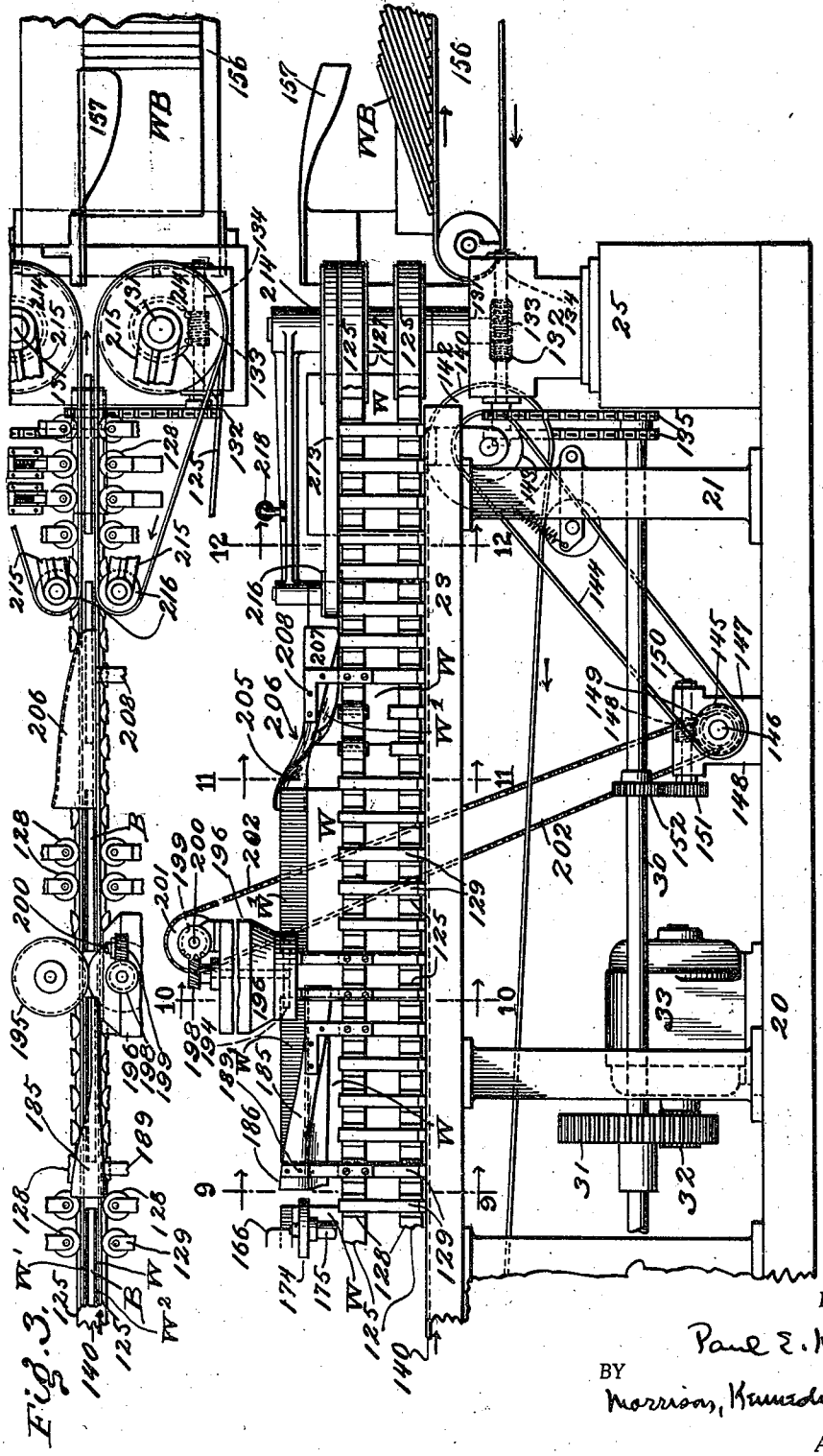


Fig. 2.



Fig. 3.

INVENTOR:
Paul E. Kleineberg
BY
Morrison, Kennedy & Campbell
ATTORNEYS.

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WRAPPING MACHINE

Filed June 13, 1934 5 Sheets-Sheet 3

Fig. 4.

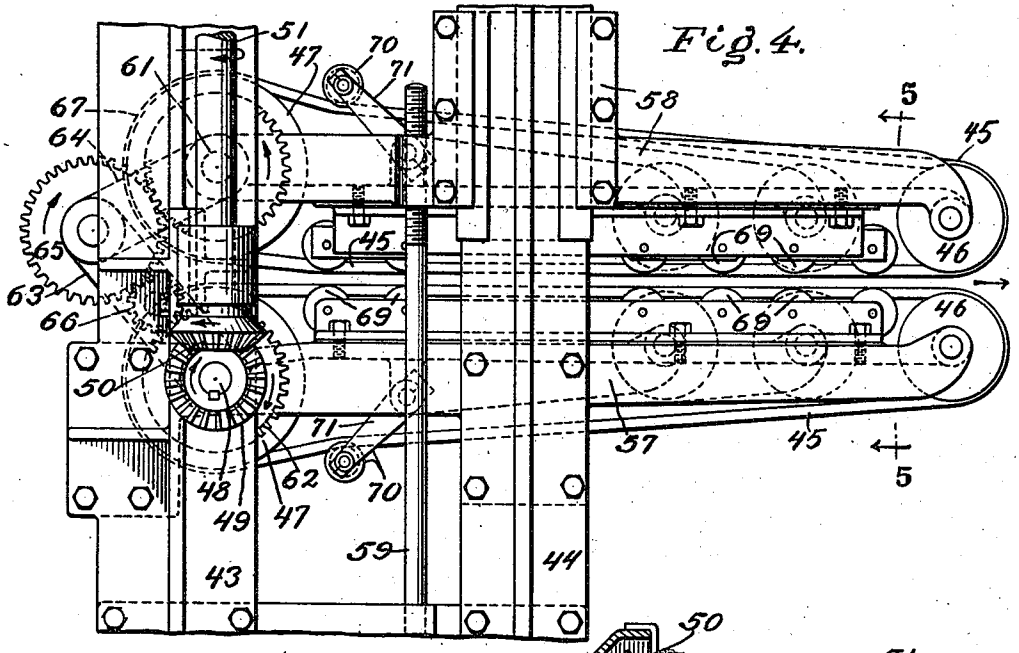
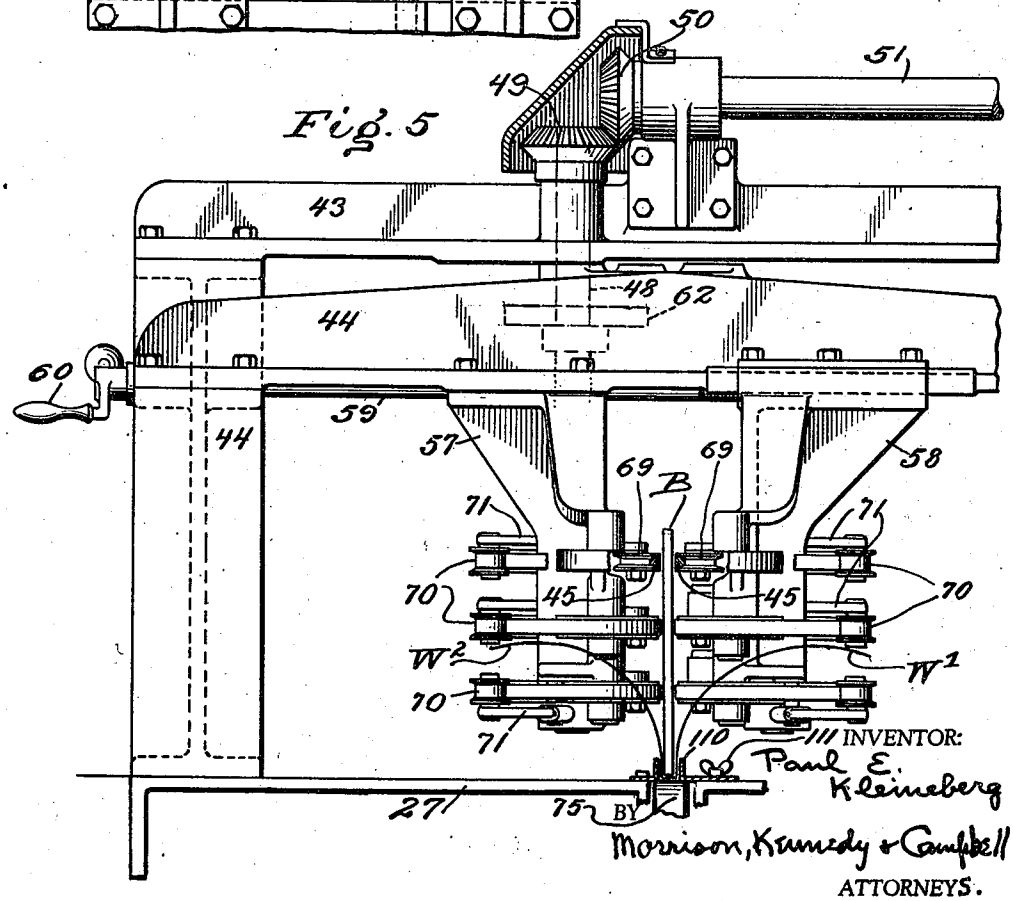


