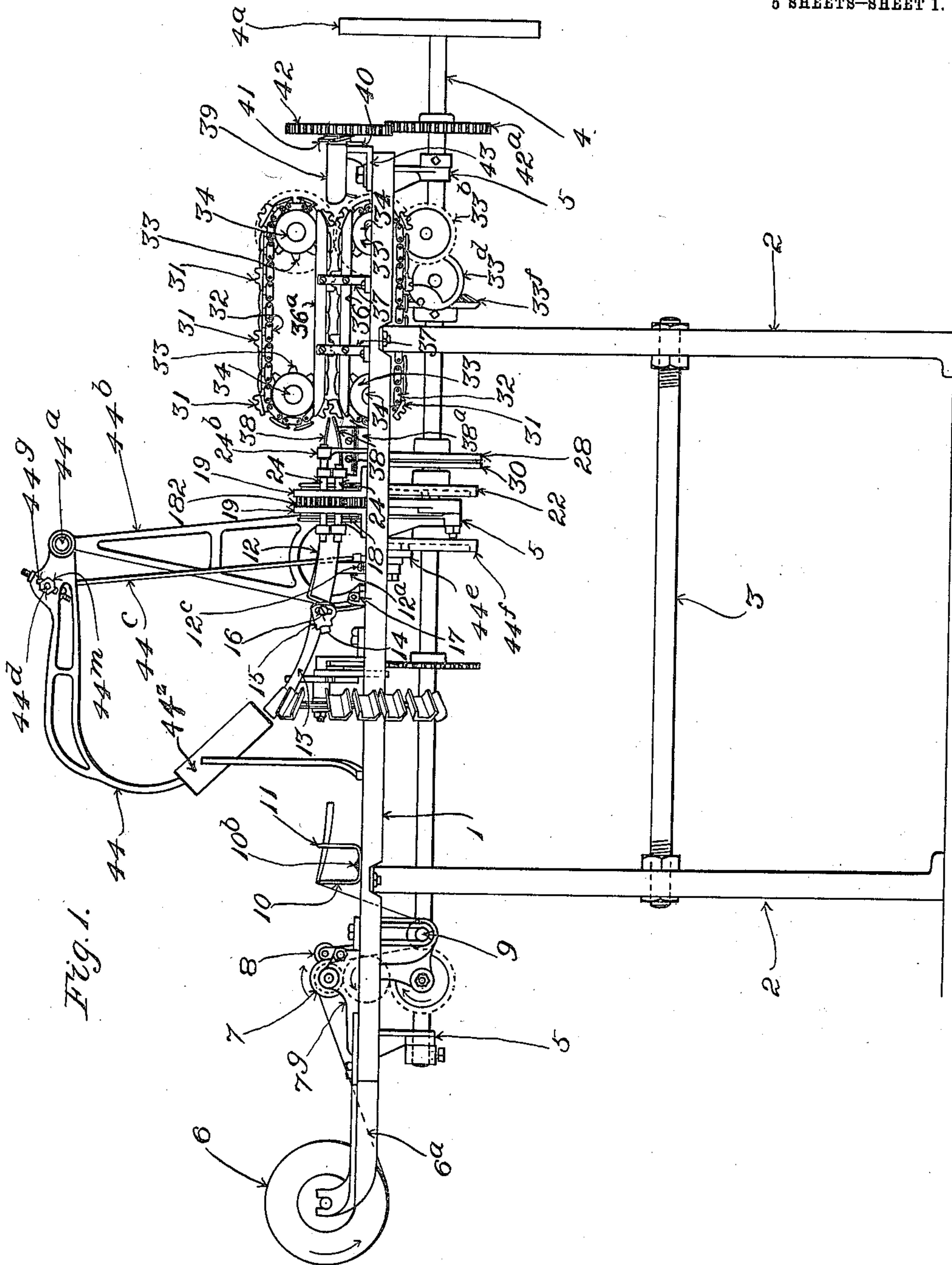


E. R. KNOTT.
WRAPPING MACHINE.
APPLICATION FILED NOV. 9, 1906.

993,255.

Patented May 23, 1911.

5 SHEETS—SHEET 1.



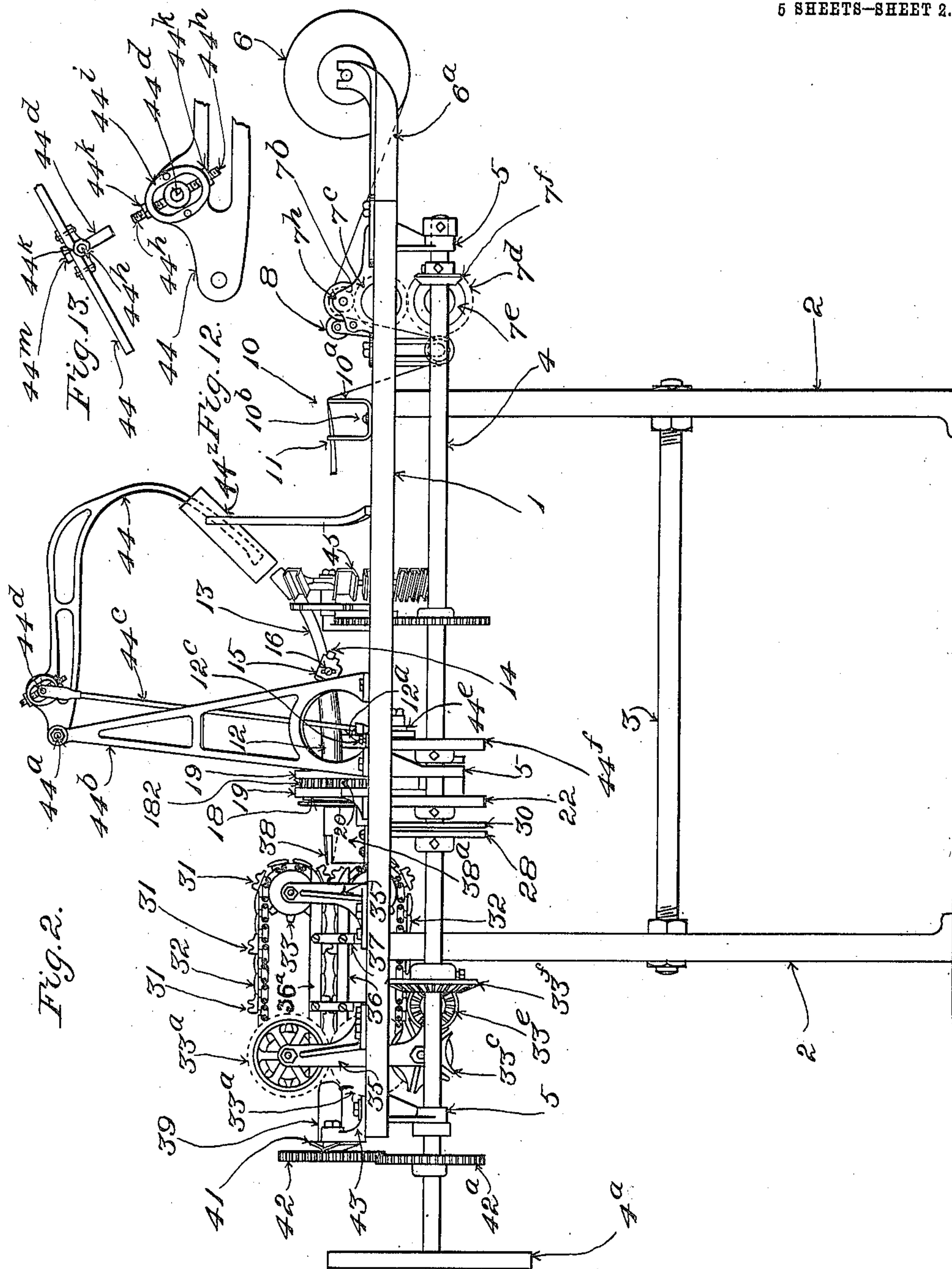
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5 SHEETS—SHEET 2.



