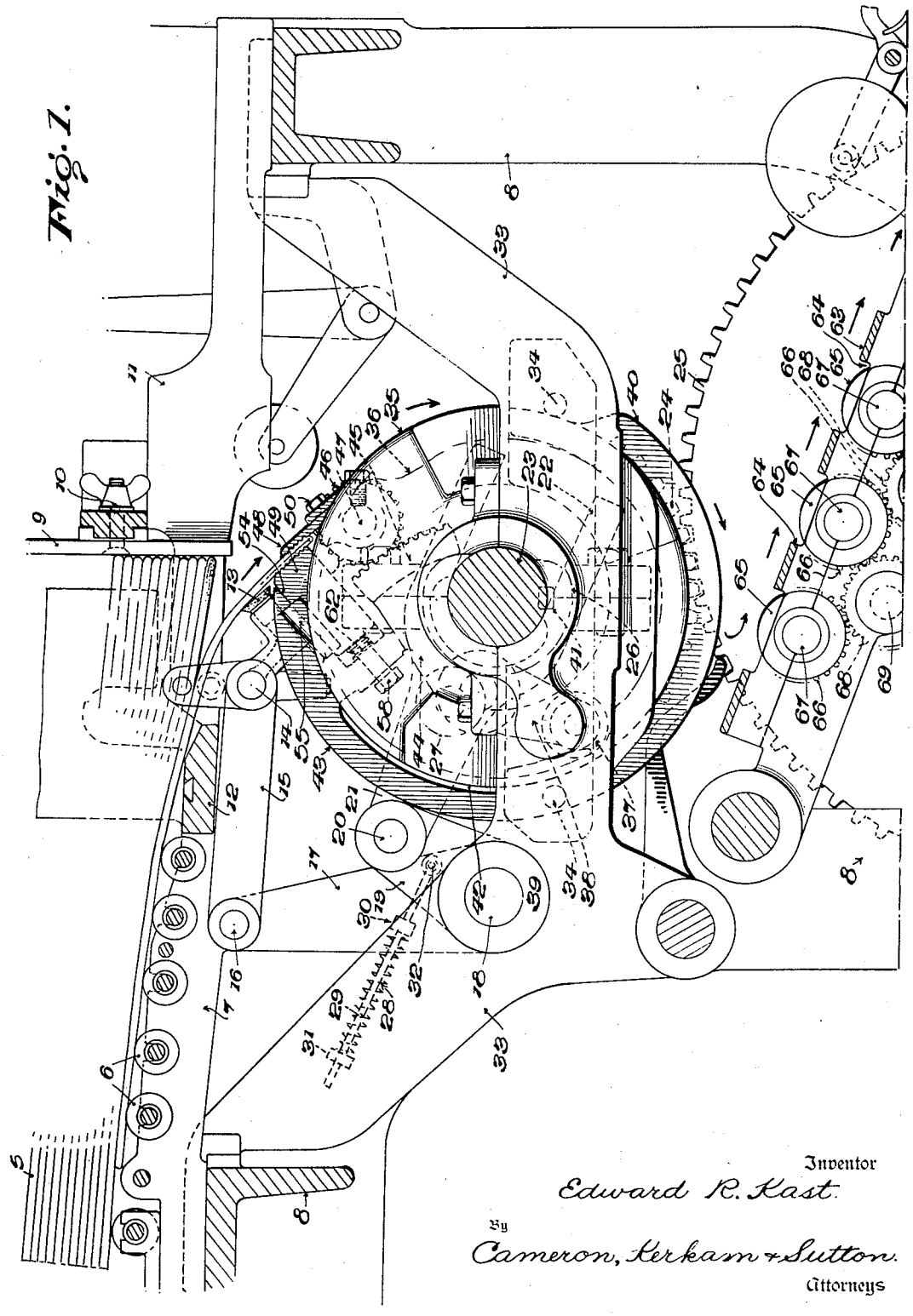
Feb. 20, 1934. E. R. KAST 1,948,038

SHEET OR SIGNATURE SEPARATING AND FEEDING MECHANISMS