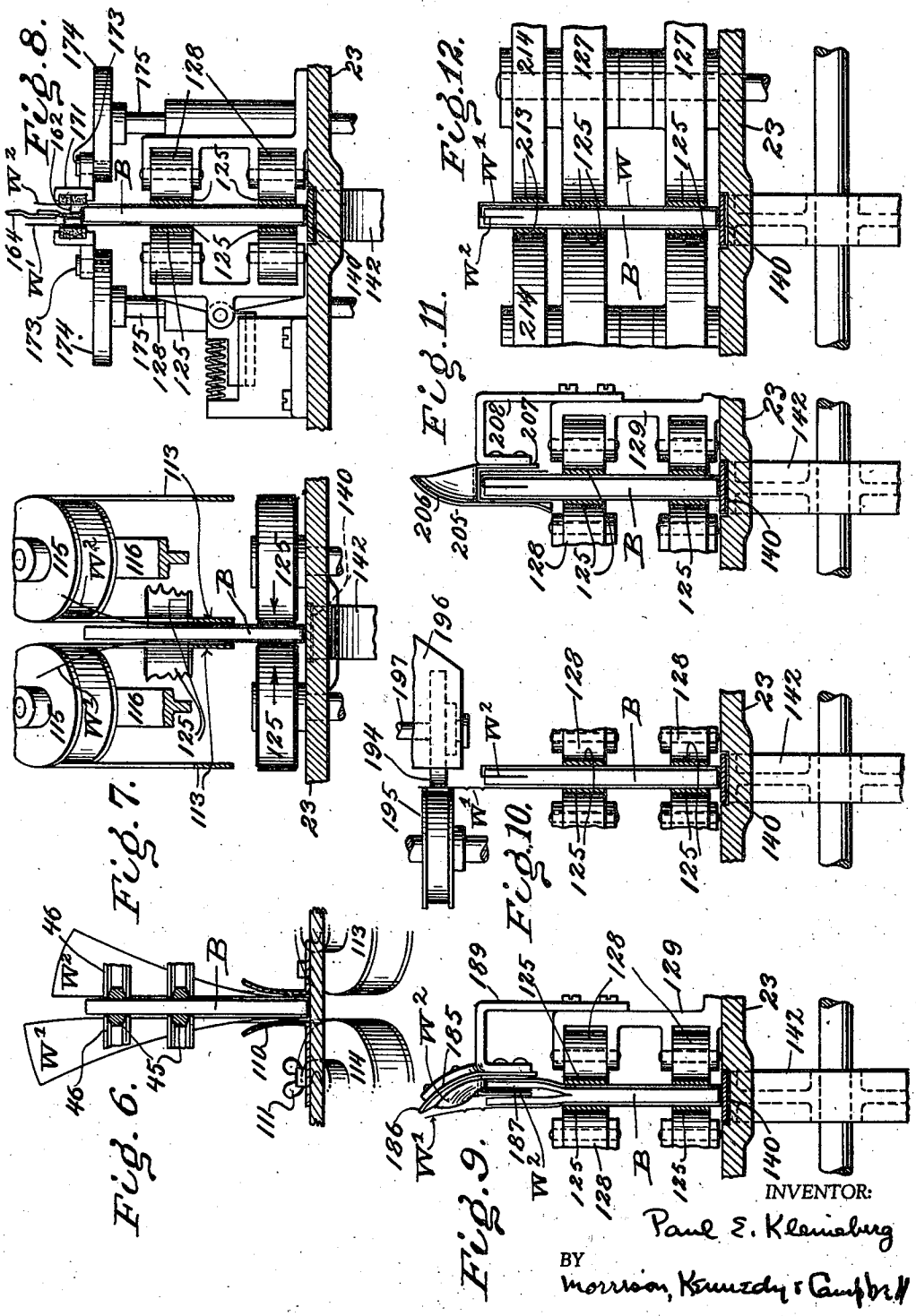

Fig. 5



Feb. 18, 1936. P. E. KLEINEBERG 2,030,879

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Paul E. Kleineberg
BY
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ATTORNEYS.