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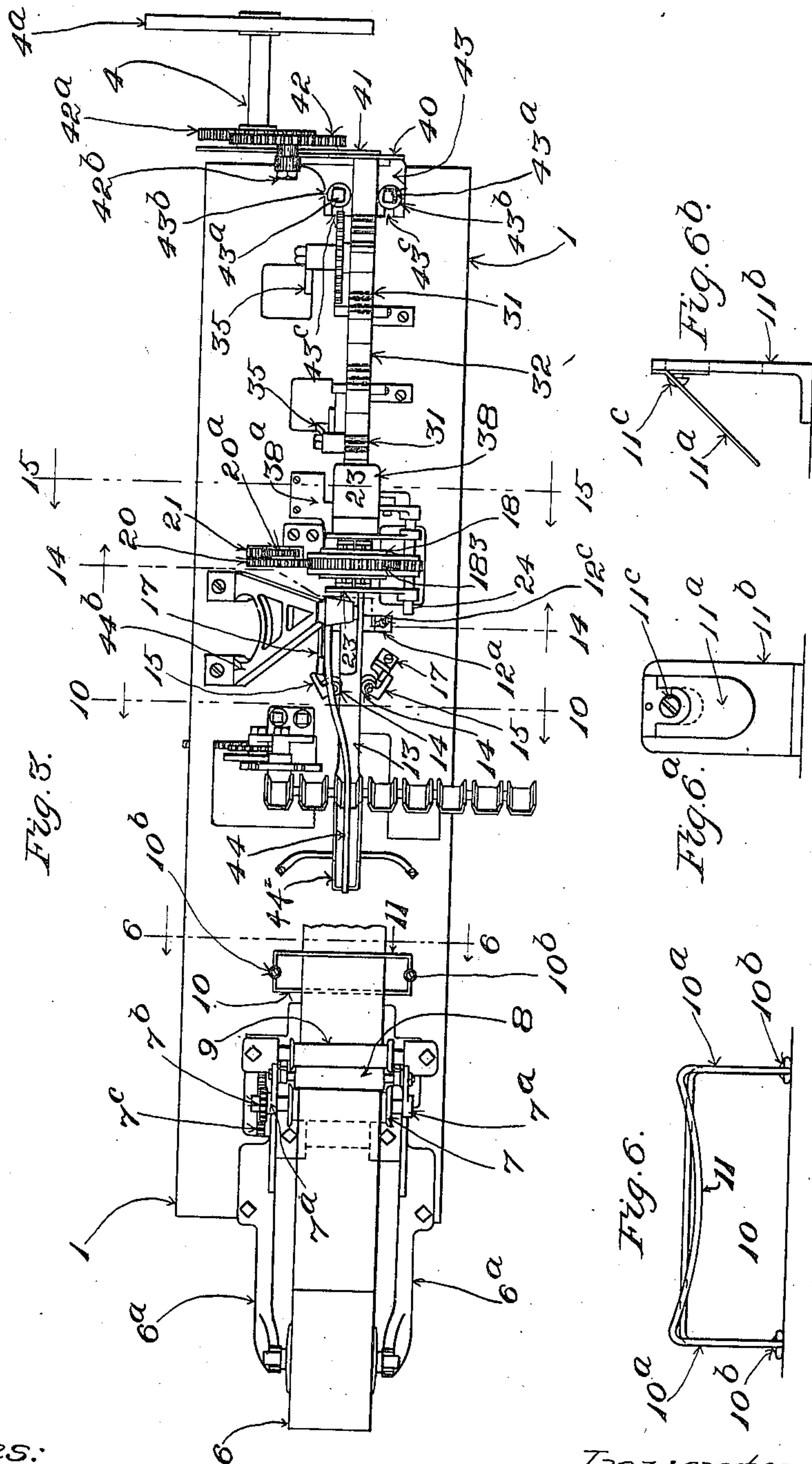
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5 SHEETS—SHEET 3.



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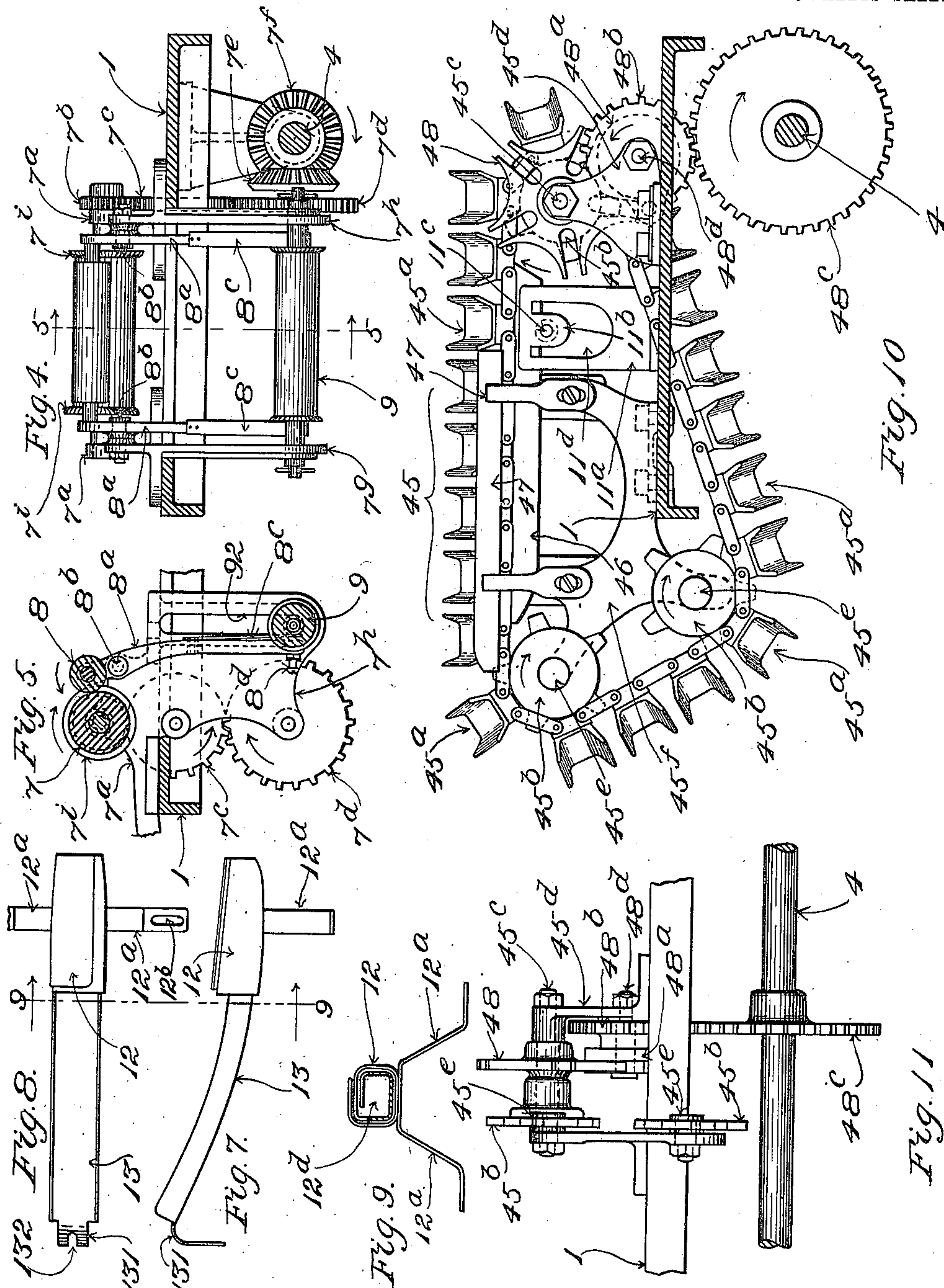
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5 SHEETS—SHEET 4.



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5 SHEETS—SHEET 5.

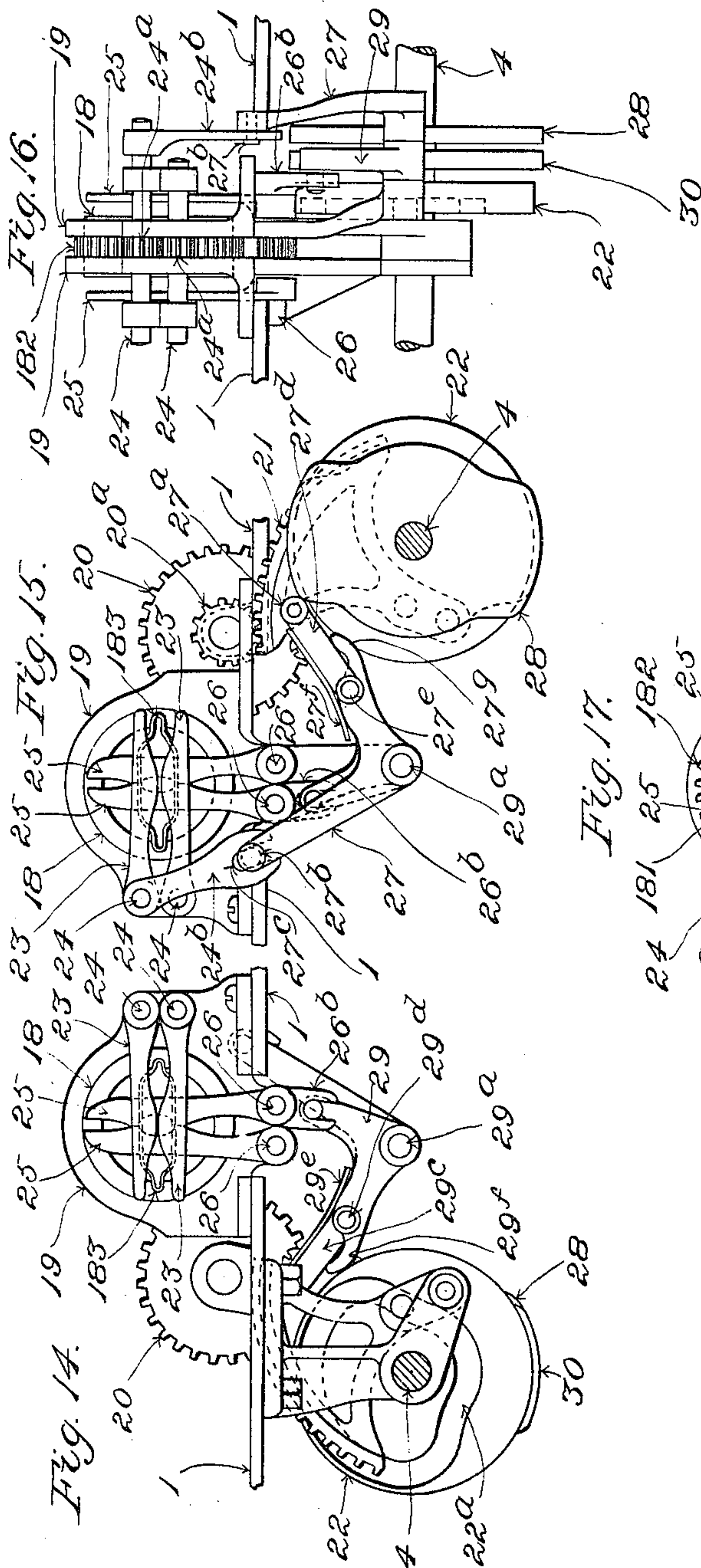


Fig. 17.