Filed Aug. 5, 1929 2 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

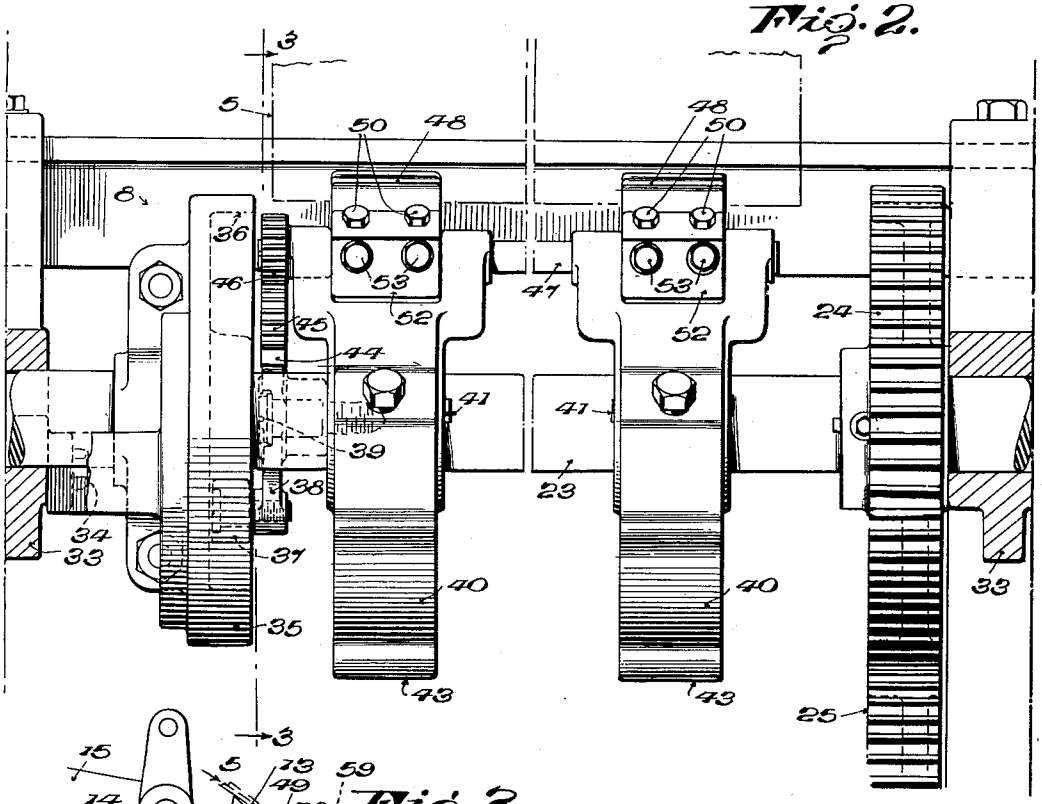


Fig. 3.