Feb. 18, 1936. P. E. KLEINEBERG 2,030,879

WRAPPING MACHINE

Filed June 13, 1934 5 Sheets-Sheet 5

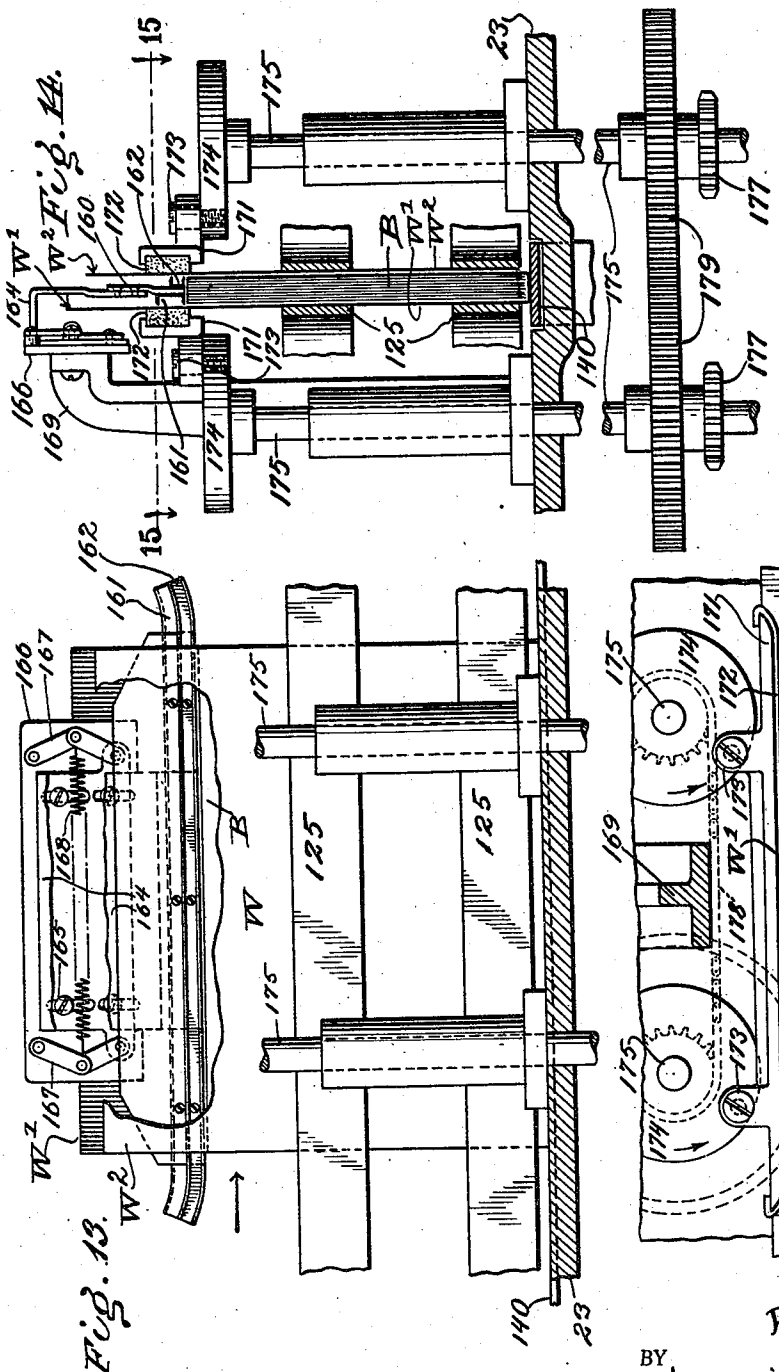



Fig. 14.




Fig. 13.

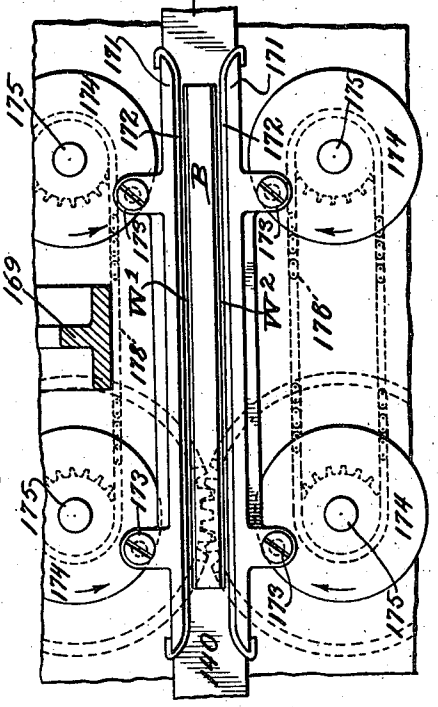



Fig. 15.

INVENTOR:
Paul E. Kleineberg
BY
Morrison, Kennedy & Campbell
ATTORNEYS.

Patented Feb. 18, 1936 2,030,879

# UNITED STATES PATENT OFFICE

2,030,879

## WRAPPING MACHINE

Paul E. Kleineberg, Easton, Pa., assignor to T. W. & C. B. Sheridan Company, New York, N. Y., a corporation of New York

Application June 13, 1934, Serial No. 730,376

18 Claims. (Cl. 93—2)

This invention relates to wrapping machines, and more particularly automatic machines for the wrapping of periodical magazines, catalogs or other books or pamphlets, or analogous articles, for example for mailing purposes.

The general object of the present invention is to afford a wrapping machine of the class referred to which will be completely automatic in operation, rapid and accurate in output and delivering the article securely wrapped and preferably sealed by adhesive in readiness for shipping or mailing. A special object is to afford an automatic wrapping machine in which the feed or travel of a series or procession of the articles to be wrapped, and a procession of wrapping sheets therefor, and the application and securing of the wrapping sheets to the articles, are effected with efficient cooperation during continuous travel or advance so as to deliver at the discharge end a series of completely wrapped and secured articles.

Another object is to afford a wrapping machine through which the article, the wrapping sheet, and the wrapped article, advance not only with continuous travel, the operations performed while in motion, but along a straight line of feed or travel, the article entering the machine at the infeed end and advancing straightly and horizontally through the machine for discharge in the same straight line of travel, thereby permitting high rate of operation.

A further object is to afford an open construction of machine in which the several operations are in plain view, and the operating parts readily accessible for purposes of adjustment and repair or for the removal of books or wrappers in case of defective operation.

Further objects include the provision of specific mechanisms for performing the successive operations on the article or book and the sheet or wrapper as will be herein described.

Other and more particular objects and advantages of the invention will be explained in the hereinafter following description of an illustrative embodiment thereof or will be understood by those conversant with the subject. To the attainment of such objects and advantages the present invention consists in the novel wrapping machine and the novel features of operation, combination, mechanism and construction herein illustrated or described.

In the accompanying drawings, Figure 1 is what may be described as a front elevation of the left half of a wrapping machine embodying the present invention, especially adapted for the wrapping of magazines, books or the like in their flat condition, as supplied to the machine, without folding or rolling thereof; the front frame wall near the left or infeed end of the machine being omitted in order to disclose a number of parts otherwise thereby concealed.

Fig. 1ª is a left elevation of certain book infeeding parts. Fig. 1ᵇ is a left elevation of a detail.

Fig. 2 is a front elevation corresponding to Fig. 1 of the right half of the same machine; Fig. 2 partly showing certain parts in common with Fig. 1, the two figures thus being combinable as a complete front elevation view.

Fig. 3 is a top plan view of the right half of the machine shown in Fig. 2.

Fig. 4 is a top plan view of the infeeding mechanism shown at the left end of Fig. 1.

Fig. 5 is a right elevation of the mechanism shown in Fig. 4, taken partially in section on the line 5—5 of Fig. 4.

