

March 2, 1948.

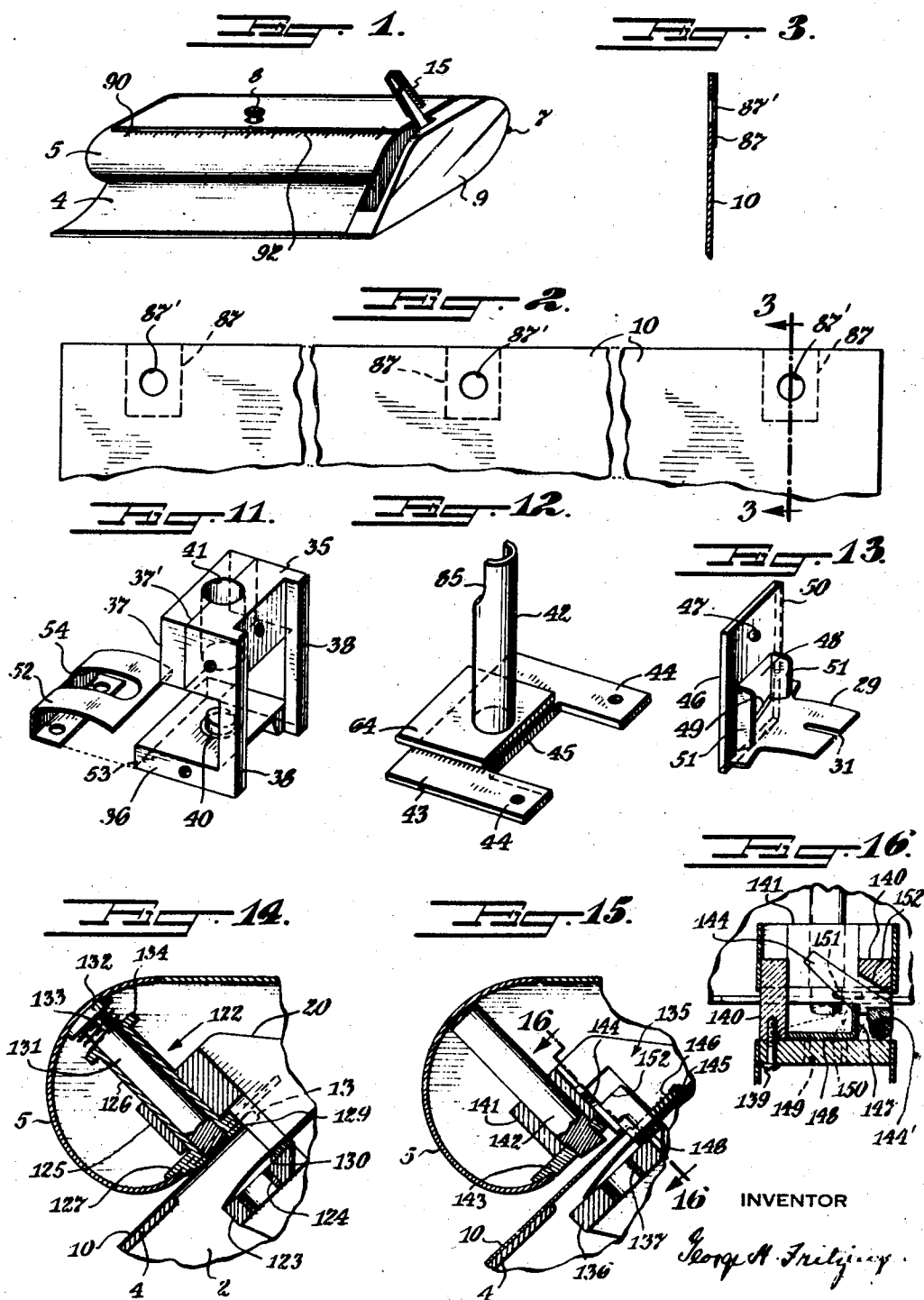
G. H. FRITZINGER

2,437,022

APPARATUS FOR USING ADHESIVE TAPE

Filed Dec. 2, 1942

5 Sheets-Sheet 1



INVENTOR

George A. Fritzinger

March 2, 1948.

