No. 881,900. PATENTED MAR. 17, 1908.

G. W. CHURCH.

STAPLING MECHANISM.

APPLICATION FILED APR. 3, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

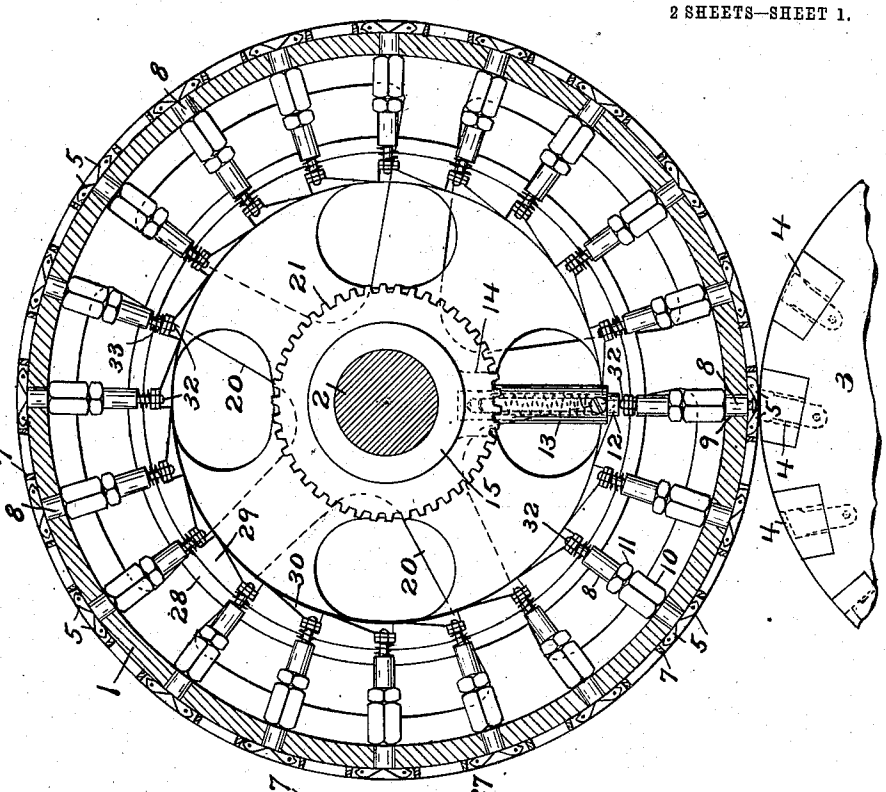
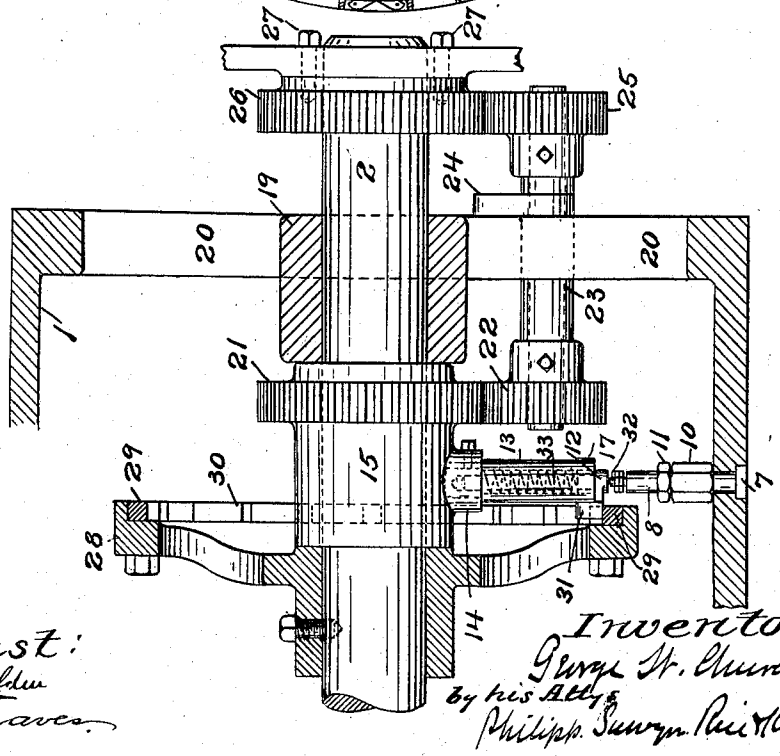


Fig. 2.



