

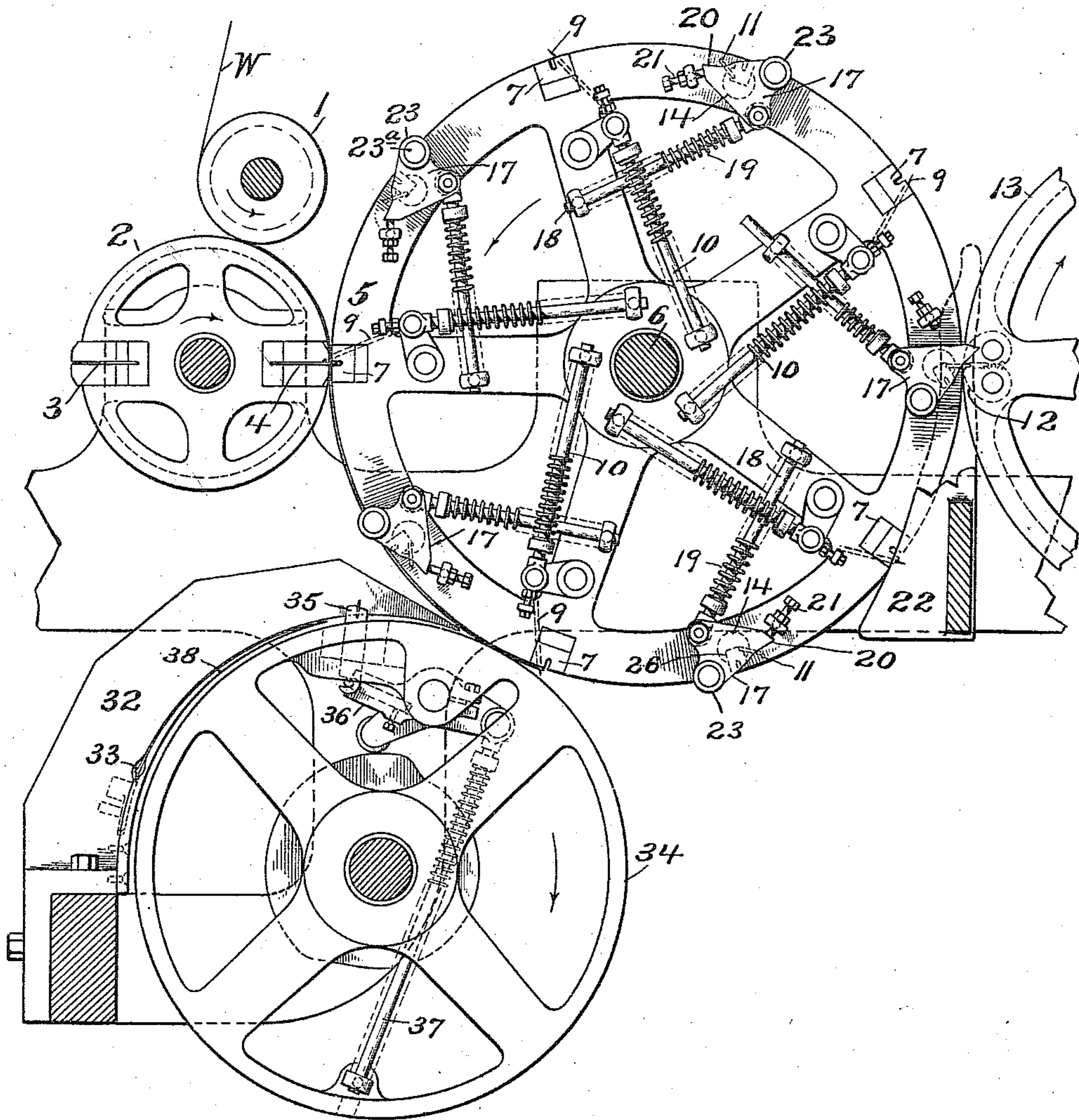
E. P. SHELDON.
STAPLING MECHANISM.
APPLICATION FILED APR. 3, 1906.

985,461.

Patented Feb. 28, 1911.

2 SHEETS—SHEET 1.

Fig. 1.