Figs. 6, 7 and 8 are transverse vertical left elevations partly in section respectively in the section lines 6—6, 7—7 and 8—8 of Fig. 1.

Similarly Figs. 9, 10, 11 and 12 are transverse vertical left elevations partly in section respectively on the section lines 9—9, 10—10, 11—11 and 12—12 of Fig. 2.

Fig. 13 is an enlarged front elevation of the scoring mechanism, shown also in Figs. 1 and 8, with the wrapper or paper sheet enclosing the book but partly cut away to disclose the mechanism.

Fig. 14 is a left elevation of the mechanism of Fig. 13.

Fig. 15 is a top plan view of the mechanism shown in Figs. 13 and 14, with the scoring blades however omitted, this view being partly in section on the horizontal line 15—15 of Fig. 14.

The illustrated wrapping machine shown in the drawings may be considered as operating upon pamphlets or other books B in the neighborhood of 8 by 12 inches in size and ½ inch thick, although naturally the design of the machine may be adapted to various other dimensions; and the construction is such that the books and wrappers W may be fed to and through the machine at a high speed to deliver a relatively large number of wrapped books per minute. The books are shown as advancing edgewise, that is, standing in a vertical plane and moving through the machine in said plane, and preferably the books travel with the back edges downward and their front or open edges upward, and in quite

close succession since all of the operations are substantially continuous.

Various adjustments for differences in thickness of book will be understood, and adjustments also for differences in width of book, that is the vertical dimension thereof when traveling through the machine. The horizontal length of the traveling books is of no consequence excepting that shorter books may be fed in more frequently than longer ones, namely, by speeding up the travel and the infeed of books and wrappers, and changing if necessary the spacing of the feeding lugs or pins, as on the wrapper conveyor chain. In any case the infeed of the wrappers to the succession books is to be carefully synchronized by the timing and adjustment of the action. Certain adjustments are shown for variations in book dimension and analogous ones will be understood where not shown.

Referring first to some of the general parts, above a common base 20 is shown a system of columns 21 carrying a first or left table 22 and a second or main or right table 23, supporting respectively the mechanisms at the left and at the right portions of the machine. At the extreme right end is a column 25 carrying the operative parts at that end of the machine. At the extreme left, upon the base 20, is shown the frame 27 of a wrapper supplying mechanism, conventionally shown as a sheet feeder, but which might supply wrappers from a roll of paper, fed advancingly and severed in a well known manner. In the lower part of the machine turning in the columns 21 is shown the longitudinal main shaft 30 which may be driven continuously through a gear 31 carried on the shaft and meshing with a pinion 32 on the shaft of a drive motor 33.

The books B, with their back edges downward, may be supplied from time to time to a hopper 35 shown in Figs. 1 and 1a, having a slanting bottom to bring the books successively to their lower front position in the line of feed, where they are stopped and registered by a vertical front wall 36, the right wall 37 of the hopper being adjusted or cut away to permit a single book at a time to be thrust rightwardly from the hopper to the feeding or conveying devices. Any conventional feeder may be employed, and there is indicated a reciprocating pusher 39 moving in harmony with the rest of the machine, operating to push each foremost book rightwardly from the hopper and then to return for the next succeeding book. A pair of opposite initial feed rolls 40 is shown arranged to grip the opposite sides of each book when thrust partly from the hopper, these rolls being upon vertical shafts 41 turned by belts 42 so that each book is gripped and driven forwardly to the conveying means to be described; the belts being driven from front and rear shafts 48 and 61 to be described. The hopper and initial feed device described are not herein claimed, being conventionally illustrative of any mechanism for the purpose.

The conveying means for causing the advancing edgewise travel of the procession of books is herein separated into a preliminary conveyor at the left and a main conveyor at the right, this separation permitting the interposition and operation of a diagonal wrapper folding and smoothing belt as will be described. Referring first to the preliminary conveying devices, these are shown carried on left and right brackets 43 and 44 mounted above the table 22. The conveyor consists primarily of a system of opposite feed belts 45, there being shown three at each side of the book path, at three different elevations, and of three different lengths, so as to accommodate the wrapper handling devices while maintaining maximum control of the book travel. The belts 45, for example, may be rubberized V-belts traveling in the V-grooves of three pairs of pulleys 46 at the right and three pairs of pulleys 47 at the left, the construction and arrangement being thus shown in Figs. 1, 4 and 5.

For driving the front set of V-belts 45 the front system of pulleys 47 is shown mounted on a vertical front shaft 48 mounted in the bracket 43 and having at its top end a bevel gear 49 engaging a bevel gear 50 on a horizontal shaft 51 which carries a sprocket wheel driven by a sprocket chain 52 from a sprocket wheel 53 on a cross shaft 54 near the base of the machine, the cross shaft carrying a worm wheel 55 driven by a worm 56 on the drive shaft 30. The speed of the main shaft and the ratios of the described gear train may be such, for example, as to advance the conveyor belts 200 feet per minute, for a travel at that speed of the procession of books. The drive of the rear set of V-belts 45 will be later described.

An adjustment is shown for altering the spacing between the front conveyor belts 45 and the corresponding rear belts, to accommodate books of varying thickness. As seen in Figs. 4 and 5, the front belts and their pulleys 46 and 47 are mounted on a fixed longitudinal carriage 57 on brackets 43 and 44, while the corresponding rear parts are mounted on an adjustably slidable carriage 58, supported beneath the overhead portion of the bracket 44, the carriage 58 having parts overlying the edge or flange of the bracket for the rigid holding and guidance thereof. The adjustment of the rear carriage 58 and all the parts carried by it may be readily effected by means of a threaded adjusting shaft 59 turning in a threaded part of the carriage 58 and extending forwardly to where the shaft is provided with a crank or handle 60 by which it may be turned for changing the adjustment.

For driving the rear set of belts 45 in any adjustment the left hand pulleys 47 of the rear belts are mounted on a common vertical rear shaft 61, similar to the front shaft 48 but turning on the carriage 58. In order to transmit rotary motion from the front shaft 48 to the rear shaft 61 the front shaft is shown provided with a gear 62, and above the gear, as seen in Fig. 1, a radius arm 63. A similar radius arm 64 extends from the shaft 61, below the gear, and at the junction of the two radius arms there is provided an idler gear 65. Between the gear 62 and the gear 65 is a reversing pinion 66, mounted on arm 63, while the gear 65 meshes directly with a gear 67 on the shaft 61. This gear train maintains constant connection so that the gears 62 and 67 rotate continuously in opposite directions, to drive the inner stretches of the respective conveyor belts 45 in the same advancing direction.

The active or inner stretches of the belts 45, where they travel along the carriages 57 and 58, are shown engaged by grooved idler pulleys 69 mounted on the carriages, and each of these pulleys may have a loose or sliding pivot with spring or cushion means pressing the pulley and thereby the belt inwardly against the side of the book. Also, each of the belts 45, at its outer stretch, may be engaged by a grooved tension pulley 70 which may be set, as shown in Fig. 4, in a position to

deflect and sufficiently tighten the belt to insure operative drive, each pulley 70 being mounted on an arm 71 adapted to be clamped or set in its adjusted position.