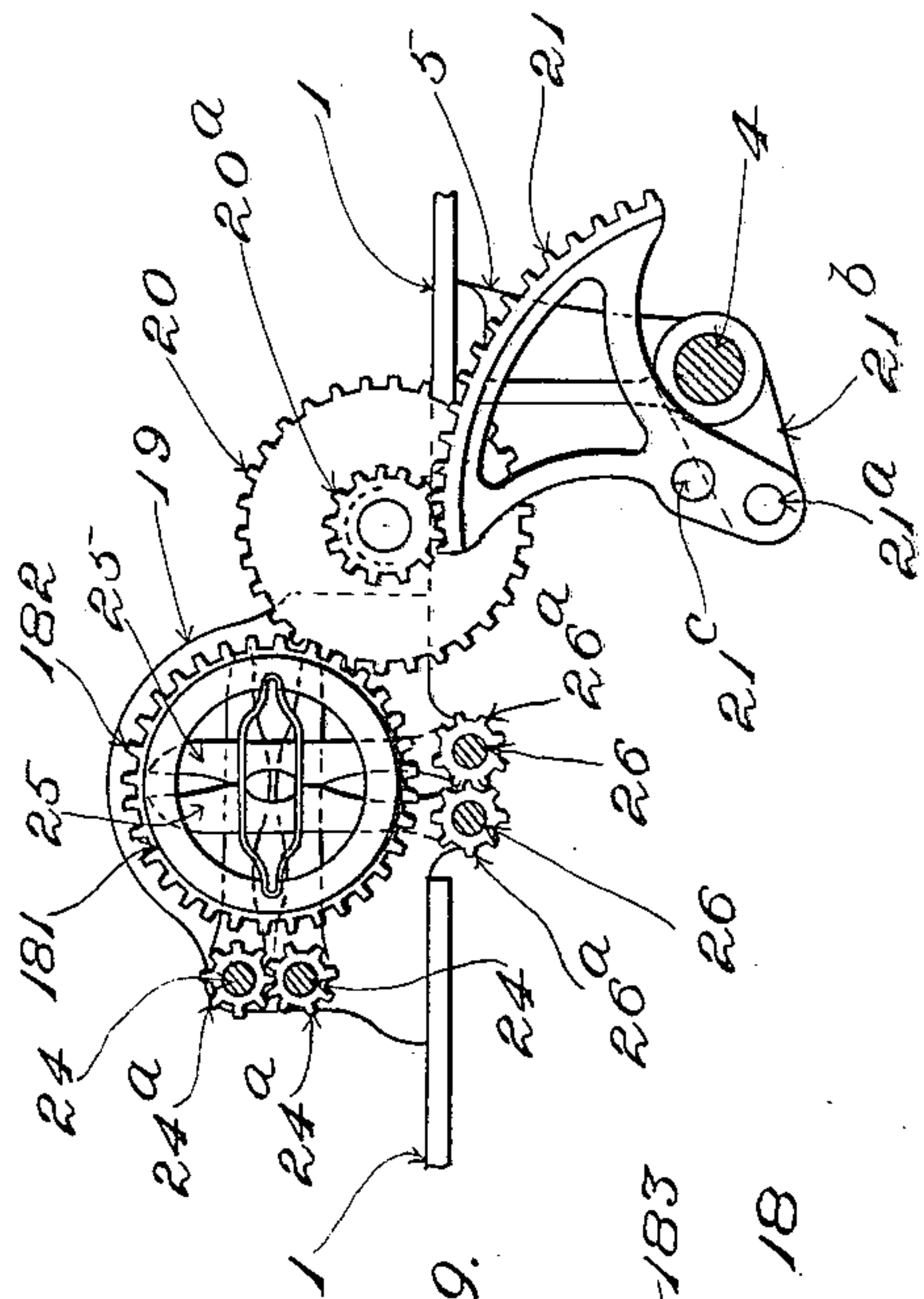
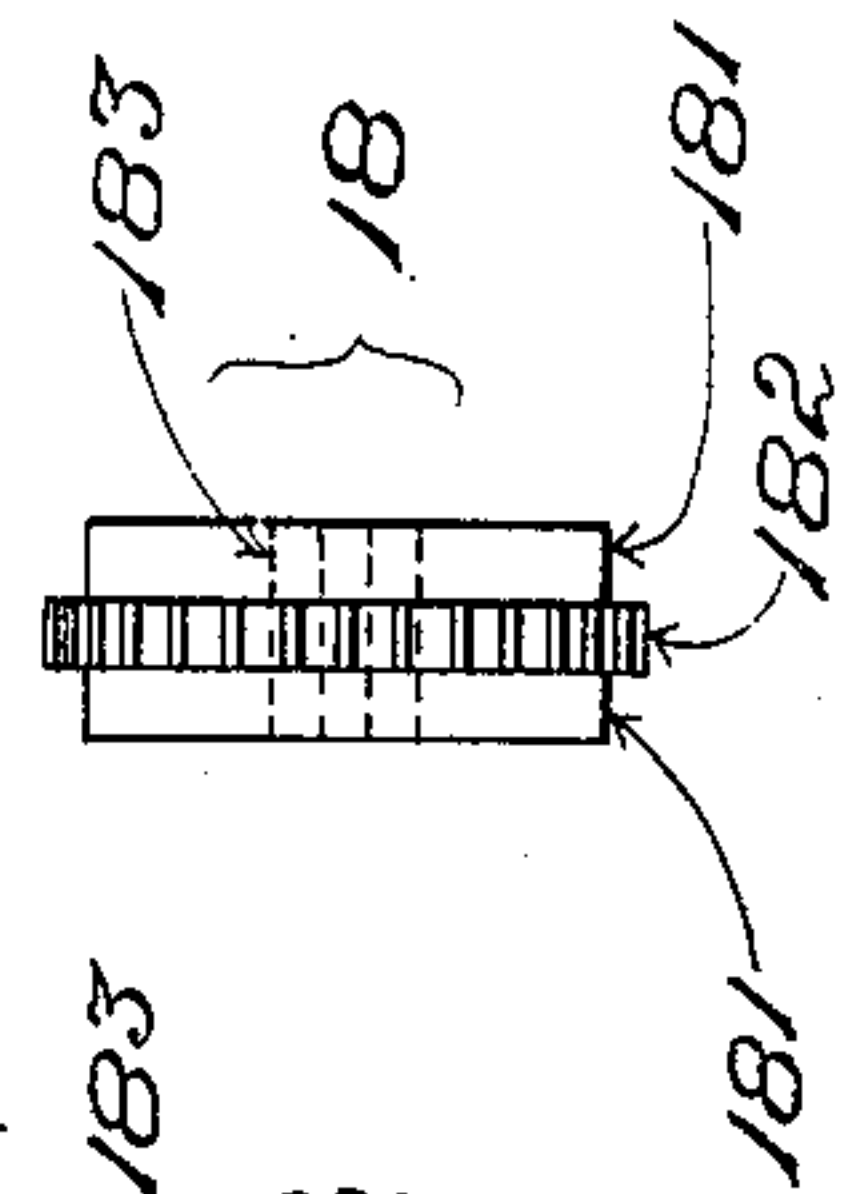
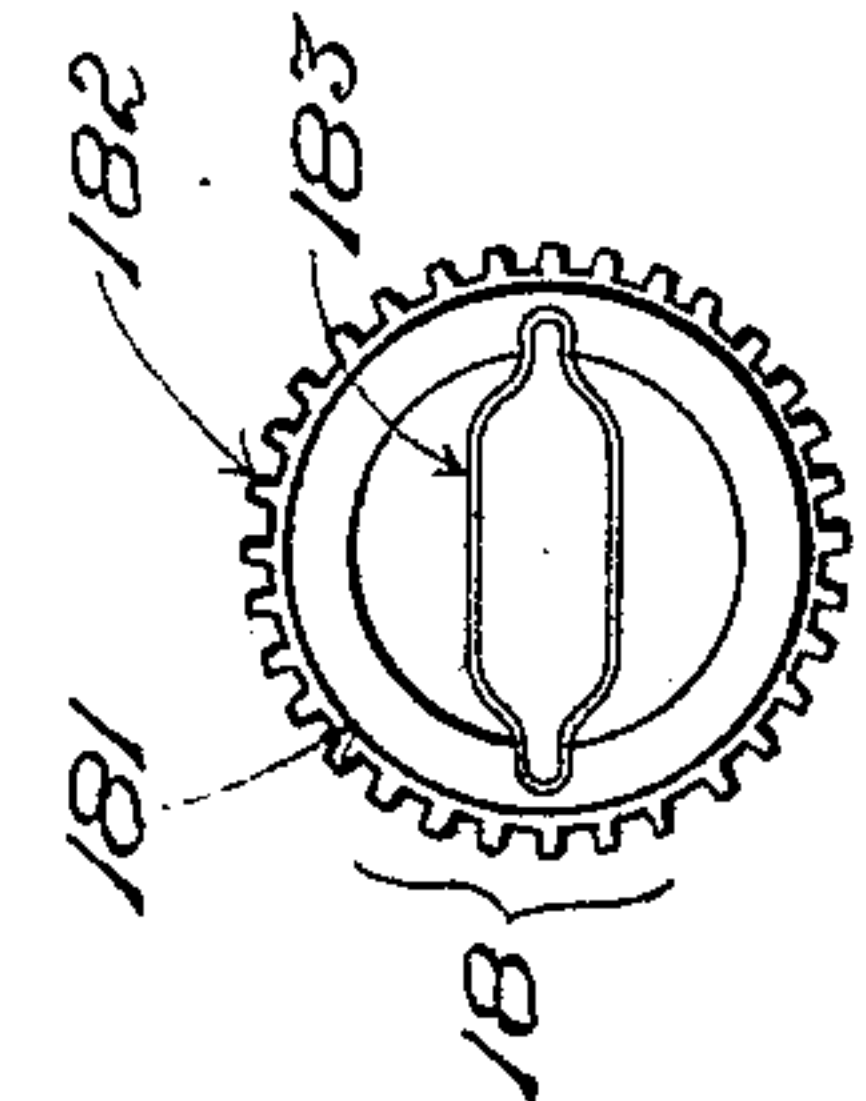


Fig. 18.