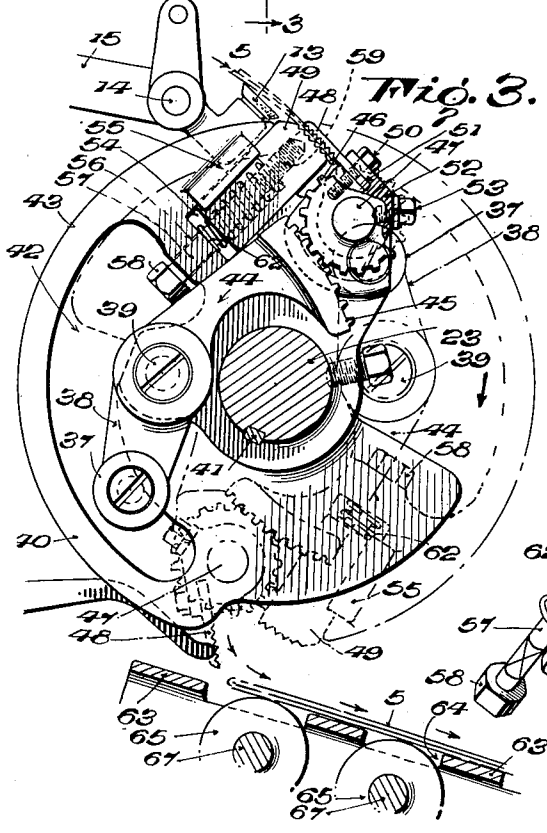
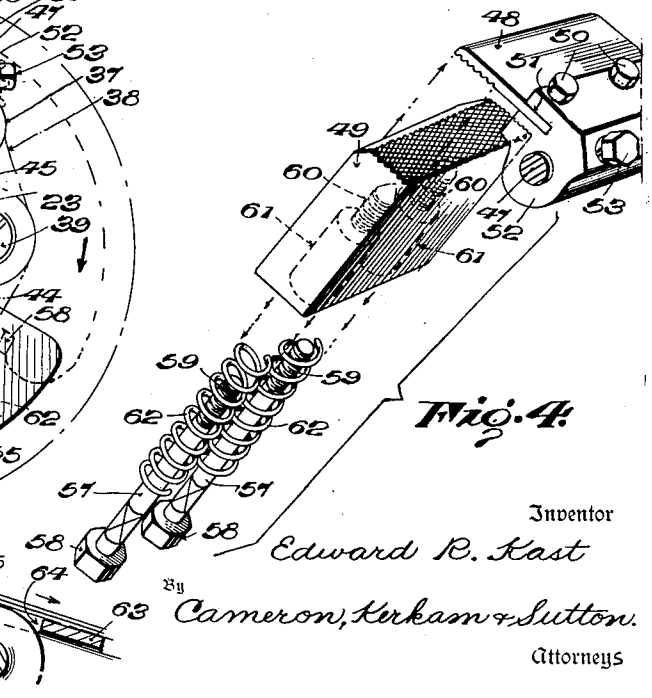


Fig. 4.



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UNITED STATES PATENT OFFICE

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SHEET OR SIGNATURE SEPARATING AND FEEDING MECHANISMS

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Application August 5, 1929. Serial No. 383,577

8 Claims. (Cl. 101—409)

This invention relates to sheet separating and feeding mechanism, and while capable of general use, is particularly adapted for separating and feeding signatures to a machine for assembling and stitching them together.

The principal object of the invention is to provide a feeding device that does not require any adjustment of the grippers, regardless of the thickness of the signature being fed, and whether the signature is one of four pages or as high as fifty-four pages.

Another object of the invention is to provide mechanism of this character with improved feeding means wherein the sheet or signature is yieldably gripped to avoid damage to the same.

Another object of the invention is to provide mechanism of this character with improved feeding means whereby the sheet or signature may be readily seized without shock to relatively movable parts that grip the sheet or signature.

Another object of the invention is to provide mechanism of this character with improved feeding means of the gripper type and embodying a yieldable block or anvil against which the gripper clamps the sheet or signature while feeding it from the separating device.

Another object of the invention is to provide improved sheet or signature feeding mechanism having a relatively small number of parts compactly arranged and operating in a highly efficient manner to grip, feed, and release the sheets or signature successively for delivery to a signature assembling and stitching machine or other instrumentality to be fed.

These and other objects of the invention will appear as the following description thereof proceeds, and in order to more clearly understand said invention, reference may be had to the accompanying drawings which illustrate one embodiment of the inventive idea.

In said drawings—

Fig. 1 is a side elevation, partly in section, of a machine equipped with sheet or signature separating and feeding mechanism embodying the present invention;

Fig. 2 is a fragmentary front elevation, with parts omitted, of the mechanism shown in Fig. 1;

Fig. 3 is a transverse vertical sectional view on the line 3—3 of Fig. 2; and

Fig. 4 is an enlarged detail perspective view of parts of the feeding mechanism shown separated for purposes of clearer illustration.