The book B is shown as traveling between the conveying side belts 45 and upon an underneath conveyor belt 75 as shown in Figs. 1 and 5. This belt supports the book substantially to the diagonal wrapper applying belt 113 to be described. The belt 75 is shown passing around a left drum or pulley 76 turning on a shaft 77 and a right drum 78 turning on a shaft 79. The belt 75 may be driven by the means which feeds the wrappers to the belt. Thus an idler pulley 81 is shown below the pulley 78 and a belt or sprocket chain 82 is shown as traveling around the drums 76 and 78 or adjacent sprocket wheels to the pulley 81 and thence around a pulley 83 adjacent to the wrapper supply. On the same shaft with the pulley or sprocket wheel 83 is shown a smaller sprocket wheel 84. To the left of these parts is a wrapper feed pulley 85 and this carries a smaller sprocket wheel 86 which operates through a sprocket chain 87 to drive the sprocket wheel 84 and thereby the wheel 83 and connected system. The sprocket wheel 86 in turn is driven through a sprocket chain 89 from a sprocket wheel on the cross shaft 54 already mentioned. Feed belts 91 are shown passing around the pulleys 83 and 85 for the purpose of conveying wrappers singly to the wrapper conveying chain 82. Idlers or drop rollers 92 ensure friction engagement of the wrappers upon the belts 91.

The supply of wrapping sheets W is shown accommodated in a hopper 93 which may be provided in any conventional manner with a separating device to detach the lowermost sheet and an extractor device to pull the sheet out and cause it to advance along the belts 91 and thence the sprocket chains 82. Said sprocket chains are shown provided with upstanding pushers or pins 97 spaced apart the correct distance to feed the successive wrappers along an upslanting path from the supply to the under belt 75, whereon each wrapper meets an infed book from the book hopper 35, the two thence passing along together through the machine under the control of the preliminary and main groups of conveying devices or belts.

It is desirable that each wrapper should be scored by two score marks corresponding with the width of the back of the book and this is shown as effected during the upslanting travel of the wrapper as carried by the chains 82. As seen in Figs. 1 and 1b a pair of scoring disks 99 is mounted adjustably on a shaft 100 opposite to a resilient or rubber roller 101. The end of the shaft 100 carries a sprocket wheel 102 and the end of the corresponding shaft of the roller 101 carries a sprocket wheel 103 and these sprocket wheels are shown as connected by sprocket chains 104 and 105 respectively with sprocket wheels mounted on the same shaft with the pulley 83, so that the power drive is transmitted to turn all of the described parts in unison at equivalent speeds. The score marks or creases facilitate the later shaping of the wrapper to the book. The scoring of the wrapper may be done by a device pressing intermittently upon the paper similar to the straight edge device 160 and its operating connections described below.

The book B and wrapper W having now been assembled, and being in advancing travel toward the right, are subject to a series of operations including, first, the upward folding and smoothing of the wrapper against the opposite side faces of the book, forming the two wrapper portions or flaps, namely rear flap W', which is to be folded over enclosingly for sealing by adhesive, and the front flap $W^2$ which is to be folded partly over and tucked down between the leaves of the book before sealing. After the flaps are upfolded as described both flaps are herein appropriately scored to facilitate their accurate bending over and down into place. Thereafter the front wrapper flap is progressively folded in and tucked down between the sheets of the book, after which the rear flap is supplied with adhesive and thereupon similarly folded over and down into adhering contact with the front flap of the wrapper and finally squeezing pressure is applied to cause the adhesive to seal the product, the product then being discharged upon a conventional or other outfeeding receptacle, all these operations occurring during advancing travel.

The means for upfolding the opposite portions of the wrapper is best shown in Figs. 1, 5, 6 and 7. First the opposite sides of the wrapper are subjected to a preliminary lifting action by means of upslanting front and rear walls 110, partly lifting the wrapper flaps, as seen in Fig. 5, the rear wall 110 having a wing nut 111 or similar means for adjusting the spacing from the other to accommodate books of varying thickness. The wrapper flaps W' and $W^2$ being thus partly lifted are ready to be acted upon by the diagonal folding and smoothing belts 113 acting progressively and oppositely against each advancing book. Each of the opposite belts 113 is shown as passing around a lower pulley 114 and an upper pulley 115, these pulleys being attached to short shafts turning in an inclined bracket 116 fixed at the top of a base piece 117 mounted upon the frame table 23. The plan of this part of the invention is to drive the inclined belts 113 at such speed that their forward component of motion equals the advancing speed of travel of the books. The drive may be effected through a pulley 118 on the shaft of the lower front pulley 114, this being connected by a belt 119 with a pulley 120 mounted on an inclined shaft near the base of the machine, the shaft carrying also a helical gear 121 turned by a corresponding gear on the cross shaft 54. Similar connections may be used for driving the rear belt 113, or it may be driven from the other by communicating gearing.

By these wrapper upfolding and smoothing devices 110, 113, the opposite flaps of the wrapper, which have already been defined by the scoring previously performed, are progressively swung up and folded in against the sides of the book. It is quite important that the sides of the wrapper shall be snugly and smoothly pressed against the sides of the book, and the described plan of first scoring the wrapper and then progressively folding it up and pressing its sides into place well accomplishes this object, so that the final steps of the wrapping operation will turn out a satisfactorily wrapped product free of wrinkles and looseness. Any substantial drag against the wrapper during the applying operation would tend to displace it. The fact that the belts 113 travel at a somewhat greater speed than the travel of the book, but in an upslanting direction, the actual forward component equalling the speed of the book, prevents any wrinkling action. Each side of the wrapper is folded, pressed and smoothed snugly upwardly into place by an ac-

tion which is the equivalent of that of a straight edge or ruler held at an incline and rubbed vertically upwardly in relation to the book, while partaking of the advancing motion.

As already explained the side conveyor belts **45** and the under belt **75** constitute a preliminary conveyor group which terminates in advance of the wrapper upfolding operation, to accommodate the diagonal smoothing belts **113**. Beyond the diagonal belts is provided the second or right group of conveyor belts, namely side belts **125**, upper and lower at each side, and an underneath belt **140** to be described. The side belts **125** pass around horizontal pulleys **126** at their left ends and larger pulleys **127** at their right ends, as seen in Figs. 1, 2 and 3. Throughout the length of each belt **125** is system of pressure pulleys or rollers **128**, seen also in Figs. 8 to 11, holding the belts up to the path of the books at each side, these pressure rollers, upper and lower, being mounted on brackets **129** attached on top of the table **23**.

The conveyor belts **125** are driven by means of their right pulleys **127**, the two pulleys at each side being mounted on a vertical shaft **131** extending downwardly into the base column **25**, each shaft being provided with a worm wheel **132** engaging a worm **133** on a horizontal shaft **134** extending outwardly from the column and having a sprocket wheel driven by a sprocket chain **135** from a corresponding sprocket wheel on the main shaft **30**.