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UNITED STATES PATENT OFFICE.

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WRAPPING-MACHINE.

993,255.

Specification of Letters Patent.

Patented May 23, 1911.

Application filed November 9, 1906. Serial No. 342,620.

To all whom it may concern:

Be it known that I, EUSTACE R. KNOTT, a citizen of the United States, residing at Boston, in the county of Suffolk, State of Massachusetts, have invented a certain new and useful Improvement in Wrapping-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to machines for wrapping pieces of candy and other articles, and more especially relates to machines on the order of that shown, described, and claimed in United States Letters Patent to Stephen M. Hamblin, No. 753,571, granted March 1, 1904. The machine of the said patent comprises devices for bending a continuous strip or web of paper longitudinally into trough-shape, means for turning or folding the side-portions of the trough-shaped strip or web down upon pieces of candy or other articles placed within the trough or concavity, a rotatable twister having a central passage through which the strip or web and the inclosed pieces of candy or other articles are passed, guides for the strip or web located at opposite sides of the twister, clamps which engage with the strip or web at the opposite ends of the twister between the latter and the said guides while the twister is rotating for the purpose of confining the twists to the portions of the strip or web which are immediately adjacent the ends of a piece of candy or other article, a delivery-feed to advance the strip or web through the machine, and means to sever the strip or web between successive enwrapped pieces of candy or other articles after passing the twister. The delivery-feeding means engages with the strip or web at the delivery side of the twister and acts to pull the strip or web along through the machine and draw it off from the supply-roll.

The invention consists in the combination, with means for folding a continuous strip or web of wrapping material upon itself longitudinally into a tube, and means for forming twists in the said tube at opposite ends of a piece of candy or other article inclosed therein, of novel means for feeding to the continuous strip or web of wrapping material the pieces of candy or other articles

which are to be wrapped therein. Also, in improved clamps or nippers for holding the folded strip or web, *i. e.*, tube, at opposite ends of the twister while the twisting is being effected, and in the construction of the said clamps or nippers by means of which the required flare or "fan-tail" of the ends of a wrapper may be insured. Also, in crimpers, adjacent the twister, by means of which tendency of the paper to tear or break in being twisted is obviated. Also, in improved delivery-feed devices. Also, in improved cutting mechanism for severing the strip or web between successive pieces of candy or other articles enwrapped therein.

In the drawings the invention is illustrated as embodied in a machine which is shown in front elevation in Figure 1, in rear elevation in Fig. 2, Sheet 2, and in plan in Fig. 3, Sheet 3. Fig. 4, Sheet 4, is a view in vertical cross-section at the supply-end of the machine showing, more particularly, the automatic supply-feeding mechanism and the means for automatically controlling the supply-feed by the tension of the strip or web. Fig. 5, Sheet 4, is a view in vertical section in the plane of the dotted line 5, 5, of Fig. 4, looking in the direction indicated by the arrows at the ends of such line. Fig. 6, Sheet 3, is a view on an enlarged scale, in section on line 6, 6, of Fig. 3, showing more particularly the supporting-guide and first breaker which are located between the supply-feeding mechanism and the folder. Figs. 6^a and 6^b, Sheet 3, are views of the second breaker, detached, and on an enlarged scale. Fig. 7, Sheet 4, is a side elevation on an enlarged scale of the folder and connected chute. Fig. 8, same sheet, is a plan thereof, and Fig. 9, same sheet, is a view thereof in vertical cross-section on line 9, 9, of Figs. 7 and 8, looking in the direction indicated by the arrows at the ends of such line. Fig. 10, Sheet 4, is a view on an enlarged scale in vertical cross-section on line 10, 10, in Fig. 3, looking in the direction indicated by the arrows at the ends of such line, showing more particularly the conveyer and conveyer-mechanism. Fig. 11, Sheet 4, is a view looking from the right-hand side in Fig. 10, showing more particularly the conveyer-actuating mechanism. Fig. 12, Sheet 2, is a detail in side

elevation on an enlarged scale of a portion of the transferrer-arm, showing more particularly the means of adjusting the path of the transferrer-arm. Fig. 13, same sheet, is a plan of such portion. Fig. 14, Sheet 5, is a view on an enlarged scale, in cross-section on line 14, 14, of Fig. 3, looking in the direction indicated by the arrows at the ends of such line. Fig. 15, same sheet, is a view on the same scale, in cross-section on line 15, 15, Fig. 3, looking in the opposite direction. Fig. 16, same sheet, is a view on the same scale in side elevation looking from the right-hand side in Fig. 14. Fig. 17, same sheet, is a view corresponding somewhat with Fig. 15, but with certain parts removed. Figs. 18 and 19, same sheet, show the twister, detached, in side elevation and edge view, respectively.

Having reference to the drawings,—the machine framing comprises the bed or table 1, and the upright supporting portions 2, 2, Fig. 1, which latter are connected together and spaced apart by the longitudinal tie-rod 3.

At 4, Figs. 1 and 2, is a driving-shaft which extends lengthwise of the machine, at one side thereof, it being mounted in bearings in hangers 5, 5, 5, carried by the bed or table 1 and extending down therefrom. At 4^a is a band-pulley upon one end of the said shaft 4 for the reception of a suitable driving-band by which the machine may be driven. The various working parts of the machine are operatively connected with the said shaft, and thereby are actuated.

At 6, Figs. 1, 2, and 3, is a wound roll of the wrapping material. Its journals are fitted to open-topped bearings in oppositely-located arms 6^a, 6^a, shown in side elevation in Figs. 1 and 2 and in plan in Fig. 3, projecting from one end of the bed or table 1, the body of the roll being located between the said arms. The supply-feed mechanism for the strip or web of wrapping material, shown in its proper relations to the other mechanisms of the machine in Figs. 1, 2 and 3, and separately in Figs. 4 and 5, Sheet 4, comprises the two feed-rolls 7 and 8 and driving connections between the same and the shaft 4. Roll 7 is formed with peripheral rings or flanges 7ⁱ, 7ⁱ, Figs. 4 and 5, to serve as edge-guides for the strip or web, and roll 8 enters between such rings or flanges. The roll 7 is mounted in fixed bearings at 7^a, 7^a, Figs. 3 and 4, in stands 7^g, 7^h, Figs. 1 and 2, which are attached to the bed or table 1. Portions of the said stands extend downward through an opening in bed or table 1, below the latter, as shown clearly in Figs. 4 and 5. The roll 7 is driven by means of a spur-pinion 7^b thereon, with which a carrier spur-gear 7^c meshes, the latter meshing also with a spur-gear 7^d which turns in unison with a miter-gear

7^e meshing with a miter-gear 7^f that is fast upon the shaft 4. The spur-gear 7^c, and the connected spur-gear 7^d and miter-gear 7^e, are mounted upon the stand 7^h below the bed or table 1. The roll 8 is a presser-roll, between which and the driven roll 7 the strip or web of wrapping material passes. It is mounted in a movable carrier having side-arms 8^a, 8^a, which are pivoted at 8^b, 8^b, to the stands 7^g, 7^h, and extend down through the opening aforesaid in the bed or table. Roll 8 tends toward roll 7 under the influence of gravity, or of gravity aided by a spring (not shown), or it might be caused to approach the same under the influence of a spring alone, so as to press the strip or web of wrapping material against the periphery of the roll 7 and thereby cause the same to be fed in consequence of the rotation of the rolls.

The supply-feed mechanism unwinds the strip or web of wrapping material from the supply-roll and relieves the portion which extends to and through the folder from the strain which is incident to drawing the strip or web from the periphery of the said roll so as to rotate the latter. An advantage of employing a supply-feed which delivers the strip or web in a practically slack condition in readiness to be drawn forward by the action of the delivery-feed mechanism, is that the portion thus delivered will pass into and through the folder substantially free from tension. This eliminates the tendency of a strip or web, passing to and through a folder under considerable tension, to contract or pucker widthwise upon itself so as to form creases or wrinkles, and also so as to reduce the extent to which the side margins of the folded strip or web overlap each other. Furthermore, in a case where the delivery-feed mechanism engages with the wrapping material at the delivery-side of the twister, as in the machine shown in the drawings, it is important, when regularity of twist and of flare or fan-tail of the cut ends of the separated wrappers are desired, that the strip or web should be free to advance under the delivery-feeding action without being subjected to any marked degree of resistance. Any considerable degree of strain due to such resistance will operate to extend or lengthen out the twists, and also to stretch the untwisted portion of folded strip or web intervening between successive pieces of candy or other articles so as to diminish greatly the flare of the ends of the wrappers after the latter have been cut apart. In practice, the supply-feed-rolls may be operated to advance the wrapping material continuously, by proportioning the gearing by means of which they are driven from the shaft 4 properly to cause their surface speed to suit the rate at which the strip or web is drawn forward through

the machine by the delivery-feed mechanism, and also the extent to which it is shortened in being twisted, care being taken in beginning operations to provide between the supply-feed mechanism and the succeeding devices a length of material somewhat exceeding one complete advance of the strip or web by the intermittently operating delivery-feed mechanism.