Attest:
P. N. Tilden
J. A. Graves

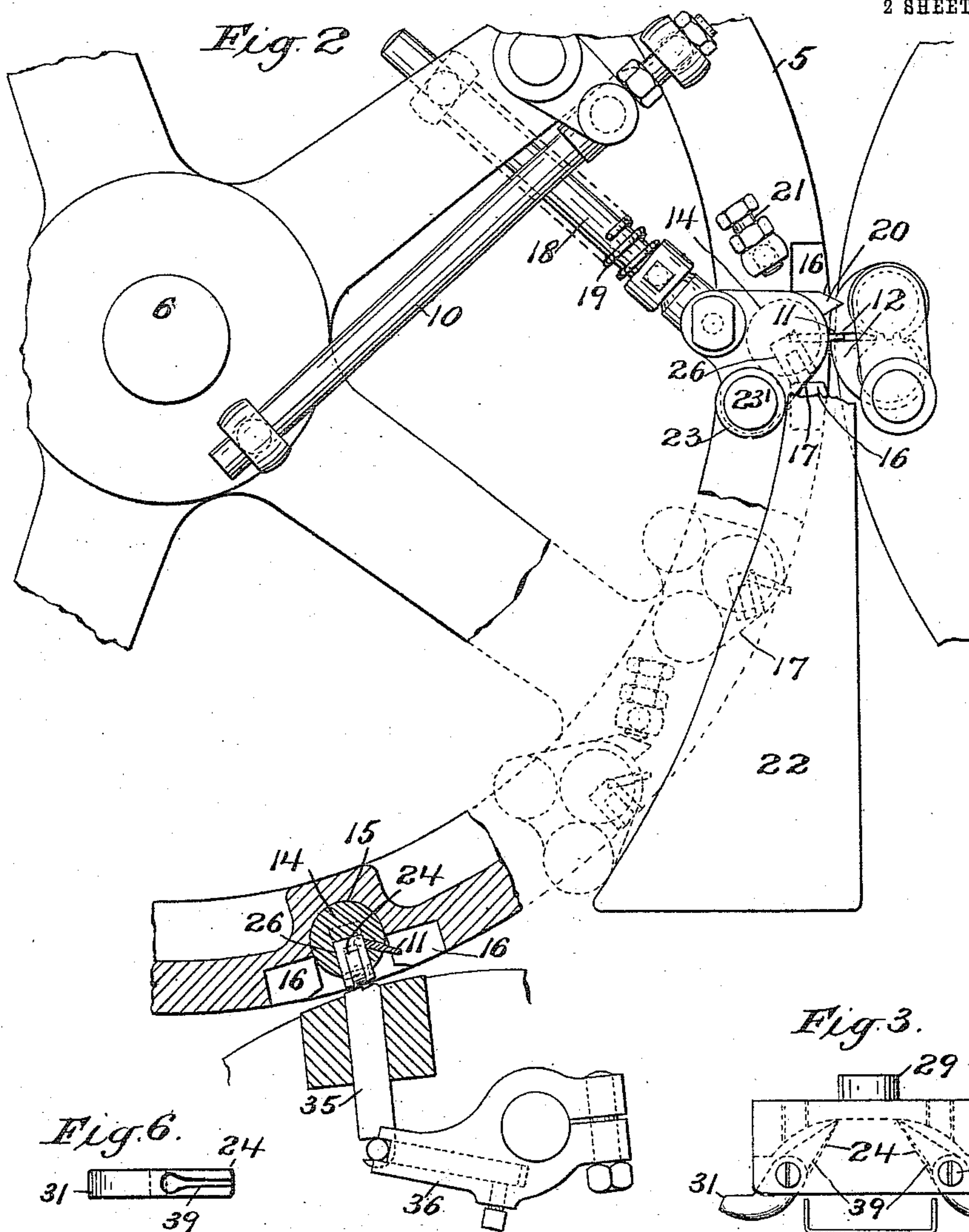
Inventor:
Edmund P. Sheldon
by his Attys
Philip P. Sawyer, Rea & Kennedy

E. P. SHELDON.
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2 SHEETS—SHEET 2.



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R. N. Tilden.
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UNITED STATES PATENT OFFICE.

EDWARD P. SHELDON, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO
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STAPLING MECHANISM.

985,461.

Specification of Letters Patent.

Patented Feb. 28, 1911.

Application filed April 3, 1906. Serial No. 309,627.

To all whom it may concern:

Be it known that I, EDWARD P. SHELDON, a citizen of the United States, residing at New York, county of Kings, and State of New York, 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.