The advancing books carried along between the side conveyor belts **125** rest upon an under belt **140** passing around a left pulley **141** and a right pulley **142**, the belt traveling in a slight depression or recess in the top of the table, as indicated in Fig. 8, and driven as follows. On the same shaft with the right pulleys **142** is a smaller pulley **143** connected by a belt or chain **144** with a pulley **145** on a cross shaft **146** turning in a base bracket **147**, the shaft **146** carrying also a worm wheel **148** driven by a worm **149** on a worm shaft **150**, which carries also a pinion **151** meshing with a pinion **152** mounted on the main shaft **30**. As before stated, the proportions of the several drives are such that all of the conveying elements will advance rightwardly with speeds corresponding with the predetermined speed of travel of the book. As each book is delivered rightwardly by the travel of the side conveyor belts **125** and the under belt **140** they may be discharged into any kind of receptacle. Conventionally there is shown an outfeeding conveyor **156** in the nature of an apron traveling slowly to the right. As each book emerges edgewise, a flapping device **157** of a fixed nature may operate to turn each book over forwardly so as to lie upon the book previously delivered. This is shown as a curved or warped deflector plate **157**.

After each book with wrapper emerges from the upfolding and smoothing devices described the wrapper is first preferably scored to facilitate subsequent tucking and down folding operations. The scoring tool **160** for producing two score lines on the rear wrapper flap W′ and two on the front wrapper flap $W^2$ is shown in Figs. 1, 8 and 13–15. This tool may be interchangeable for different thicknesses of book, and the cooperating parts may be correspondingly adjustable. The scorer is shown as comprising upper and lower rear scoring blades **161** and upper and lower front scoring blades **162**, the former being spaced vertically apart by a distance equalling the entire thickness of the book, while the latter are spaced apart a smaller distance due to the fact that the front flap $W^2$ is to be tucked in at about the center of the book as appears in the subsequent Figs. 9 and 10. This entire assemblage may be gaged or positioned vertically by the book itself, being mounted as will be described in a floating manner so as to rest resiliently upon the upper edge of the traveling book.

The mountings of the scoring tool **160** may be as follows. It is shown as attached to a sheet metal shank **164** of an inverted U-shape, the front leg depending above the book and carrying the tool, while the rear arm depends to the rear thereof, where it is mounted by slot and pin devices **165** for vertical sliding motion at the front of a plate **166** which is fixedly mounted at the top front part of a fixed bracket **169** upstanding from the table **23**. As appears in Figs. 13 and 14 there are right and left toggle pairs **167**, each connected above to the plate **166** and below to the tool shank **164**, with a connecting spring **168** pulling upon the floating joints of the toggles. By this arrangement the action of the spring is to supplement gravity and resiliently thrust down the shank **164**, thereby yieldingly holding the scoring tool upon the edge of the book. For the wrapping of a given batch of books the described devices may be lifted manually to admit the first book, or the entire device may manifestly be vertically adjusted for books of different width, and as seen in Fig. 13 the initial end of the scoring tool may be curved upwardly to avoid conflict with the advancing book; and the final or delivery end may either continue straight to the end, or be curved upwardly as shown, at a point removed from the scoring operation so far as to cause no conflict therewith.

The effecting of the two scoring marks on each wrapper flap may be by the scoring blades **161** and **162** respectively in cooperation with rear and front scoring bars **171**, these being shown as longitudinal members, substantially as long as a book, each having a cushioned face **172** composed for example of rubber, the two scoring bars being adapted to be moved simultaneously toward each other, to press the opposite flaps of the wrapper against the scoring blades. This is shown as performed intermittently in such manner that the scoring bars partake of the forward travel of the books, thus permitting continuous travel and preventing drag. For this purpose each of the scoring bars **171** is shown as mounted directly upon two crank pins **173** turning in unison, the crank pins upstanding from crank disks **174** mounted at the top ends of vertical shafts **175**, which shafts extend downwardly through bearings **176**. By this arrangement the two scoring bars move in constant parallelism, each of them describing a circular path and the two of them converging upon the wrapper and scoring tool while moving advancingly, so that a quick tangential pressure or blow is effected against each flap of each wrapper, which action is repeated intermittently as the cranks **173** move around their circular paths, the blades impressing the wrapper flaps into the resilient faces **172** and so leaving creases determining the subsequently folding actions.

The two crank shafts **175** at each side of the machine may be interconnected by sprocket wheels **177** thereon engaged by a sprocket chain **178**, and each shaft may carry a gear **179** communicating drive to the corresponding shaft at the opposite side of the machine. For effecting adjustment for variations in book thickness an arrangement may be employed similar to that shown in Fig. 4 in-

cluding a flexible gear train. For driving the described mechanism one of the shafts 175 may be extended downwardly to where it carries at its lower end a bevel gear 180 engaging a complementary bevel gear 181 on a cross shaft, which shaft also carries a sprocket wheel driven by a sprocket chain 182 from a corresponding sprocket wheel on the shaft 54 deriving its rotation from the main shaft 30.

The next operation is the bending inward and downward and tucking between the sheets of the book the front flap $W^2$ of the wrapping sheet. The mechanism for this preferably operates progressively by reason of the travel of the book and wrapper, and is shown in Figs. 2, 3 and 9 as a tucker plate or blade 185 mounted adjustably or floatingly in proper relation to the top edge of the traveling books. The tucker 185 may be of the general nature of a tucking implement on a sewing machine, being composed of shaped or twisted sheet metal, the first or left end 186 extending high up so as to overreach the book and wrapper, and from there toward the right the tucker being of progressively more and more bent contour until, at its right end 187, it is of inverted U cross section, the rear leg occupying the space between the separated parts of the book. This fixed tucker blade therefore serves both to open up and separate the leaves of each advancing book into two portions, which is easily effected since this part of the book is loosely held, and progressively to bend over and downwardly between the leaves of the book the front flap of the wrapper, which has previously been doubly scored to facilitate its sharp bending where it goes over the top edge of the front section of the book and downwardly therebehind. This tucking device is shown mounted at the top end of a pair of special brackets 189 attached for convenience to two of the brackets 129 already mentioned.

The next operation is the applying of adhesive at the front upper margin of the rear wrapper flap W' during travel of each book. Conventional mechanism therefor is shown in Figs. 2, 3 and 10 wherein a pasting or gluing disk 194 is shown as applying adhesive to the wrapper flap at a properly adjusted distance above the book, near the edge of the flap. The gluing disk 194 is opposed by a roller 195, which may be an idler roll. The disk is shown partly enclosed in a glue vessel 196, projecting through the rear side of the vessel with a close fit to prevent escape of adhesive. The glue roll is driven, being shown mounted at the lower end of a driven shaft 197, the upper end of which carries a helical gear 198 engaged by a similar gear 199 on a cross shaft 200 which shaft carries also a sprocket wheel 201 driven by a chain 202 from a similar sprocket wheel on the shaft 146 already described.