At 9 is a take-up device which is located at the delivery side of the rolls 7, 8. It consists in this instance of a drop-roll that is free to rise or fall. Such roll bears upon the strip or web, and as the latter slackens the roll is allowed to descend, while, as the strip or web is drawn forward by the delivery-feed, the roll is raised by the tightening of the strip or web. The drop or tension-roll 9 is guided in its movements by slotted ways at 92, 92, in the depending portions of the stands 7^e, 7^h. Its journals project through the slots in the stands, as shown in the general views, Figs. 1 and 2, but best in the enlarged detail views, Figs. 4 and 5, Sheet 4.

In accordance with one portion of the invention, the gearing of the supply-feed-rolls is proportioned to deliver the strip or web at a rate faster than is necessary to meet the requirements due to the action of the delivery-feed and to the shortening in twisting, and has combined therewith controlling mechanism, of which the drop or tension-roll 9 forms an element, by means of which the delivery-feed is suspended as soon as a predetermined amount of slack has been delivered, and is caused to be resumed when such slack has been drawn forward. For the purposes of control, the presser-roll is movably mounted as already explained, and the carrier-frame therefor is combined with the drop or tension-roll in such manner that the latter, in the movement by which it takes up the slack in the continuous strip or web, acts to communicate to the carrier-frame movement by which the pressure of the presser-roll 8 against the roll 7 is relieved, allowing the said roll 7 to turn without feeding the strip or web, the succeeding rise of the drop or tension-roll, due to the tightening of the strip or web resulting from the delivery-feed, permitting the carrier-frame to move so as to reinstate the pressure of the presser-roll 8, thereby pinching the strip or web against the surface of the roll 7 again, and causing the supply-feed to be resumed. To the foregoing ends, the downwardly-extending arms 8^a, 8^a, of the carrier-frame for the presser-roll 8 are provided with surfaces adapted to be acted upon by the journals of the drop or tension-roll 9. The said surfaces are constituted by the faces of slightly flexible strips 8^c, 8^c, which are attached by their upper ends to the arms 8^a, 8^a, the arms having applied thereto adjusting

screws 8^d, one of which is shown in Fig. 5, by means of which the extent of the projection of the strips 8^c, 8^c, into the path of movement of the said journals may be varied to meet requirements in practice. While the drop or tension-roll 9 occupies its elevated position the faces of the strips 8^c, 8^c, are relieved of the pressure of its journals, and the presser-roll 8 is permitted to move toward the roll 7 to cause the strip or web of wrapping material to be pinched between the two rolls, and fed. When the drop or tension roll descends, the pressure of the journals thereof against the faces of the strips 8^c, 8^c, acts to turn the carrier-frame and separate the presser-roll 8 from the roll 7, thereby discontinuing the supply-feed as aforesaid.

From the drop or tension-roll 9 the strip or web of wrapping material passes to and over the supporting-guide 10, which is shown in place in the machine in Figs. 1, 2 and 3, and in detail in Fig. 6. The said guide extends across the path of the strip or web. It is constituted, for convenience, of a wire having at opposite sides of such path downwardly-extending supporting portions 10^a, 10^a, Fig. 6, provided with feet that rest upon the top surface of the bed or table 1. It is attached to the bed or table 1 by clamping-screws 10^b, 10^b, engaging with the said feet. Next succeeding the supporting guide 10 is the first breaker 11, shown also in Fig. 6, resembling in arrangement and general construction the supporting guide just described, and in the present instance shown formed in one piece therewith although this is not material. The acting portion of the said breaker extends across the path of the strip or web, and is shaped to provide a downturned convexity, as indicated clearly in Fig. 6, Sheet 3. The strip or web on its way from the supporting-guide to the folder passes under the said acting portion, which latter deflects or presses the strip or web downwardly. The upward pressure of the strip or web against the convexity of the acting portion causes the former to conform to the latter, and assume in consequence a transverse curvature with its side-portions upturned. Next in advance of breaker 11 is a second breaker, 11^a, Figs. 6^a, 6^b, Sheet 3, and Fig. 10, Sheet 4, having an acting portion in the shape of a tongue inclining downwardly and toward the supply-end of the machine. It is supported by means of a stand, 11^b, Fig. 10, to which its upper end is made fast by a securing screw 11^c. The said acting portion of the breaker 11^a is somewhat narrower transversely of the machine than that of the breaker 11, and its rounded lower end extends lower than the convexity of the said breaker 11. It constitutes an inside guide and former by means of which the curvature of the strip or web is increased while the side-portions

thereof are allowed to approach each other more closely and to occupy nearly upright positions. Through the stand 11^b is formed an opening 11^a, Fig. 10, corresponding substantially in shape and proportions with the outline of breaker 11^a. After passing the latter, the trough-shaped strip or web passes through the said opening, the surrounding wall of which constitutes an outside guide for the strip or web. By means of breakers 11, 11^a, and the outside guide which is constituted by stand 11^b, the strip or web, in addition to being bent into trough or gutter-shape preliminary to entering the folder, is kept smooth and free from longitudinal wrinkles and creases, and tendency of the side-portions to double down upon themselves is obviated. The subsequent approach of the side-portions of the strip or web toward each other, and the overlapping of the same with each other, under the action of the folder as the strip or web passes there-through, also are facilitated. The inclination of the tongue-like breaker 11^a downward toward the supply-end of the machine causes the free lower extremity or tip thereof to act first upon the middle portion of the width of the strip or web, which is the loosest, leaving the side-portions of the strip or web more or less free to adjust themselves at the sides of the said breaker, and the inclination of the breaker causes the higher portions of its sides to come progressively into action. From the outside guide 11^b the trough-shaped strip or web passes to the folder 12. Through the employment of the breakers and outside guide I am enabled to reduce very considerably the distance by which supporting-guide 10 and the folder are required to be separated from each other.

The folder 12 is shown in Figs. 1, 2 and 3 in its relations to the other elements of the machine, and separately in Figs. 7, 8 and 9 of Sheet 4 on an enlarged scale. The acting portion of the folder is spiral in cross-section, the convolutions of the spiral being proportioned, as in Fig. 9, to cause one side-portion of the strip or web to overlap the other in the folded tube of wrapping material. Centrally through the folder extends a passageway 12^a, Fig. 9, of a cross-section suited in its proportions to the size in cross-section of the pieces of candy, or other articles, to be wrapped. In the operation of the machine, the pieces of candy or other articles are caused to pass successively through the passageway, and on issuing from the delivery-end of the folder are contained within the inclosure of the tubularly folded strip or web. The chute 13, which is connected with the folder and extends from the same toward the supply-end of the machine, is trough-shaped and serves as a guide for conducting the successive pieces of candy or

other articles into the passageway of the folder. The acting portion of the folder stands on downwardly-extending feet 12^a, 12^a, with which it is provided, the said feet having horizontally bent portions which rest upon the top surface of the bed or table 1. The said horizontal portions are slotted, as shown at 12^b, Fig. 8, the slots receiving the stems of screws 12^c, 12^c, Figs. 1, 2 and 3, which hold the feet to the said surface. The feet are confined between the projecting flanges of the heads of the said screws and the bed or table, but are not fixedly clamped in position, the folder being left free to shift or play transversely to a limited extent. The folder has connected therewith one end of the chute 13, presently to be described, the said chute extending toward the supply-end of the machine and the free end of the same being provided with the downturned lug 131 that is formed with the slot 132. The slotted lug 131 fits loosely upon the stem of the securing screw 11^c, Fig. 10, between the projecting flange of the head of such screw and the downwardly projecting central lug of stand 11^b in which the screw is set. Thereby the folder and chute are held from movement lengthwise of the machine. The described means of securing the folder and chute in place provides for ready removal and replacement of the same, and facilitates the substitution of one folder for another when variation in size or shape of folder is required in order to fit the machine to accommodate a change in the size or proportions of the pieces of candy or other articles to be wrapped. A folder of given size and proportions will operate satisfactorily in connection with quite a range of variation in the sizes and proportions of the pieces or articles, but beyond such range a folder of different size and proportions will be required. The capacity of the folder to play transversely enables it by so doing to accommodate itself to any lateral swaying of the tubularly-folded or doubled strip of wrapping material extending from the same to and through the twister which may occur at the time of the twisting operation. Thereby better results are secured in practice than where the folder is secured immovably in position.

For the purpose of holding the strip or web extended widthwise as it approaches the folder, and keeping its side-portions from sagging or working down within the folder, I provide stretching-guides which in this instance comprise temples that are located at opposite sides of the chute or trough 13. The temple at each side consists of a small roll 14 having a frictional surface to act against the strip or web. Each roll 14 is mounted in a carrier-frame 15 that is secured by a screw 16 to a stand 17 which is attached to the upper surface of the bed or

table 1. As the strip or web advances to the folder, its side-portions pass between the respective rolls 14, 14, and the corresponding upturned side-walls of the chute or trough. The rolls press the said side-portions against the said side-walls. The axes thereof are placed at an inclination with respect to the line of travel of the strip or web, so that as the rolls rotate in consequence of the frictional engagement between the surfaces thereof and the surface of the strip or web they tend to deflect the side-portions of the latter upward, thereby drawing the intermediate portion of the strip or web more or less tightly around the bottom of the chute or trough. To vary the stretching action, when necessary, the inclination of the axes of the rolls is changed. This change is permitted by the slotting of the frames 15, 15, for the passage of the screws 16, 16, as shown in Figs. 1 and 2.