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Fig. 3.

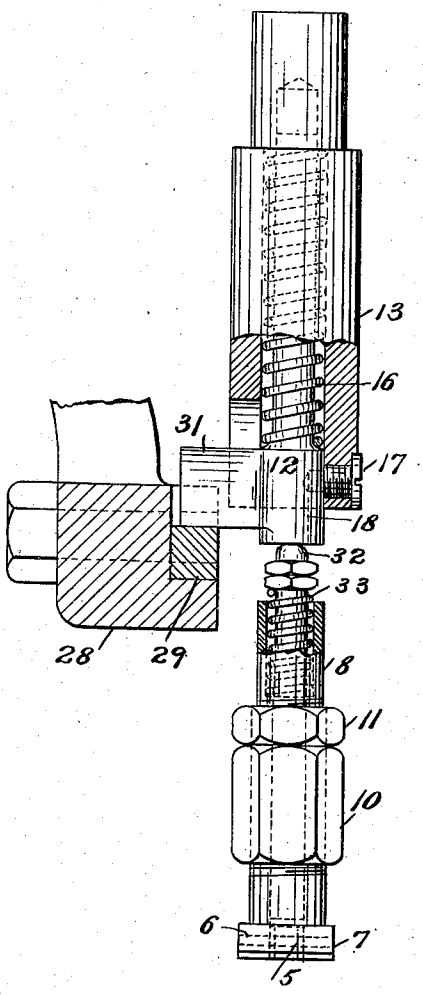


Fig. 4.

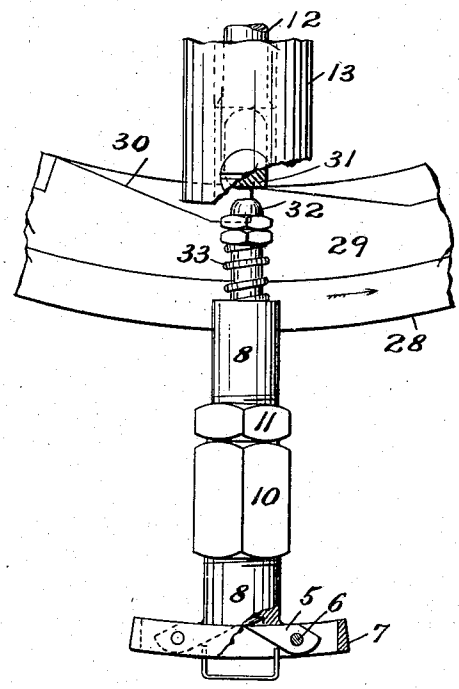
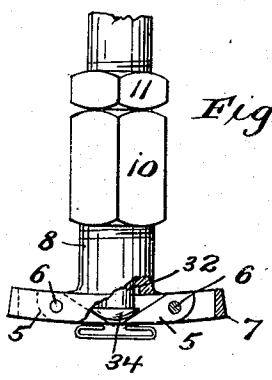


Fig. 5.



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UNITED STATES PATENT OFFICE.

GEORGE W. CHURCH, OF STAMFORD, CONNECTICUT, ASSIGNOR TO ROBERT HOE, OF NEW YORK, N. Y.

STAPLING MECHANISM.

No. 881,900. Specification of Letters Patent. Patented March 17, 1908.

Application filed April 3, 1906. Serial No. 309,577.

To all whom it may concern:

Be it known that I, GEORGE W. CHURCH, a citizen of the United States, residing at Stamford, county of Fairfield, and State of Connecticut, have invented certain new and useful Improvements in Stapling Mechanisms, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to certain improvements in stapling mechanisms and more particularly to that class of such mechanisms in which the product is stapled while in motion, or, as it is usually termed, on the run.