The next operation is the bending and folding over and down of the glued rear wrapper flap W' and applying its glued margin to the front side of the already tucked in front wrapper flap $W^2$. For this purpose there is shown in Figs. 2, 3 and 11 an over-folding plate or blade 205 analogous to the tucker 185 and similarly adjustable or floating in relation to the book. The over-folding plate 205 has a high first or left end 206 which engages and starts the deflection of the wrapper, the plate being of twisted character and its right end terminating with a lower portion 207 whereat the flap has been completely turned down and thrust against the front side of the book, the plate having an inverted U-shape at this point. By this arrangement as each book travels through this part of the machine the wrapper flap is progressively turned over and pressed down into place, having been already scored at the two points requisite for making sharp bends and affording a neat appearance to the product. The over-folding plate 205 is shown mounted at the top end of a special bracket 208 which for convenience may be mounted on one of the brackets 129 already mentioned.

The last step before discharge is the applying of pressure to the opposite sides of the book adjacent to the line of adhesive so as to seal finally the wrapper upon the book. For this purpose there is shown in Figs. 1, 2 and 12 a pair of opposite pressure belts 213 of short extent, operating beyond the over-folding device 205 to apply progressive pressure upon each book until its discharge. The opposite belts 213 pass around large right hand pulleys 214 mounted at the top ends of the shafts 131 already mentioned. Mounted loosely upon the top of said shafts are a pair of swingable brackets 215 extending leftwardly and each carrying a left hand pulley 216 around which also the corresponding pressure belt travels. The two swingable brackets 215 may be secured or clamped in their adjusted positions as shown or they may be drawn together resiliently by an overhead spring 218 or analogous means, to hold them pressing firmly against the opposite sides of the advancing books. Beyond the sealing or adhesive pressure device the wrapped books W B pass in procession to the discharge and outfeed devices already described.

The complete machine hereof and the successive operations may be summed up as follows, it being understood that the invention includes not only the complete combination, but subcombinations and individual mechanisms. The machine comprises means for causing continuous straight-line travel edgewise through the machine of a procession of books; the travel being straight at least from and after the point of assemblage or meeting of the book B and wrapper W; the word books intended to include analogous objects. Means for feeding a procession of wrappers and assembling them with the successive books during travel so that the bottom longitudinal edge of each book, in this case the back of the book, is positioned upon the middle part of the corresponding wrapper. For ease of description relative terms such as top, bottom, up, down, vertical, and horizontal are employed, without however intending them as limitations, since in many cases the arrangements may be altered or reversed without changing the principles. Means, as disks 99, for longitudinally scoring each wrapper during feed to form parallel score marks corresponding to the side corners of the bottom edge of the book. This scoring is shown as performed before the wrapper meets the book, but might equally well be performed just after the wrapper meets the book by scoring means or blades located adjacent to the corners of the book. Means, as belts 113, for thereafter upfolding the side flaps of each wrapper during travel and causing the same to lie flatly against the side faces of the book with the top edges of the flaps, or at least one of them, above the top edge of the book. Means, as tool 160 and bars 171, for thereafter during travel scoring each wrapper flap along longitudinal lines corresponding to the later folding of the respective flaps; this scoring being preferably performed at this stage rather than at the same earlier stage with the middle scoring of the wrapper. Means, as plate 185, for

thereafter during travel folding over one of the wrapper flaps and tucking it down between the components or pages of the book; this being preferable to folding it outside of the book, and affording a locking between the book and wrapper. Means, as disk **194**, for thereafter during travel applying adhesive to one wrapper flap along a longitudinal sealing line; this being shown as placing a stripe of glue along the inner top margin of the unfolded wrapper flap, although it might equally well be applied at the proper sealing line along the already folded flap. Means, as plate **205**, for thereafter during travel folding over and down the second wrapper flap and applying it to the first flap for sealing by such adhesive. Finally is the means, as belts **213**, for applying during travel sealing pressure upon the second wrapper flap at the sealing line, so that the product is then in suitable condition for discharge. The straightline book travel may in some cases need to be modified preceding the wrapper folding etc., for example, in the case of a thin pamphlet which is required to be first folded flatly upon itself before wrapping, as described in a copending application, Serial No. 730,377, filed June 13, 1934.

There has thus been described a wrapping machine embodying the present invention and attaining the objects and advantages recited. Since, however many matters of operation, combination, mechanism and construction may be variously modified without departing from the principles of the invention it is not intended to limit the invention to such matters except so far as set forth in the appended claims.

I claim:

1. A machine for wrapping books or like articles comprising conveying means for causing continuous straightline travel edgewise through the machine of a procession of books, means for feeding a procession of wrappers and assembling them with the successive books during travel so that the bottom longitudinal edge of each book is positioned upon the middle part of the corresponding wrapper, means for longitudinally scoring each wrapper during feed to form parallel score marks corresponding to the side corners of the bottom edge of the book, means for thereafter upfolding the side flaps of each wrapper during travel and causing the same to lie flatly against the side faces of the book with the top edges of the flaps above the top edge of the book, means for thereafter during travel scoring each wrapper flap along longitudinal lines corresponding to the later folding thereof, means for thereafter during travel folding over one wrapper flap and tucking it down between the components of the book, means for thereafter during travel applying adhesive to one wrapper flap along a longitudinal sealing line, means for thereafter during travel folding over and down the second wrapper flap and applying it to the first flap for sealing by such adhesive, and means for applying during travel sealing pressure upon the second wrapper flap at the sealing line.

2. A machine for wrapping books or like articles comprising conveying means for causing continuous travel edgewise through the machine of a procession of books, means for feeding a procession of wrappers and assembling them with the successive books during travel so that the bottom longitudinal edge of each book is positioned upon the middle part of the corresponding wrapper, means for thereafter upfolding the side flaps of each wrapper during travel and causing the same to lie flatly against the side faces of the book with the top edge of at least one flap projecting above the top edge of the book, means for thereafter during travel scoring such wrapper flap along longitudinal lines corresponding to the later folding thereof, means acting during travel for thereafter folding over and tucking down into the book one wrapper flap before the other flap is folded and sealed, means for thereafter during travel applying adhesive to one wrapper flap along a longitudinal sealing line, and means for thereafter during travel folding over and down the projecting wrapper flap and applying it to the other flap for sealing by such adhesive.

3. A machine for wrapping books or like articles comprising conveying means for causing continuous straightline edgewise travel of a procession of books, means for feeding a procession of wrappers and assembling them with the successive books during travel so that the bottom longitudinal edge of each book is positioned upon the middle part of the corresponding wrapper, means for thereafter progressively upfolding the side flaps of each wrapper during travel and causing the same to lie flatly against the side faces of the book with the top edge of at least one of the flaps above the top edge of the book, means for thereafter during travel applying adhesive to one wrapper flap along a longitudinal sealing line, and means for thereafter during travel folding over and down one wrapper flap and applying it to the first flap for sealing by such adhesive; the wrapper upfolding means comprising a diagonally upslanting belt at each side of the traveling books, and connections for driving said belts at a speed faster than the travel of the books such that the forward component of such drive substantially equals the book travel speed.

4. In combination with means for advancing edgewise a procession of books and wrappers therefor, mechanism for folding and smoothing the wrapper upon one or both sides of the book comprising an endless traveling member or belt arranged at a rising incline and moved at such speed that its forward component corresponds with the advancing speed of the books.