From the folder, the strip or web in the form of a tube passes to the twister. The latter is designated 18. Figs. 1, 2 and 3 show the same in its working relations in connection with the other parts of the machine. Figs. 14, 15, 16 and 17, Sheet 5, show it on an enlarged scale in connection with the nippers or clamps and crimpers, and with the actuating mechanism of such parts. Figs. 18 and 19 of the same sheet show the twister detached, also on the same enlarged scale. The twister is cylindrical exteriorly, with plain end-portions 181, 181, see more particularly Fig. 19, and an intermediate toothed portion or gear 182. It is supported by stands 19, 19, which are mounted upon the bed or table 1. The plain portions 181, 181, of the twister are designed to constitute journals, and are fitted to bearings with which the said stands are formed or provided, with the gear 182 of the twister located between the two stands. For the purpose of communicating rotary movement to the twister, the latter is operatively combined with the shaft 4 by a train of actuating mechanism comprising a spur-gear 20, a spur-pinion 20^a, a toothed sector 21, and a cam 22. The spur-gear 20 and spur-pinion 20^a are connected to turn in unison and are suitably mounted alongside the twister. The teeth of the said spur-gear mesh with those of the gear 182 of the twister. The teeth of the sector 21 mesh with those of the spur-pinion 20^a, the said sector being pivoted at 21^a, Fig. 17, upon a portion of one of the supporting-stands 5 for the shaft 4. The cam 22 is fast upon the said shaft 4 and formed with a cam-groove 22^a, Fig. 14, in which is received the pin 21^c carried by the sector 21. By the action of the cam in rotating, the twister is turned first in one direction to produce twists in the tube of wrapping material at the ends of one piece of candy or other article inclosed therein,

and then, after the tube has been advanced to bring the next succeeding piece of candy or other article into position in connection with the twister, the twister is turned in the reverse direction to put twists in the tube at the ends of such succeeding piece or article. The action of the twister is intermittent, the cam-groove 22^a being shaped to cause the twister to dwell at the end of its rotation in either direction to give time for feeding the wrapping material and its inclosed pieces of candy or other articles forward one step. The twister is formed with a central opening which extends longitudinally therethrough and is of ample capacity to permit the tube of wrapping material and the pieces of candy or other articles which are contained therein to be advanced through the same. It is provided with means for engaging, outside the inclosing tube of wrapping material, with the piece of candy or other article which is inside the twister, so as to cause the said piece or other article, and the portion of the tube which immediately surrounds the same, to turn in unison with the twister. This means comprises a flattened tube of spring material which is shown at 183 in Fig. 18, and indicated by dotted lines in Fig. 19, it being represented also in Figs. 14 and 15. The opposite flattened sides of the engaging member 183 extend parallel with each other across the interior opening of the twister, at a distance apart corresponding substantially with the thickness of the piece of candy or other article being wrapped, the opposite bends of the said member being pinched together as represented in Figs. 14, 15, and 16, and seated within grooves which are formed in the inner surface of the shell of the twister. It is preferred that the opposite side-portions of the engaging member 183 shall press upon opposite sides of the piece of candy or other article which is pushed between the same so as to prevent such piece or article from moving too far through in consequence of momentum, or from being drawn back by the return movement of the device which pushes the same along within the folded tube of wrapping material into position within the twister.

At 23, 23, etc., are the clamps or nippers which are employed at opposite ends of the twister for the purpose of locating or confining, close to the opposite ends of the piece of candy or other article that is being wrapped, the twists which are communicated to the tube of wrapping material by rotary movement of the twister. These clamps or nippers comprise two sets of jaw-members, each set consisting of a pair of the said jaw-members co-acting with each other, and there being one pair located adjacent each of the ends of the twister. The jaw-members extend horizontally, transversely with relation

to the path of the tube of wrapping material, one jaw of each pair being arranged above the said path, and the other jaw thereof below the latter. The jaw-members are
 5 fast upon short shafts 24, 24, extending parallel with each other longitudinally of the axis of the twister, and mounted one above the other in bearings with which the stands 19, 19, are formed or provided. The upper
 10 jaw-members of the two sets or pairs are carried by the upper one of the said shafts and the lower jaw-members thereof are carried by the lower one of the shafts. By the closing together of the jaw-members of the
 15 respective sets or pairs upon the tube of wrapping material intervening between them, the sides of the said tube are flattened together and are held while the twisting takes place. For the purpose of causing the
 20 jaw-members to be opened and closed at the proper times in the working of the machine, they are operatively connected and combined with the shaft 4 by means of spur-pinions 24^a, 24^a, Figs. 16 and 17, respectively
 25 fixed upon the respective shafts 24, 24, and meshing with each other, an arm 24^b Fig. 15 fixed upon the upper shaft 24, a rocker or bell-crank 27, and an edge-cam 28 fast upon the shaft 4. The cam 28 engages a roll
 30 27^a which is mounted in connection with one arm of the rocker, and thereby in its rotation the cam operates to move the said rocker. The other arm of the rocker is in engagement with arm 24^b of the upper shaft
 35 24 by means of a pin or stud 27^b carried by the said rocker-arm and working in a slot 27^c formed in the arm 24^b and extending longitudinally thereof. Thereby, when
 40 rocker 27 is moved by the action of the cam 28, rocking movement is transmitted to the upper shaft 24 and to the jaw-members 23, 23, which are secured thereto. The spur-pinions 24^a, 24^a, transmit rotary movement from the upper shaft 24 to the lower shaft
 45 24, causing the latter to move simultaneously with the former and to the same extent but in the opposite direction in either opening or closing. To secure a yielding action of the jaw-members in closing toward
 50 each other, provision for yielding is made in the train of connections between the upper shaft 24 and the actuating shaft 4. To this end, the roll 27^a is mounted movably in connection with the rocker 27, upon an arm
 55 27^a, Fig. 15, which is pivoted at 27^e upon the rocker and held pressed normally by means of a leaf-spring 27^f against a fixed portion 27^g of the rocker. So long as the
 60 jaw-members are not opposed in their closing movement, the spring 27^f holds the arm 27^a in contact with the stop upon the rocker which is constituted by the said fixed portion 27^g thereof, and the rocker turns on its pivot in response to the pressure of the acting sur-
 65 faces of the cam against the roller 27^a.

When, however, the movement of the jaws is arrested before the higher grades of the cam have ceased to act against the said roller, the continued pressure of such grades operates to turn the arm 27^a upon its pivot at 70 27^e against the resistance of spring 27^f, bending the latter. Through the interposition of the spring in the train of transmitting connections, the said jaw-members are caused to close together against the interposed flat- 75 tened tube of wrapping material with a force which is proportioned to the tension of such spring. The yielding grip of the jaw-members permits the wrapping material to slip between the acting faces thereof in case 80 an excess of strain results from the action of the twister in forming the twists in such material. It also avoids liability to cut the wrapping material through excess of pressure which might occur if the jaw-members 85 were unyielding in their closing action. Should the jaw-members close together upon a piece of candy or other resisting object between them the yielding of the spring 27^f will avoid breakage of the working parts. 90 For the production of a flare in the end-portions of a wrapper, between the twists and the cut ends thereof, the jaw-members of the clamps or nippers are constructed to grip the flattened tube only at midwidth of 95 the latter, leaving the marginal portions of the wrapping material thereof free from the clamping action. To this end the working faces of the said jaw-members are rounded or convex so as to meet only at the middle 100 of the width of the wrapping material. In forming the twists, more or less of the length of the tube of wrapping material is taken up therein, the tube being thereby shortened. In consequence of the fact that the 105 marginal portions of the flattened tube lie at the exterior in the twists, they are taken up to a somewhat greater extent than the middle portions of the width of the tube, which are more centrally located in the 110 twists. By forming the jaw-members as aforesaid they hold the said middle portions adjacent each end of the twister, while permitting the marginal portions to draw past or around the acting portions of the nippers 115 as the shortening takes place. This mode of operation leaves the untwisted length or portion of wrapping material which intervenes between two successive enwrapped pieces of candy, or other articles, full and 120 bulging between the twists, so that when the enwrapped pieces or articles are disconnected from one another by cutting across untwisted portions, the ends of the respective wrappers are left expanded and flaring. 125 In order that the marginal portions of the flattened tube of wrapping material may not become torn between the ends of the twister and the jaw-members of the nippers or clamps by the strain thereon in be-