The general type of mechanism to which the invention relates may be said to embody a rotating carrier on which the staple forming and driving mechanism is mounted and a rotating carrier on which the staple clenching mechanism is mounted, the product to be stapled being passed between these carriers and the staples being inserted without interrupting the movement of the product. In the earlier forms of mechanism of this character, the clenching mechanism embodies a stationary member or block against which the staples were driven, and in the operation of mechanism of this class, the legs of the staple began to bend inward practically as soon as they penetrated the paper. It was found in practice that there was a liability of tearing the paper by thus clenching the staple by what may be termed a progressive bending beginning substantially as soon as the legs of the staple perforated the paper.

The present invention has for its object to produce a simple and effective construction of stapling mechanism of the class referred to in which the clenching mechanism shall be operated to clench the staple, the clenching operation not being begun until the driving operation is wholly or nearly completed, thus avoiding tearing the paper.

A further object of the invention is to produce a simple and effective mechanism for clenching staples in mechanisms of the class referred to in which the clencher shall be operated by an actuating mechanism which has a movement toward the clencher to effect the clenching operation and a movement away from said clencher.

With these and other objects in view, the invention consists in certain constructions, and in certain parts, improvements and combinations as will be hereinafter fully described and then specifically pointed out.

Referring to the drawings—Figure 1 represents in sectional elevation a carrier provided with staple clenching mechanisms of the improved type, the position of the cooperating driver carrier being also indicated in this figure. Fig. 2 is a sectional elevation of the carrier shown in Fig. 1, the plane of section being at right angles to the plane of section of Fig. 1, the view showing more particularly the means for maintaining the actuator stationary. Figs. 3, 4 and 5 are detail views illustrating the operation of the mechanism.

Referring to the drawings, 1 indicates a rotating carrier, this carrier being supported on and fixed to a shaft 2 which will be suitably mounted in bearings in the frame of the machine in which the stapling mechanism is mounted. This carrier 1 serves to support the clenching mechanism to be hereinafter described. The coöperating carrier for the staple driving mechanism is indicated at 3, the driving members being shown in dotted lines at 4. This staple forming and driving mechanism may be of any of the well-known types, and an illustration of the same is, therefore, regarded as unnecessary. As showing a form of staple forming and driving mechanism which may be employed, however, reference is made to Patent No. 510,840, dated December 12, 1893.

The staple clenching mechanism employed to carry the invention into effect may be widely varied in its details of construction, and the number of such mechanisms employed on the carrier may also be varied, in accordance with the exigencies of the work required. In the construction shown, the carrier 1 is provided with twenty clenching mechanisms, each mechanism embodying a pair of clenching members 5, one for each staple leg. In the best constructions, these members will be pivoted members. In the construction shown, these members are pivoted at 6 to a block or head 7, this head being provided with a stem 8 which passes through openings 9 drilled in the circumference of the carrier 1. The several stems are, in the construction illustrated, held in position by nuts 10 and lock nuts 11.

The construction by which the clencher, whatever be the form employed, is operated

may be varied within wide limits. In the construction illustrated, there is employed an actuator in the form of a plunger 12, this plunger being mounted in a socket 13 which is supported in a boss 14 secured to a hub 15 which is loosely supported on the shaft 2 before referred to. In the best constructions and as shown, the actuator employed will be spring operated. The spring for driving the plunger 12 is shown at 16. Suitable means, as a stop screw 17 working in a groove 18, see dotted lines in Fig. 3, in the plunger, may be employed to prevent the spring from forcing it out of the socket.