Referring to the drawings, wherein like reference characters designate like parts throughout the several views, the sheets or signatures 5 are stacked one above the other in a box, the bottom of which is formed by a series of rollers 6 that are journaled in suitable bearings on brackets one of which is indicated at 7. These brackets are bolted or otherwise suitably secured to the framework 8 of the machine at the top thereof, and the front of said box is formed by a plurality of vertical stops one of which is indicated at 9. These stops are bolted or otherwise suitably secured at 10 on a bracket 11 attached to the top of the framework 8 by any suitable fastening means.

Extending across the bottom of the box in spaced relation with the front thereof, is a cross bar 12 and mounted between said cross bar and the front stops 9 of the box, is a suction separator 13 that is connected with any suitable source of suction controlled by devices (not shown) for making and breaking the suction in said separator at predetermined intervals. The separator 13 is fixed on a rockshaft 14 journaled in suitable bearings on the machine framework, said rockshaft also having fixed thereon an arm 15 that is pivotally connected at 16 with an arm 17. The arm 17 is fixed on a rockshaft 18 journaled in suitable bearings on the machine framework, the shaft 18 also having fixed thereon an arm 19 that is pivotally connected at 20 with one extremity of a link 21. The opposite extremity of said link is provided with a fork 22 that is engaged over a shaft 23 which extends longitudinally of the machine and is journaled in suitable bearings on the framework thereof.

This shaft 23 has fixed thereon, a gear 24 which meshes with a gear 25 that is fixed on a shaft (not shown) driven from any suitable source of power. The gear 25 thus acts through the gear 24 to drive the shaft 23 on which is fixed a cam 26. The cam 26 engages a roller 27 that is journaled on the link 21. Continuous engagement of the cam 26 with the roller 27 is effected by a spring 28 which is mounted on a rod 29 between a collar 30 thereon and an eyelet 31 secured to the framework of the machine. One end of the rod 29 is pivotally connected at 32 with the arm 19, and the opposite end of said rod extends freely through, and is guided by, the eyelet 31.

It will appear from the foregoing that the suction separator 13, through the described connections therefor with the cam 26, is moved up and down by the latter to separate the bottom signature of the stack from those above it. As each signature is thus separated from the stack, it is gripped and fed therefrom for delivery to a sig-

nature assembling and stitching machine or other instrumentality to be fed. The signature gripping and feeding mechanism is preferably operated and constructed as follows.

Disposed below each end of the signature holding box and in substantially vertical alinement therewith, is a hanger 33 that extends transversely of the machine and is bolted or otherwise suitably secured to the machine framework at the top thereof. Rigidly secured at 34, 34 to the hanger 33, is a closed cam 35, in the groove 36 of which is engaged a roller 37. This roller 37 is journaled on the free end of an arm 38 that is fixed on a rockshaft 39. The rockshaft 39, in turn, is journaled in suitable bearings on curved segmental sheet and gripper supports 40 that are keyed at 41 to the shaft 23 and rotate therewith (Figs. 1 and 3). These sheet and gripper supports are of irregular formation and hollowed out, as at 42, to reduce their weight. The sheet and gripper supports 40 preferably have substantially semi-circular sheet supporting surfaces 43 on which the sheets or signatures rest while gripped and transferred by devices to be presently described.

Each of the support 40 carries a set of grippers and the sets of grippers on the several supports being constructed exactly alike, it is only necessary to describe one set of the same. Fixed on the rockshaft 39 is an arm 44 that is provided on the free end thereof with an arcuate-shaped rack 45. This rack 45 meshes with a segmental gear 46 that is fixed on a rockshaft 47 journaled in suitable bearings on the sheet and gripper supports 40. Each set of grippers comprises a movable and preferably serrated jaw 48 and a yieldably mounted and preferably serrated jaw or anvil 49 with which said movable jaw cooperates to grip the sheet or signature therebetween regardless of its thickness. The movable jaw 48 is retained by machine screws 50 in the slot 51 of a holder 52 that is fixed on the rockshaft 47 by machine screws 53. The yieldable jaw or anvil 49 is mounted in an inclined pocket 54 (Fig. 3) formed at one end of the corresponding segmental support 40, said pocket being provided at each side thereof with a guide 55 slidably engaging the yieldable jaw or anvil 49 and preventing displacement of the same laterally from the pocket 54.