ginning the twisting, movable members are employed at each end of the twister to engage with the said marginal portions, between the twister and the jaw-members of the corresponding nippers or clamps, and press the said marginal portions toward the center, crimping or bunching the material closely together at the place where the twists are to be produced therein. When thus crimped or bunched together approximately in line with the axis of rotation of the twister, the twisting is more easily effected, relieving strain at the twister; in other words, it is easier for the twister to cause the enwrapped piece of candy or other article within its grasp to rotate for the purpose of the twisting. The crimpers comprise sets or pairs of crimper-members 25, 25, one set or pair being provided in connection with each end of the twister. The said crimper-members extend vertically with relation to the path of the tube of wrapping material, one member of each pair being arranged at one side of the said path, and the other member at the opposite side thereof. They are fast upon short shafts 26, 26, extending parallel with each other longitudinally of the axis of the twister, and mounted side by side in bearings with which the stands 19, 19, are provided. The right-hand crimper-members of the two sets or pairs are carried by one of the said shafts, and the left-hand crimper-members thereof are carried by the other of the said shafts. The acting faces of the members are made concave, the concavity of each crimper-member of a pair registering with that of the opposing crimper-member of such pair, so that when such crimper-members are most closely together there remains an opening between them containing the crimped or compacted wrapping material and within which the latter is capable of turning as the twisting takes place. Within the said opening the wrapping material is relieved more or less from pressure, so that the twists are not only permitted to form properly, but flattening of the same is obviated. The jaw-members 23, 23, of the nippers or clamps operate when in their closed state to confine the wrapping material within the limits of the opening aforesaid, and thereby prevent portions of the said material from getting caught between the opposing contacting portions of the crimper-members above and below the concavities as the said members close together. For the purpose of causing the crimper-members to be opened and closed at the proper times in the working of the machine, they are operatively connected and combined with the shaft 4 by means of spur-pinions 26^a, 26^a, Fig. 17, fixed upon the respective shafts 26, 26, and meshing with each other, an arm 26^b which is fixed to one

of the said shafts 26, a rocker or bell-crank 29, Fig. 14, which is pivoted at 29^a, and an edge-cam 30 fast upon the shaft 4. The cam 30 engages a roll, which is mounted upon an arm 29^c, Fig. 14, pivoted to rocker 29 at 29^d and backed up by a leaf-spring 29^e tending normally to hold the said arm in contact with a stop-projection 29^f on the rocker. Through the employment of the movably mounted roll backed up by the spring 29^e the action of the crimper-members in closing is made yielding as in the case of the jaw-members of the clamps or nippers.

The delivery-feed mechanism comprises gripper-blocks 31, 31, etc., Figs. 1 and 3, which are carried by upper and lower endless chains 32, 32, supported by sprocket-wheels 33, 33, etc., Figs. 1 and 2, the latter turning upon supporting-studs 34, 34, etc., on stands 35, 35, Figs. 2 and 3, which are mounted upon the bed or table 1 at the delivery-end of the machine. The blocks 31, 31, etc., of the two chains work together in pairs, one on the one chain cooperating with one on the other chain, and so on, and in order that they may take an effective hold upon the wrapping material their working faces are corrugated, the projecting portions of each block of a pair working into the depressions of the other thereof. The chains are caused to move intermittingly, as presently will be explained. In the working thereof, each pair of clamping-blocks in turn is caused to engage with the untwisted portion of the tube of wrapping material intermediate two successive enwrapped pieces of candy or other articles, and operates during the advance of the carrier-chains to draw the wrapping material forward the length of the wrapper. The upper run of the lower chain works upon a guide or runway 36, Figs. 1 and 2, supported by stands 37, 37, upon the bed or table 1, and thereby the said run is sustained. The lower run of the upper chain passes beneath a guide or runway 36^a also carried by the stands 37, 37, and thereby such portion of the said feed-chain is held down so that each of the clamping-blocks carried thereby shall hold the wrapping material securely against the opposing clamping-block throughout the extent of their travel together. The sprocket-wheels 33, 33, at the forward ends of the chains have connected therewith spur-gears 33^a, 33^a, Fig. 2, meshing together, and thereby the two chains are caused to travel in unison. The chains are actuated from the shaft 4 for the purposes of the delivery-feed by driving-connections comprising a spur-pinion 33^b, Fig. 1, that meshes with a like pinion (not shown) connected with the lower spur-gear 33^a, Geneva-stop gearing comprising a slotted wheel 33^c (Fig. 2) which is connected with the said spur-pinion

33^b, and a pin-wheel 33^a (Fig. 1), a bevel-gear 33^c (Fig. 2) which is connected with the said pin-wheel, and a larger bevel-gear 33^f on the shaft 4, and with which the gear 33^e meshes. Through the connections described the chains are actuated intermittently, being held locked from accidental movements during the intervals between their regular movements, and overthrow also being prevented, by the locking convexity of the pin-wheel 33^a entering the concavities of the slotted or star-wheel 33^c, as usual in Geneva-stop driving connections.

In consequence of the fact that in this machine the twisting of the tube of wrapping material at the opposite ends of a piece of candy or other article is accomplished by rotating the twister and consequently the said piece or article as well as the portion of wrapping material immediately inclosing the same, while adjacent portions of the wrapping material at opposite ends of the twister are held from rotation by means of the nippers or clamps, the twist that is put into the wrapping material at one end of the piece of candy or other article is in one direction, whereas that at the other end thereof is in the reverse direction. The distance in the said machine between the clamps or nippers at the delivery-end of the twister, and the point at which the wrapping material is clasped between the two opposing clamping-blocks 31, 31, of the chains 32, 32, which are in position to close thereon corresponds with the length of a wrapper. In order that the strain, as the said pair of clamping-blocks draws the tube and strip of wrapping material forward through the machine, may be prevented from untwisting or straightening out the two twists of opposite direction between such points, guide-plates 38, 38, Figs. 1, 2 and 3, are located between the said points, one above and the other below the path of movement of the wrapping material and its contents. These plates are supported by the stand 38^a, which is mounted on bed or table 1. By their engagement at top and bottom with an enwrapped piece of candy or other article they hold the same from turning under the strain and thereby prevent the untwisting. The distance between successive clamping-blocks 31, 31, on each chain 32 corresponds with the length of a wrapper, *i. e.*, with the distance between the middle of the length of one of the intervening untwisted portions of the tube of wrapping material and the middle of the length of the next succeeding untwisted portion. Consequently, each pair of coöperating clamping-blocks engages with one of the said intervening untwisted portions.

As the twisted tube of wrapping material and its enwrapped contents is discharged from the feeding-clamps, it is pushed through

a trough-shaped guide 39, at the end of which is a fixed shear-blade 40 over which the said tube passes.

At 41, 41 are moving shear-blades carried by a rotating spur-gear 42, which latter meshes with a spur-gear 42^a fast upon the shaft 4 and is thereby driven. By the rotation of the spur-gear 42 the moving cutter-blades 41, 41, are operated so as to act alternately in conjunction with the fixed shear-blade to sever the tube of wrapping material at midlength of the intervening untwisted portions.

The guide 39, fixed shear-blade 40, and the supporting stud 42^b, Fig. 3, of the spur-gear 42, are mounted upon a stand 43 on the bed or table 1. The said stand is fixed in position by clamping bolts 43^a, 43^a, Fig. 3, and washers 43^b, 43^b, under the heads of such bolts. The stems of the bolts pass through horizontal slots 43^c, 43^c, in the foot of the stand, which permit the stand to be adjusted lengthwise of the machine. By means of the adjustment thus provided for, the cutting-mechanism may be shifted bodily to suit the length of feed, so as to locate the cutting-mechanism in proper position to sever the wrapping material in the middle of the length of each of the intervening untwisted portions of the wrapping material, whatever the length of the feeding movement may be.

The machine is provided with feeding devices comprising means for supplying pieces of candy or other articles to the strip or web of wrapping material, at regular intervals apart, for the enwrapping, and with a conveyer from which the said pieces or articles are transferred successively by the said means. The means referred to comprise a bent swinging feeder-arm 44, Figs. 1, 2 and 3, which is hung by a pivot 44^a to the upper portion of a stand 44^b rising from the top of the bed or table 1. The said arm is arranged to swing in the direction of the length of the machine. The chute 13 and folder 12 are bent in a curve which is concentric with the said pivot of the feeder-arm, and when the feeder-arm is swung downward from its position in Figs. 1, 2 and 3, and forward toward the delivery-end of the machine, it pushes a piece of candy, or other article, occupying its path, ahead of it along chute 13, through the central passageway 12^a of the folder, and along the interior of the folded tube of wrapping material into a position within the grasp of the twister. By its backward and upward swing it is withdrawn and restored to its position within a trough-shaped guide 44^z at a short distance to the rear of the supply-end of the chute 13. For the actuation of the feeder-arm, it is connected and combined operatively with shaft 4, the connecting and combining means comprising a rod

44^c, Figs. 1 and 2, having the upper end thereof connected with a pivot 44^a, Figs. 2, 12 and 13, carried by the feeder-arm, a cam-actuated arm or lever 44^e, hung at the under side of the bed or table 1 and to which the lower end of rod 44^c is connected, and a cam 44^f on shaft 4 and engaging with arm or lever 44^e. As the shaft and cam rotate, the arm or lever 44^e is moved first in one direction and then reversely, and through the rod 44^c such movements are transmitted to the feeder-arm to occasion the required feeding action and withdrawal thereof. Means is provided for enabling the position of the forward limit or extreme of the feeding stroke of the feeder-arm to be adjusted, so as to cause the piece of candy or other article which is fed thereby to assume the desired position with relation to the twister, at the center of the latter. Thus, the pivot 44^a is fitted to a slot 44^s extending obliquely across the arm 44 adjacent its point of support upon stand 44^b and passes through an eye formed in an adjusting device shown best in Figs. 12 and 13, Sheet 2, having oppositely projecting pins 44^h, 44^h, which pass through a flange 44ⁱ on one side of arm 44. The said pins are screw-threaded, and nuts 44^k, 44^k, are fitted to the same outside the said flange. By turning the said nuts in the required directions the adjusting device, and with it the pivot 44^a, may be given the position on arm 44 which is necessary in order to cause the acting end of such arm to advance to the proper point in its feeding movement.