10 This invention relates to certain improvements in stapling mechanisms, and more particularly, to that class of such mechanism in which staples are inserted in products, such as sheets or webs, while the same are in

15 motion, or what is usually termed, "on the run". In stapling the products, the staples are applied on a line on which the products are subsequently folded, the webs or sheets, as the case may be, being caused to pass be-

20 tween the elements of a staple driving mechanism, which, as usually constructed, includes a carrier on which the staple driver is mounted, and a carrier on which the anvil or

25 clenching member of the mechanism is mounted, these carriers moving at the speed of the moving product. These carriers have usually been cylinders, and the staple driver has been given a movement toward and from the axis of its cylinder carrier to insert the staples.

30 The anvil or clenching member has, however, been stationary with respect to its carrier. This form of construction has certain disadvantages, particularly where a fold is to be

35 formed by a member, such as a blade, which is carried on one of the carriers. It has been usual, in such cases, to mount the blade and the clenching member of the stapling mechanism on the same carrier. Inasmuch, how-

40 ever, as the fold has to be made on the same line in which the staples are inserted, it is necessary, where the blade is movable, to cut it away so as to enable it to pass the stationary clenching member, so that the entire

45 length of the blade cannot be utilized in making the fold. Where, furthermore, the blade is stationary, as for instance the ordinary tucking blade which coöperates with nipping jaws, it has also been necessary to cut it away. The sections of the blade not

50 cut away, however, protrude a certain distance from the circumference of the cylinder, whereas the stapling anvil is flush with the circumference. This makes it necessary to bend down the paper into the gap or

gaps between the sections of the blade in 55 which the stapling anvils lie, making it difficult to properly insert the staples, particularly where a number of plies are to be stapled together and overlie the sections of the blade. Furthermore, it has proven very 60 advantageous in practice to use a construction of tucking blade and nipping jaws in which the jaws and blade each lie inside the pitch line of the carrier for the other at the time when the folding operation takes place. 65 When this construction of jaws and blades is employed, it is necessary also to cut the nipping jaws away opposite the points occupied by the stapling anvils, which, of course, decreases the length of the operative 70 face of the jaws and, therefore, decreases their capacity for forming a good fold where a number of plies of heavy paper is to be folded. In stapling mechanisms as heretofore constructed, furthermore, the clenching 75 member has been made stationary not only with respect to its carrier but during the clenching operation, the configuration of the clenching member being such that the legs of the staple are caused to bend inward as 80 they penetrate the paper. When, however, the legs of the staple are caused to move inward as soon as they pass through the plies of paper, there is a tendency to tear the paper. Further, the clenching anvils, as 85 heretofore constructed, have been provided with grooves in which the legs of the staples are guided, these grooves being located outside the points where the legs of the staple were expected to strike the anvil. If, how- 90 ever, the staple was not truly driven, the legs would not strike these guiding grooves and consequently, the clench given the legs of the staples would not be such as to cause them to lie in the same plane with the back of the 95 staple, that is, truly in the line of fold which was afterward given the product.

It is one of the objects of this invention to produce a stapling mechanism in which one of the elements is movable into and out of 100 position with respect to the stapling line, thereby rendering it possible to employ the mechanism in connection with other agencies, which subsequently act on the paper without interference. 105

A further object of the invention is to produce a stapling mechanism, one of the elements of which is mounted on a carrier

provided with a folding blade, the element and the blade being capacitated to be moved successively into the folding line, so that they do not interfere with each other during the folding operation.

A further object of the invention is to produce a stapling mechanism capacitated for use with webs or sheets which are to be stapled on the run in which the clenching element of the stapling mechanism shall be given a movement to clench the staple after the staple is driven, thus avoiding the tearing of the paper which is apt to occur when the inserting and clenching operations are substantially simultaneous.

A further object of the invention is to produce an improved stapling mechanism in which means shall be provided for accurately guiding the legs of the staples into position during the clenching operation.

A further object of the invention is to improve the details of construction of stapling mechanism, so as to make them simple in construction and effective in operation.

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

Referring to the drawings—Figure 1 is a side elevation, partly in section, of a folding and stapling mechanism embodying the invention. Fig. 2 is an enlarged detail view, with certain parts in section, illustrating certain features of the construction shown in Fig. 1. Fig. 3 is a detail view of the clenching member of the stapling mechanism. Fig. 4 is a sectional detail view illustrating the clenching member of the stapling mechanism and its support, the parts of the clenching member being shown in a different position from that illustrated in Fig. 3. Fig. 5 is an enlarged sectional view of the clenching member, the tucking blade employed, and the support in which they are mounted. Fig. 6 is a front view of one of the clenching members.