Slidably mounted in suitable openings 56 formed in the bottom of the pocket 54, are bolts 57, the heads 58 of which extend into the openings 442 of the corresponding support 40. The threaded ends 59 of said bolts have threaded engagement with the walls of suitable openings 60 formed in the jaw or anvil 49 and extending from enlarged spring housings 61 through which the bolts 57 pass in spaced relation with the walls thereof. These housings 61 open into the pocket 54, and mounted on the bolts 57 between the bottom of said pocket and the opposite ends of the housings 61, are coil springs 62.

The gripping face of each yieldable jaw or anvil 49 is inclined inwardly from the curved sheet supporting surface of its corresponding support 40 so that said gripping face is disposed in a plane which intersects the circle of revolution of said surface indicated in full and dot and dash lines, Fig. 3 of the drawings. It will also appear, from Fig. 3 of the drawings, that each jaw or gripper 48 moves toward and away from the corresponding jaw or anvil 49, within the circle of revolution of the curved sheet supporting surface 43. This construction and arrangement enables the gripper to be mounted close to the stack of sheets or signatures and the separating means, and enables the separating means to turn the edge of the lowermost sheet or signature between the open grippers 48, 49 so that when said grippers are closed they withdraw said sheet or signature from said stack.

When the separator 13 engages the bottom signature of the stack and is lowered to separate the forward edge of said signature therefrom, the signature gripping means just described rotates in the direction of the arrow (Fig. 3), the movable jaws 48 are opened by the cam 35, and the forward edge of the signature is turned between the jaws 48, 49 by the separator 13. At the instant said jaws receive the forward edge of the signature, suction in the separator 13 is broken, and the jaws 48 are closed by the cam 35, thereby clamping the signature against the yieldably mounted jaws or anvils 49. In the continued rotation of the gripping mechanism, the signature is separated from the bottom of the stack and rests on the curved surfaces 43 of the support 40. After the grippers have rotated through approximately one-half of a revolution, they are opened, as indicated in dotted lines in Fig. 3, by the cam 35. The released signature is then deposited on a table 63 that is supported on the framework 8 of the machine in an inclined position as clearly shown in Fig. 1. This table is provided at intervals therealong with openings 64 through which project rollers 65 that are journaled in suitable bearings on the framework of the machine. The rollers are driven by suitable means including gears 66 fixed on the shaft 67 of the rollers and meshing with gears 68 that are fixed on shafts 69 journaled in suitable bearings on the framework 8 of the machine. The signature deposited on the table 63 is thus fed down the same by the rollers 65 to the signature assembling and stitching machine or other instrumentality to be fed.

After the grippers 48 release the sheet or signature and the same is deposited on the table 63, said grippers remain open until they travel to the separator 13 which, in the meantime, has been raised to engage another signature at the bottom of the stack, and lowered to separate the forward edge of said signature from those above the same and turn said edge between the grippers 48, 49. At this time, the jaws or grippers 48 are closed by the cam 35 to engage the last named signature and clamp it on the yieldable jaws or anvils 49. The clamped sheet or signature is then carried around, as before described, to the point where the grippers 48 are opened by the cam 35 and the signature is released and deposited on the table 63. The described operations of the separator 13 and the jaws or grippers are repeated so that during the operation of the machine, the sheets or signatures are successively separated and fed from the stack in the signature box onto the delivery table 63. The rollers 65 of said table act, as before described, to feed the sheets or signatures successively to the signature assembling and stitching machine or other instrumentality to be fed.

It will appear from the foregoing, that the grippers require no adjustment, regardless of the thickness of the signature being fed, and that the sheet or signature feeding mechanism embodying the present invention avoids the possibility of damage to the machine. Moreover, the mounting of the yieldable jaws or anvils not only enables said jaws or anvils and the grippers to accommodate sheets or signatures of

various thicknesses, but at the same time insures a positive gripping or clamping of the sheets or signatures without danger of damage to or mutilation of the same.

While one embodiment of the inventive idea has been disclosed herein with more or less particularity, it is to be expressly understood that the invention is not limited to such embodiment, or otherwise than by the terms of the appended claims.