The conveyer mechanism by which the pieces of candy, or other articles, that are to be wrapped are presented to the action of the feeder-arm is shown in its working relations to the remainder of the machine in Figs. 1, 2 and 3, and separately on an enlarged scale in Figs. 10 and 11 of Sheet 4. In the drawings the conveyer is designated 45. It is constituted of an endless chain of links, certain of which are provided with buckets 45^a, 45^a, shown best in Fig. 10. The said chain passes around a series of supporting and actuating sprocket 45^b, 45^b, etc. The conveyer extends transversely across the machine, and to some distance beyond one side thereof, as shown best in Figs. 3 and 10, in order to render it convenient for an attendant stationed at such side of the machine to place pieces of candy or other articles, within the buckets of the upper run of the conveyer, and also enable him to keep a sufficient number of the said buckets occupied to insure that every forward stroke of the feeder-arm shall carry a piece of candy or other article into place to be wrapped. One of the sprockets is mounted upon stud 45^c, carried by stand 45^d on the bed or table 1. The other two are mounted upon studs 45^e, 45^e, carried by the outer por-

tion of a stand 45^f mounted on bed or table 1 and projecting transversely beyond the edge of the same. The said upper run of the conveyer travels across the machine in line with and close to the rear end of chute 13, so as to present the buckets successively in line with such chute, between the latter and the acting end of the feeder-arm when in its retracted position. An advancing movement of the said feeder-arm will cause its said acting end to push the piece of candy, or other article, from the bucket which at the moment is in register with the chute, into and through the latter and the feeder, and into position within the twister. The upper run of the conveyer is supported by a runway 46, Fig. 10, that is attached to the stand 45^f. The buckets respectively occupy an inclined position, so that the one thereof which at a given moment is in line with the chute and the retracted feeder-arm, between the same, shall conform with the inclination of the first portion of the feeding movement of the feeder-arm, and also with the inclination of the rear portion of the chute. To prevent the contents of the buckets from sliding out forwardly before the arrival at the chute, a retaining guide-strip 47 is attached to the stand 45^f in front of the path of the buckets, and closely adjacent the latter. The conveyer is actuated intermittently in proper timing with reference to the other working parts of the machine, by driving-connections intermediate shaft 4 and the sprocket on stud 45^c, such driving-connections comprising a Geneva-stop driving construction 48, 48^a, a spur-gear 48^b connected with the pin-wheel 48^a of such construction, and a spur-gear 48^c fast on shaft 4. The slotted star-wheel 48 of the said construction is fast with the sleeve of the said sprocket on stud 45^c. Pin-wheel 48^a and spur-gear 48^b are fast with each other and turn on a stud 48^d carried by stand 45^d, and said spur-gear 48 meshes with the spur-gear 48^c.

While I have been particular to describe fully the illustrated embodiment of the invention, I do not wish to be understood as limiting myself to the precise details of construction hereinbefore described and shown in the accompanying drawings, save in the case of those claims in which particulars of construction are expressly specified, inasmuch as it is obvious that the construction of the different parts and combinations of the machine may be varied without involving departure from the principles and spirit of the invention.

I claim as my invention:—

1. In a wrapping machine, the combination with means for folding a continuous strip or web of wrapping material upon itself longitudinally, mean for moving pieces of candy or other articles to be wrapped

into positions outside the said strip or web for being fed to the latter, means for transferring the pieces of candy or other articles from such position to the strip or web, and means for completing the enwrapment at the ends of a piece of candy or other inclosed article.

2. In a wrapping machine, the combination with means for folding a continuous strip or web of wrapping material upon itself longitudinally into a tube, a movable conveyer for the piece of candy or other article to be wrapped, means for transferring to the said strip or web the piece of candy or other article which has been moved into position by the conveyer, and means for completing the enwrapment at the ends of a piece of candy or other inclosed article.

3. In a wrapping machine, the combination with means for folding a continuous strip or web of wrapping material upon itself longitudinally into a tube, and a rotary twister, of means for feeding a piece of candy or other article from outside into said tube and along inside the tube and into the grasp of the said rotary twister, to be rotated by means of the latter.

4. In a wrapping machine, the combination with a twister, means to rotate the same, and non-rotary clamps to engage with the wrapping material at opposite sides of the twister, of means for feeding a piece of candy, or other article, from outside into the tubularly formed wrapping material along inside such material and into the grasp of the rotary twister.

5. In a wrapping machine, the combination with a twister, means to rotate the same, devices to feed the wrapping material into the said twister and deliver the enwrapped piece of candy or other article therefrom, and non-rotary clamps to engage with the wrapping material at opposite sides of the twister, of means for feeding a piece of candy, or other article, from outside into the tubularly formed wrapping material past the clamp at the receiving side of the twister and into the grasp of the twister.

6. In a wrapping machine, the combination with means for doubling or folding a continuous strip or web of wrapping material upon itself, a rotary twister, non-rotary clamps to hold the wrapping material at opposite sides of the twister, means to feed the wrapping material and deliver the wrapped article, and means to sever a wrapper from the said strip or web, of means for feeding a piece of candy, or other article, from outside into the wrapping material past the clamp at the receiving side of the twister and into the grasp of the twister.

7. In a wrapping machine, the combination with twisting devices comprising means to engage with a wrapper containing a piece of candy or other article and clamps to en-

gage with the wrapper at opposite ends of said piece or article, and mechanism to produce relative rotation of said means and clamps to twist the ends of the wrapper, an endless conveyer for the pieces of candy or other articles to be wrapped, and devices to transfer one of the said pieces or articles from the said conveyer to the wrapper and place it within the grasp of the twisting devices.

8. In a wrapping machine, the combination with devices for twisting wrapping material at opposite ends of a piece of candy or other article inclosed therein, and means for feeding the said wrapping material to the said devices, of an endless conveyer for the pieces of candy or other articles to be wrapped, and devices for transferring one of said pieces or articles from the said conveyer to the said twisting devices.

9. In a wrapping machine, the combination with an endless conveyer for the pieces of candy or other articles to be wrapped, a folder for doubling or folding a continuous strip or web of wrapping material upon itself longitudinally, devices for twisting the wrapping material at opposite ends of a piece of candy or other article inclosed therein, and devices for transferring one of the said pieces or articles from the said conveyer into the doubled or folded strip or web.

10. In a wrapping machine, the combination with means for folding a continuous strip or web of wrapping material upon itself longitudinally, of an endless conveyer for the pieces of candy or other articles to be wrapped, devices for transferring the said pieces or articles from the said conveyer to the strip or web, and means for completing the enwrapment at the ends of a piece of candy or other article.

11. In a wrapping machine substantially such as described, the combination with twisting - devices, and wrapper - feeding devices, of an endless conveyer having buckets to contain the pieces of candy or other articles to be wrapped, and devices to transfer a piece of candy or other article from one of the said buckets to the wrapper and twisting devices.

12. In a wrapping machine, the combination with means for folding a continuous strip or web of wrapping material upon itself longitudinally into a tube, and twisting devices, of the endless conveyer provided with buckets, a pusher, and means to actuate the said pusher to transfer a piece of candy or other article from the said conveyer to the interior of the said tube.

13. In a wrapping machine, the combination with a rotary twister, and means for feeding wrapping material thereto, of the pusher by which a piece of candy or other article to be wrapped is placed inside the

said twister, means to actuate the said pusher, and means to adjust the stroke of said pusher with relation to the twister to cause it to place the piece of candy or other article properly within the twister.

14. In a wrapping machine, the combination with means for folding a continuous strip or web of wrapping material upon itself longitudinally into a tube, means for rotating an inclosed piece of candy or other article and the portion of wrapping material which surrounds the same, of sets of movable jaw-members at opposite ends of the said rotating means, and means to close the said jaw-members upon the wrapping material to hold the same for the purpose to confine the twists between said jaw-members and the ends of the piece of candy or other article while the rotation takes place, and to open the said jaw-members to release the wrapping material and allow the same and the enwrapped contents to be drawn forward.

15. In a wrapping machine, the combination with means for folding a continuous strip or web of wrapping material upon itself longitudinally into a tube, twisting means operating to rotate an inclosed piece of candy or other article and the portion of wrapping material which surrounds the same, of sets of movable members at opposite sides of the said twisting means engaging with the wrapping material at opposite ends of the said rotating means and at the middle of the width of the folded wrapping material, and means for closing and opening the said jaw-members.

16. In a wrapping machine, the combination with means for folding a continuous

strip or web of wrapping material upon itself longitudinally into a tube, twisting means operating to rotate an inclosed piece of candy or other article and the portion of wrapping material which surrounds the same, of crimping means adjacent the said twisting means to bunch together the wrapping material to facilitate the twisting thereof.

17. In a wrapping machine, the combination with means for folding a continuous strip or web of wrapping material upon itself longitudinally into a tube, means for twisting the wrapping material at opposite ends of a piece of candy or other article inclosed in the same, feeding clamps, and means for operating said clamps to engage with an untwisted portion of wrapping material intermediate successive pieces of candy or other articles inclosed therein and feed the tube and strip or web through the machine.

18. In a wrapping machine, the combination with means for folding a continuous strip or web of wrapping material upon itself longitudinally into a tube, means for twisting the wrapping material at opposite ends of a piece of candy or other article inclosed in the same, means to feed the wrapping material and its contents through the machine, a stationary cutting member, a cooperating cutting member, and a rotating carrier for the latter cutter-member.

In testimony whereof I affix my signature in presence of two witnesses.

EUSTACE R. KNOTT.

Witnesses:

CHAS. F. RANDALL,
EDITH J. ANDERSON.