In the construction illustrated, the actuator is maintained in a stationary position with respect to the shaft and the clenching members are successively operated as they come within its range of action. The means for holding the actuator stationary with respect to the shaft 2 may be widely varied. The construction shown is adapted for use with a carrier, the circumference of which is connected to a central hub by means of spokes, the central hub being indicated at 19 and the spokes being shown at 20. The hub 15 before referred to is provided with a gear 21 which meshes with a gear 22 fast on a shaft 23, this shaft being supported in a suitable bearing 24 secured to one of the arms 20. The outer end of this shaft 23 is provided with a gear 25 which meshes with a gear 26 which surrounds the shaft 2 but which is made stationary by securing it to the frame by bolts 27, or in any other suitable manner. It will be readily understood that as the carrier rotates, the gears 20 and 22 will travel around the stationary gear 26 and the gear 21, and will operate to hold the hub 15 and the socket 13 connected therewith stationary with respect to the shaft.

The actuator will, in the best construction be operated in both directions by mechanism which may be widely varied in its character. In the particular construction illustrated, the shaft 2 is provided with a support or frame 28 in which is mounted a cam ring 29, this ring being provided with a plurality of operating faces 30. In the construction illustrated, the number of these faces correspond with the number of clenchers. Each plunger 12 is provided with a lug 31 which extends into the path of the rotating ring 29. As the ring rotates, therefore, each time a cam face passes under the lug 31, the plunger will be forced back against the stress of its spring and as the lug passes off the cam face, the plunger will be given a quick downward driving movement by its spring. In the best constructions, the cam faces will be formed as shown, that is, they will be provided with an inclined face which operates on the lug to retract the plunger, the incline joining a face which is substantially radial to the center of rotation of the ring, so as to provide for the quick movement referred to.

In the particular construction referred to, the movement of the plunger 12 is transmitted to the clencher by means of pins 32, there being one of these pins for each pair of clenching members. As shown, the stems 8 are made hollow and the pins 32 are located in them, the upper ends of the pins being surrounded by light springs 33 which tend normally to hold the pins elevated, the amount of elevation being such that the pins during the revolution of the carrier, pass just underneath and close to the bottom of the plunger 12. The lower ends of the pins are in contact with the pivoted clenchers 5 before referred to, and if desired, the lower ends may be provided with rounded heads 34, as shown.

In the operation of the mechanism as the carrier 4 rotates, the staples are inserted by the driving mechanism through the product which passes between the carriers 1 and 4. At about the time the driving of a staple is completed, a pin 32 comes into position underneath the actuator plunger 12 which at this time has been raised by an incline on the ring 29. The position of the parts just prior to the time the staple is clenched is well illustrated in Fig. 4, the position of the staple being also indicated in this figure. As the movement of the carrier continues, the lug on the plunger 12 rides off the inclined face of the cam and the spring 16 drives the plunger suddenly against the head of the pin. In the best constructions, the side of the lug will be squared so as to provide for a very quick movement of the plunger. The descent of the plunger and pin turns the clenchers on their pivots and clenches the staple, as shown in Fig. 5.

The construction is exceedingly simple and effective, and it will be noted that it enables the clenching of the staple to be delayed until the driving of the staple is practically completed, thus avoiding danger of tearing the paper which occurs where the legs of the staple are forced against a stationary bending block, thus effecting a bending which is practically progressive with the inward movement of the staple.

Changes and variations may be made in the construction shown for carrying the invention into effect. The invention is not, therefore, to be confined to the particular construction herein shown and described.

What is claimed is:—

1. In a stapling mechanism, the combination with a pair of constantly running carriers moving at the speed of the product to be stapled, of staple driving mechanism mounted on one of the carriers, a clencher mounted on the other carrier, a spring operated actuator for the clencher, and means for placing the spring under operating tension.

2. In a stapling mechanism, the combination with a pair of constantly running carriers moving at the speed of the product to be stapled, of staple driving mechanism mounted on one of the carriers, a clencher mounted on the other carrier, means including a spring driven plunger for actuating the clencher, and means for retracting the plunger against the stress of the spring.

3. In a stapling mechanism, the combination with a pair of constantly running carriers moving at the speed of the product to be stapled, of staple driving mechanism mounted on one of the carriers, a pair of clenching members mounted on the other carrier, means including a spring driven plunger for operating the members, and means for retracting the plunger against the stress of the spring.