The mechanism which has been selected for the purpose of illustrating the invention is a collecting delivery for a web press, the web being indicated at W and passing between a guiding roller 1 and a cutting cylinder 2, this cylinder being provided with knives 3, 4. Coöperating with this cutting cylinder 2 is a collecting and delivery cylinder 5 mounted on a shaft 6, this cylinder being provided with the usual cutting woods 7. The sheets are taken by pins 9 operated by the usual spring rod construction, the rods being illustrated at 10. The operating mechanism for these rods is omitted in the interest of brevity, these features of construction having no bearing on the invention. The cylinder 5 is operated, in the par-

ticular construction, to collect four cuts, after which the sheets are folded off.

The folding mechanism with which the invention is employed may be varied widely in its details of construction. In the particular construction illustrated, the folding mechanism is of the tucking blade and nipping jaw type, the cylinder 5 being provided with five tucking blades 11, these blades co-operating with a pair of nipping jaws 12 mounted on a jaw carrying cylinder 13. While the particular construction of tucking blades and jaws may be varied, in the best constructions, they will be of the type illustrated in Patent No. 806,094, granted Dec. 5, 1905, to Robert Hoe, as the assignee of J. C. F. Balze; that is to say, the blades and jaws will be so arranged that during the folding operation the blades and jaws each lie within the pitch line of the carrier of the other.

In folding mechanisms of the particular type referred to, viz., those employing tucking blades and nipping jaws, the blades have been heretofore made stationary upon the cylinder. This made it necessary, when stapling mechanism was to be employed with folding mechanism of this type and one of the stapling members was to be mounted in the same carrier with the tucking blade or blades, to cut away both the blades and jaws so as to leave spaces in which the clenching members or anvils of the stapling mechanisms could be located, which, of course, reduces the operating surfaces of both the blades and jaws. In accordance with the present invention, the tucking blades, instead of being stationary as heretofore, are made movable into and out of position with respect to the stapling line and the stapling member which was mounted on the same carrier with the tucking blades, is also made movable toward and away from the stapling line. The construction by which the stapling member and the tucking blade are mounted so as to be movable, as described, may be varied within wide limits. In the particular construction shown, they are mounted on a support which is given the proper movements to successively bring the blade and stapling mechanism into operative position with respect to the stapling line. In the best constructions and as shown, the support consists of a shaft 14, there being, of course, one of these shafts for each blade 11. In the particular construction illustrated, the circumference of the carrier 5 is provided with a series of recesses 15 in which the shafts are located, the shafts being held in position by caps 16, or in any other suitable manner. These shafts may be operated by any suitable construction. As shown, each of the shafts is provided with a head 17 to which is connected a spring rod 18, these rods being surrounded

by springs 19. The tendency of these springs is, in the particular construction shown, to rock the shafts 14 and hold them in such position that the tucking blades will be out of operative position with respect to the folding line, the heads 17 being provided with stops 20 which coöperate with adjustable screw stops 21 on the carrier 5, these stops limiting the movement of the shafts produced by the springs. The shafts may be given their movements, in opposition to the movements produced by the springs, by means of a stationary cam 22 suitably mounted in the frame, this cam co-operating with cam rolls 23 mounted on studs 23' on the heads. As the carrier 5 rotates and the cam rolls successively strike the cam plate 22, the shafts 14 will be rocked to bring the blades from the position shown in dotted lines in Fig. 2 to the position shown in full lines. Owing to the character of the collecting mechanism, however, the folding operation will not occur except when a blade 11 comes into register with the jaws 12 which, in the particular construction shown, will be after four cuts have been taken by any one of the sets of pins on the carrier 5.

In order to provide for a proper clearance for the nipping jaws 12, the supporting shaft 14 may, if desired, be cut away as indicated at 11^a, in Figs. 4 and 5.

In the particular construction illustrated, as has been indicated, one of the members of the stapling mechanism is mounted in a carrier 5 and this member is made movable with respect to the folding and stapling line, it being understood, of course, that the folding takes place on the line on which the staples are driven. While this stapling member may be mounted in any desired way so as to be made movable, an exceedingly simple and effective construction is that illustrated, in which the stapling members are mounted in the same supports with the blades 11, namely, the shafts 14. In the particular construction illustrated, the members of the stapling mechanism which are mounted in the carrier 5 are the clenching members or anvils. While the construction of these clenching members may be widely varied, in the best constructions and as shown, they will be of such a character as to be movable with respect to the carrier 5 or the support in which they are mounted so as to effect the clenching of the staple. In prior constructions, the clenching member or anvil was made stationary with respect to the carrier during the stapling operation, the legs of the staple striking the anvil as soon as they penetrate the paper and being progressively bent into their clenched position, as the staples are passing through the paper. By making the clenching members movable, in the manner described, the clenching operation may be delayed until the

staple is nearly or quite driven home, so that the danger of tearing the paper by a progressive bending is avoided.