5. The combination as in claim 4 and wherein a book advancing means comprises a first group of traveling belts conveying the books to the folding and smoothing mechanism, and a second group of traveling belts conveying the books therebeyond.

6. A machine for wrapping books or like articles comprising conveying means for causing continuous travel edgewise of a procession of books and wrappers assembled so that the bottom longitudinal edge of each book is positioned upon the middle part of the corresponding wrapper, means for thereafter upfolding the side flaps of such wrapper during travel and causing the same to lie flatly against the side faces of the book with the top edges of at least one of the flaps projecting above the top edge of the book, means for thereafter during travel scoring each projecting wrapper flap along longitudinal lines corresponding to the latter folding and sealing thereof, comprising a scoring tool positioned to rest atop the top book edge and having longitudinal scoring blades, and opposing means at the opposite side of each wrapper flap for pressing the flap against the blades.

7. A machine as in claim 6 and wherein the opposing means for pressing the flap against the

blades comprises a cushioned member movable in unison with the travel.

8. A machine as in claim 6 and wherein the opposing means for pressing the flap against the blades comprises a longitudinal bar mounted to move in a circular path tangential to the scoring blades, and means to actuate it in a manner to partake of the travel motion at the moment of scoring.

9. A machine for wrapping books or like articles comprising conveying means for causing continuous travel edgewise through the machine for a procession of books, means for feeding a procession of wrappers and assembling them with the successive books during travel so that the bottom longitudinal edge of each book is positioned upon the middle part of the corresponding wrapper, means traveling ahead with the book and diagonally upwardly for thereafter upfolding the side flaps of each wrapper during travel and causing the same to lie flatly against the side faces of the book with the top edge of at least one flap projecting above the top edge of the book, means for thereafter during travel scoring such wrapper flap along longitudinal lines corresponding to the later folding thereof, means for thereafter during travel applying adhesive to one wrapper flap along a longitudinal sealing line, and means for thereafter during travel folding over and down the projecting wrapper flap and applying it to the other flap for sealing by such adhesive.

10. A machine for wrapping books or like articles comprising conveying means for causing continuous travel edgewise through the machine for a procession of books, means for feeding a procession of wrappers and assembling them with the successive books during travel so that the bottom longitudinal edge of each book is positioned upon the middle part of the corresponding wrapper, means traveling ahead with the book for thereafter upfolding the side flaps of each wrapper during travel and causing the same to lie flatly against the side faces of the book with the top edge of at least one flap projecting above the top edge of the book, means contacting upon and gaged by the top edge of the book for thereafter during travel scoring the upfolded wrapper flap along longitudinal lines corresponding to the later folding thereof, means for thereafter during travel applying adhesive to one wrapper flap along a longitudinal sealing line, and means for thereafter during travel folding over and down the projecting wrapper flap along such scored line and applying it to the other flap for sealing by such adhesive.

11. A machine for wrapping books or like articles comprising conveying means for causing continuous travel edgewise through the machine for a procession of books, means for feeding a procession of wrappers and assembling them with the successive books during travel so that the bottom longitudinal edge of each book is positioned upon the middle part of the corresponding wrapper, means traveling ahead with the book for thereafter upfolding the side flaps of each wrapper during travel and causing the same to lie flatly against the side faces of the book with the top edge of one flap projecting above the top edge of the book to an extent greater than the thickness of the book, means for thereafter during travel scoring the upfolded wrapper flap along longitudinal lines corresponding to the later folding thereof, means for thereafter during travel applying adhesive to one wrapper flap along a longitudinal sealing line, and means for thereafter during travel folding the projecting wrapper flap along such scored line over horizontally upon the book top and thence down at the other side and applying it to the other flap for sealing by such adhesive.

12. A machine for wrapping books or like articles comprising conveying means for causing continuous straightline edgewise travel of a procession of books and wrappers assembled so that the bottom longitudinal edge of each book is positioned upon the middle part of the corresponding wrapper, means for thereafter progressively upfolding the side flaps of each wrapper during travel and causing the same to lie flatly against the side faces of the book with the top edge of at least one of the flaps above the top edge of the book, comprising a diagonally upslanting belt and connections for driving said belt at a speed faster than the travel of the books such that the forward component of such drive substantially equals the book travel speed while the upward component effects the folding of the flap, and means for thereafter during travel folding over one wrapper flap and sealing it to the other flap.

13. A machine as in claim 12 and wherein the book conveying means comprises a first group and a second group of feed members spaced to accommodate the wrapper upfolding means between them.

14. A machine for wrapping books or like articles comprising conveying means for causing continuous straightline edgewise travel of a procession of books, means for feeding a procession of wrappers and for assembling the wrappers and books so that the bottom longitudinal edge of each book is positioned upon the middle part of the corresponding wrapper, means for progressively upfolding the side flaps of each wrapper during travel and causing the same to lie flatly against the side faces of the book with the top edge of at least one of the flaps above the top edge of the book, means for thereafter during travel applying adhesive to one unfolded wrapper flap along a longitudinal sealing line, and means for thereafter during travel folding over and down one wrapper flap and applying it to the first flap for sealing by such adhesive; the wrapper upfolding means comprising opposite folding members and operating connections for rubbing such members progressively upward across the sides of the book to smooth the wrapper thereon while simultaneously advancing such members in the direction of and in unison with the book travel.

15. A machine for wrapping books or like articles comprising conveying means with an underneath traveling support and upright book-guiding members for causing continuous travel edgewise of a procession of books, with the successive books resting upon wrappers so that the longitudinal back edge of each book is positioned upon the middle part of the corresponding wrapper, means for upfolding both side flaps of each wrapper during travel and causing the same to lie flatly against the side faces of the book between the book and said upright guiding members and with the top edges of the flaps above the top edge of the book, means for thereafter during travel folding over one wrapper flap and tucking it down between the components of the book, and means for thereafter during travel folding over and down the second wrapper flap and applying it to the first flap for sealing thereto.

16. A machine as in claim 15 and wherein the

folding and tucking means is mounted in floating manner above the open front edge of the upright book.

17. A machine as in claim 15 and wherein the folding and tucking means is mounted in floating manner above the open front edge of the upright book, and is positioned first to open up the book between the loose leaves thereof and thereupon insert the flap in such opening.

18. A machine for wrapping pamphlets comprising conveying means with an underneath traveling support and opposite upright guiding members for causing continuous travel edgewise of a procession of pamphlets, with the successive pamphlets resting upon wrappers so that the longitudinal back edge of each pamphlet is positioned upon the middle part of the corresponding wrapper and its upper front edge is loosely held, means for upfolding the side flaps of each wrapper during travel and causing both flaps to lie flatly against the side faces of the pamphlet between the book and said upright guiding members and with the top edges of the flaps above the top edge of the pamphlet, means mounted above the front edge of the book operating during travel first to enter between the loose leaves of the pamphlet and thereupon to fold over one wrapper flap and tucking it down between the separated leaves of the pamphlet, and means for thereafter folding over and down the second wrapper flap and applying it to the first flap.

PAUL E. KLEINEBERG.