4. In a stapling mechanism, the combination with a pair of constantly running carriers moving at the speed of the product to be stapled, of staple driving mechanism mounted on one of the carriers, a pair of pivoted clenching members mounted on the other carrier, means including a spring driven plunger for operating the members, and means for retracting the plunger against the stress of the spring.

5. In a stapling mechanism, the combination with a pair of constantly running carriers moving at the speed of the product to be stapled, of staple driving mechanism mounted on one of the carriers, a pair of clenching members mounted on the other carrier, means including a spring driven plunger for operating the members, and means including a cam for retracting the plunger against the stress of the spring.

6. In a stapling mechanism, the combination with a pair of constantly running carriers moving at the speed of the product to be stapled, of staple driving mechanism mounted on one of the carriers, a pair of pivoted clenching members mounted on the other carrier, means including a spring driven plunger for operating the members, and means including a cam for retracting the plunger against the stress of the spring.

7. In a stapling mechanism, the combination with a pair of constantly rotating carriers moving at the speed of the product to be stapled, of staple driving mechanism mounted on one of the carriers, a plurality of clenching mechanisms mounted on the other carrier, each of said mechanisms including a pair of clenching members, spring actuating means for giving the clenching members a clenching movement, and a cam ring having a plurality of operating faces coöperating with said actuating means.

8. In a stapling mechanism, the combination with a pair of rotating carriers moving at the speed of the product to be stapled, of staple driving mechanism mounted on one of the carriers, a plurality of clenching mechanisms mounted on the other carrier, each mechanism including a pair of clenching members and an operating plunger, and a spring operated actuator coöperating with the plungers to give the members a clenching movement.

9. In a stapling mechanism, the combination with a pair of rotating carriers moving at the speed of the product to be stapled, of staple driving mechanism mounted on one of the carriers, a plurality of clenching mechanisms mounted on the other carrier, each mechanism including a pair of pivoted clenching members and an operating plunger, and a spring operated actuator coöperating with the plungers to give the members a clenching movement.

10. In a stapling mechanism, the combination with a constantly rotating carrier, of staple driving mechanism mounted thereon, a second constantly rotating carrier, a shaft on which said carrier is mounted and to which it is secured, a plurality of clenching mechanisms mounted on the carrier, an actuating mechanism for the clenching mechanisms, said mechanism including an actuator supported on the shaft, and means for holding the actuator stationary with respect to the shaft.

11. In a stapling mechanism, the combination with a constantly rotating carrier, of staple driving mechanism mounted thereon, a second constantly rotating carrier, a shaft on which said carrier is mounted and to which it is secured, a plurality of clenching mechanisms mounted on the carrier, an actuating mechanism for the clenching mechanisms, said mechanism including a spring driven actuator supported on the shaft, and means for holding the actuator stationary with respect to the shaft.

12. In a stapling mechanism, the combination with a constantly rotating carrier, of staple driving mechanism mounted thereon, a second constantly rotating carrier, a shaft on which said carrier is mounted and to which it is secured, a plurality of clenching mechanisms mounted on the carrier, an actuating mechanism for the clenching mechanisms, said mechanism including a spring driven actuator supported on the shaft, means for holding the actuator stationary with respect to the shaft, and a cam mechanism for retracting the actuator against the stress of its spring.

13. In a stapling mechanism, the combination with a constantly rotating carrier, of a plurality of staple driving mechanisms mounted thereon, a second constantly rotating carrier, a shaft to which the carrier is secured and with which it moves, a plurality of staple clenching mechanisms mounted in the carrier, each of said mechanisms includ-

ing a pair of pivoted members, and an operating plunger, a spring driven actuator plunger supported on the shaft, means for holding this actuator plunger stationary with respect to the shaft, and means for causing the actuator plunger to operate the operating plungers.

In testimony whereof, I have hereunto set my hand, in the presence of two subscribing witnesses.

GEORGE W. CHURCH.

Witnesses:
F. W. H. CRANE,
LOUIS ROEHM.