The particular construction of the anvil or clenching member by which it is made movable in the manner indicated, may be widely varied. As shown, each clenching member or anvil consists of a pair of clenchers 24, these clenchers being pivoted by means of screws 25 in blocks 26, these blocks, as shown, being located in recesses 27 in the shaft 14 and being held therein in any suitable manner, as by screws 28. If desired, each of these blocks 26 may be provided with a dowel 29 engaging a recess 30 in the floor of the recess 27. While the movement of these clenchers to clench the staples may be variously effected, can be effectively and advantageously accomplished by means extraneous to the carrier 5. In the particular construction illustrated, each of these stapling members 24 is provided with an extension 31 which normally projects beyond the face of the carrier, these projections being operated upon at the proper time to rock the clenchers and thus effect the clenching of the staple.

The staples may be formed and driven by any suitable mechanism. As illustrated, a stapling horn 32 is provided, a length of wire being fed through a groove 33 in this horn and transversely thereto, this construction being well-known in the art. The staple driving mechanism is mounted on a rotating carrier 34 and embodies a plunger or driver 35, this plunger being connected to a rock arm 36 held in position by a spring rod 37. The length of wire inserted in the groove 33 is held in position by a spring finger 38 and as the carrier 34 rotates, the length of wire is caught by the plunger 35 and swept around under the horn, this operation bending the wire length up into a staple. This construction of staple forming mechanism is well-understood and is specifically illustrated in Patent No. 510,840, granted December 12, 1893, to which reference may be had for a fuller disclosure of the particular mechanism employed. The driving of the staple is effected by a suitable cam not shown. The construction may, however, be similar to that illustrated in Patent 602,896, granted April 26, 1898.

It will be observed that the carrier 34 is of the proper diameter, so that the staple driving mechanism comes into position to form and drive the staple once for every four cuts taken by the pins on the carrier. The staple driving plunger begins its staple inserting movement practically as soon as the staple passes off the end of the horn 32, and when the insertion of the staple is nearly or quite completed, the extensions 31 of the clenchers 24 before referred to are struck by the surface of the carrier 34 and

forced inward. This, of course, causes the clenchers to rock on their pivot and clenches the staple legs.

In prior constructions, the clenching anvils were provided with guiding grooves which were, however, only slightly greater than the diameter of the wire, the purpose of these grooves being to receive the ends of the legs of the staple as they pass through the paper and guide them properly into their clenched position. It has been found in practice that the staple legs are apt to be deflected from their proper line in passing through the paper and they do not, therefore, always strike the grooves before referred to. In the best constructions, therefore, the clenching members will be provided with guiding grooves or recesses arranged as shown in Fig. 6, that is, the upper parts of the grooves will be enlarged somewhat, the enlarged portion tapering down to a channel 39, which is about the width of the wire. With this construction, a deflected wire leg will be guided down into the bottom of the guiding groove and be directed by it into proper clenching position.

Changes and variations may be made in the particular mechanism shown by which the invention is carried into effect. The invention is not, therefore, to be limited to the specific construction herein shown and described.

What is claimed is:—

1. The combination with a moving carrier, of a stapling mechanism, one member of which is mounted on the carrier, a cooperating stapling member, means for giving the member on the carrier a movement into and out of position with respect to the stapling line, and means for effecting the stapling operation.

2. The combination with a moving carrier, of an anvil mounted therein, a staple driver, means for giving the anvil a movement into and out of operative position with respect to the stapling line, and means for effecting the stapling operation.

3. The combination with a sheet carrier, of a stapling mechanism, one member of which is mounted on said carrier, a cooperating stapling member, means for moving the member on the carrier into and out of operative position with respect to the stapling line, means for effecting the stapling operation, and means for effecting a fold on the stapling line.

4. The combination with a sheet carrier, of a stapling anvil mounted therein, a cooperating staple driver, a carrier for said driver, means for moving the anvil into and out of operative position with respect to the stapling line, means for effecting the stapling operation, and means for folding the stapled product on the stapling line.