What is claimed is:

1. In mechanism of the character described, a driven shaft, an element fixed on said shaft to rotate therewith, a jaw or anvil yieldably mounted in inclined position in said element and having a gripping face inclined inwardly from and disposed wholly within its circumferential circle of revolution, a gripper mounted on the element for movement within said circle toward and away from said jaw or anvil, and means for operating said gripper during its rotation with the shaft and the element fixed thereon.

2. In mechanism of the character described, a rotatable gripper support provided with an inclined pocket, a yieldable jaw or anvil mounted in said pocket and having a gripping face inclined inwardly from the circumferential circle of revolution of said support, a gripper journaled on the support for swinging movement within said circle toward and away from the inclined gripping face of said jaw or anvil, means for rotating the gripper support and the parts carried thereby, and means for swinging said gripper in opposite directions during rotation of the same with the gripper support.

3. In mechanism of the character described, a rotary gripper support, a serrated jaw or anvil having a gripping face inclined inwardly from the circumferential circle of revolution of the rotary gripper support, said jaw or anvil being yieldably and slidably mounted in inclined position in said gripper support to rotate therewith, a gripper mounted on the gripper support for movement within said circle toward and away from the gripping face of the jaw or anvil, and means for operating said gripper during its rotation with said support.

4. In mechanism of the character described, a rotatable gripper support, a jaw or anvil yieldably mounted in inclined position within the gripper support and having an inclined gripping face disposed wholly within the circumferential circle of revolution of said support, a gripper mounted on the support for movement within said circle toward and away from the jaw or anvil, said jaw or anvil and the gripper being adapted to grip sheets or signatures varying in thickness without having to adjust said elements, means for rotating the gripper support and parts carried thereby, and means for operating said gripper during its rotation with said gripper support.

5. In mechanism of the character described, a rotating gripper support provided exteriorly with a curved sheet supporting surface, a jaw or anvil yieldably and slidably mounted in inclined position within said support and having a gripping face inclined outwardly to said curved sheet supporting surface from a point within its circle of revolution, a gripper mounted on a part of said support within the circle of revolution of its curved sheet supporting surface, said gripper being movable toward and away from the inclined gripping face of said jaw or anvil and acting therewith to grip and release the bent edge of a sheet or signature transported and delivered by said mechanism, and means for moving the gripper as aforesaid during its rotation with the gripper support.

6. In mechanism of the character described, a gripper support provided interiorly with an inclined pocket and exteriorly with a substantially semicircular sheet supporting surface terminating at one end adjacent the outer extremity of the inclined pocket, means for rotating the support, a jaw or anvil yieldably mounted in inclined position in said pocket and having a gripping face inclined from the curved sheet supporting surface of said gripper support inwardly of its circle of revolution, a gripper mounted on the gripper support for movement toward and away from the jaw or anvil and within the circle of revolution of said curved sheet supporting surface, and means for operating said gripper during rotation of the same with said gripper support.

7. In mechanism of the character described, a curved segmental sheet support, means for rotating the same, a jaw or anvil yieldably and slidably mounted in inclined position within the curved segmental sheet support at one extremity thereof and having a gripping face inclined from said extremity inwardly of the circle of revolution of the curved surface of said support, a gripper mounted on the sheet support for movement toward and away from the inclined gripping face of said jaw or anvil, and means for operating said gripper during rotation of the same with said jaw or anvil and the curved segmental sheet support.

8. In mechanism of the character described, a rotatably mounted curved segmental sheet support provided therein at one end thereof with an inclined pocket, means for rotating the curved segmental sheet support, a jaw or anvil yieldably mounted in inclined position in said pocket and provided with a gripping face inclined from said end of the sheet support inwardly of the circle of revolution of its curved exterior surface, a notched block journaled on the sheet support adjacent the jaw or anvil, a gripper secured in the notch of said block for movement thereby toward and away from the inclined gripping face of the jaw or anvil, and means for rocking the block and said gripper during rotation of the same with said jaw or anvil and said sheet support.

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