5. The combination with a carrier, of a

folding blade mounted therein, a stapling mechanism, one member of which is mounted on the carrier, means for moving said stapling member into and out of operative position with respect to the line of fold to be made by the blade, and means for thereafter effecting the folding operation.

6. The combination with a carrier, of a folding blade mounted therein, a stapling anvil, mounted on the carrier, a staple driver, means for moving the anvil into and out of position with respect to the line of fold to be made by the blade, and means for thereafter effecting the folding operation.

7. The combination with a sheet carrier, of a folding blade stationary with respect to the carrier at the time the fold is made, cooperating folding devices, a stapling mechanism one member of which is mounted on the carrier, and means for causing said member and blade to successively come into operative position with respect to the folding and stapling line.

8. The combination with a sheet carrier, of a folding blade stationary with respect to the carrier at the time the fold is made, cooperating folding devices, a stapling anvil mounted in the carrier, a cooperating staple driver, and means for causing the anvil and the blade to successively come into operative position with respect to the folding and stapling line.

9. The combination with a rotating sheet carrier, of a pair of stapling members, one of which is mounted on the sheet carrier, a rotating carrier on which the other member is mounted, means for moving the member on the carrier into and out of operative position with respect to the stapling line, and means for effecting the stapling operation.

10. The combination with a rotating sheet carrier, of a folding blade mounted therein, a pair of stapling members, one of which is mounted on the sheet carrier, a rotating carrier on which the other member is mounted, means for moving the stapling member on the sheet carrier into and out of position with respect to the folding and stapling line, and means for effecting the folding and stapling operations.

11. The combination with a rotating sheet carrier, of a folding blade stationary with respect to the carrier during the folding operation, a stapling mechanism, one member of which is mounted on the sheet carrier, a rotating carrier for the other member, cooperating folding devices, and means for causing the blade and stapling member on the sheet carrier to successively occupy operative positions with respect to the folding and stapling line.

12. The combination with a sheet carrier, of a support mounted therein, a stapling member carried thereby, a cooperating stapling member, and means for moving the

support to move the stapling member into and out of operative position.

13. The combination with a sheet carrier, of a support, stapling and folding means carried thereby, cooperating stapling and folding devices, and means for operating the support to successively position the stapling and folding members with respect to the stapling and folding line.

14. The combination with a rotary sheet carrier, of a rotary support, stapling and folding means carried thereby, cooperating stapling and folding devices, and means for operating the support to successively position the stapling and folding members with respect to the stapling and folding line.

15. The combination with a rotary sheet carrier, of a rotary support mounted therein, a stapling anvil and tucking blade carried by the support, a staple driving mechanism, a pair of nipping jaws with which the blade cooperates, and means for rotating the support to present the anvil to the staple driving mechanism and the tucking blade to the nipping jaws.

16. The combination with a pair of rotating cylinders between which the product to be stapled is fed, of a staple driving member mounted on one of the cylinders, a clenching device mounted on the outer cylinder, and means for giving the clenching device a movement with respect to the cylinder after the staple is driven to clench it.

17. The combination with a carrier, of a staple driving member moving with the carrier, a second carrier, a pair of clenching members mounted in the carrier, and means projecting from the face of the clenching member carrier for giving said devices a clenching movement.

18. The combination with a carrier, of a staple driver mounted thereon, a second carrier, a pair of staple clencher pivoted in

the carrier, and means projecting from the face of the clencher carrier for turning said members on their pivots to clench the staple.

19. The combination with a rotating carrier, of a staple driver mounted therein, a second rotating carrier, a staple clenching device mounted therein, and means connected with said device and projecting beyond the circumference of the clenching device carrier for giving said device a movement to clench the staple.

20. The combination with a rotary carrier, of a staple clenching device mounted therein, a second rotating carrier, a pair of pivoted staple clencher mounted in the carrier, and means projecting beyond the circumference of the clencher carrier for turning the clencher on their pivots to effect a clenching movement.

21. The combination with a rotary carrier, of a staple driver mounted therein, a second rotating carrier, a clenching device mounted in this carrier, and means operated by the first carrier for giving said device a clenching movement.

22. The combination with a rotary carrier, of a staple driver mounted therein, a second rotary carrier, a pair of pivoted clencher mounted in said second carrier, said clencher having projections extending beyond the circumference of the carrier and adapted to be struck by the staple driving carrier to turn said clenching devices on their pivots to effect the clenching movement.

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

EDWARD P. SHELDON.

Witnesses:

F. W. H. CRANE,
LOUIS ROEHM.