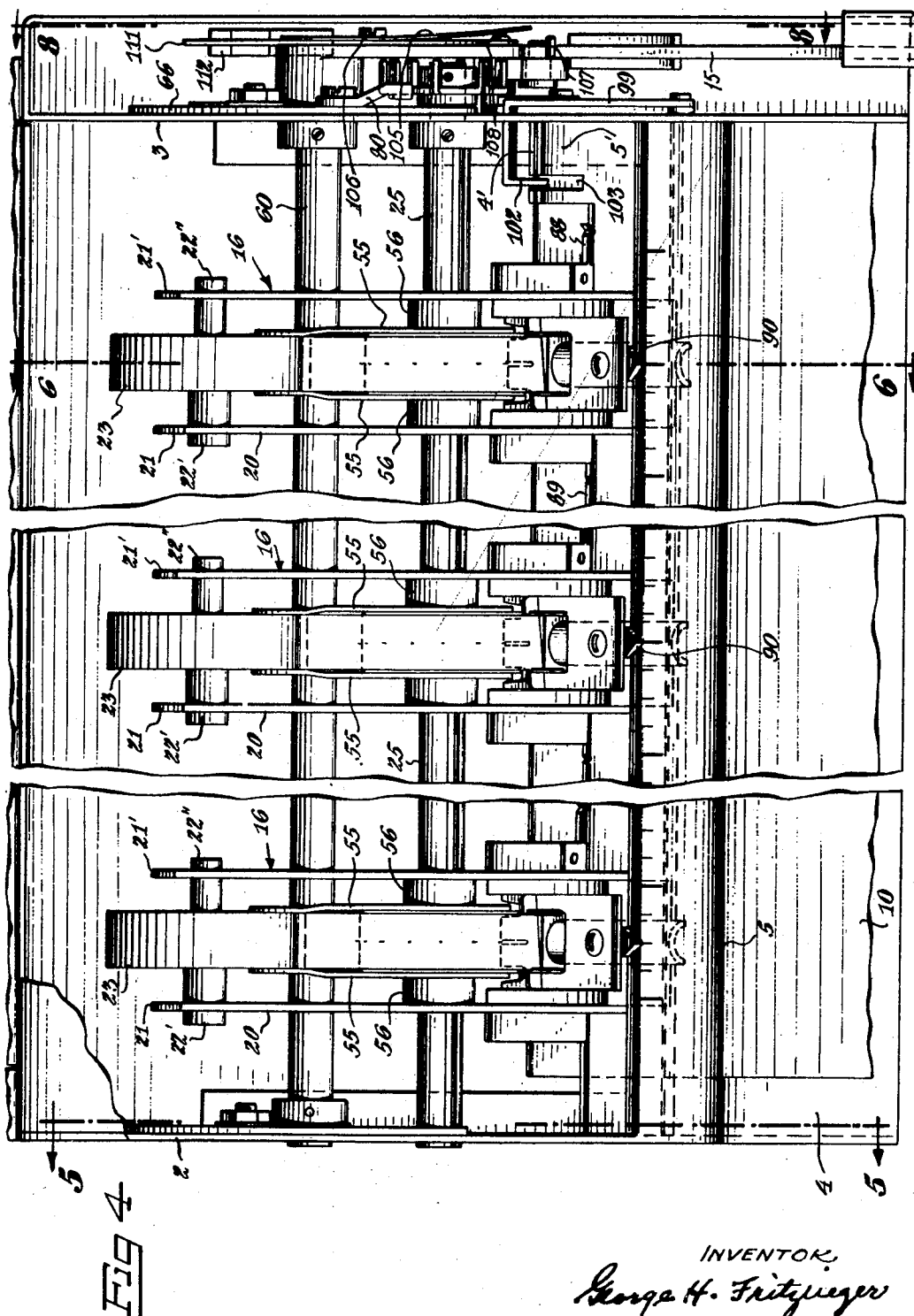
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Fig. 5.

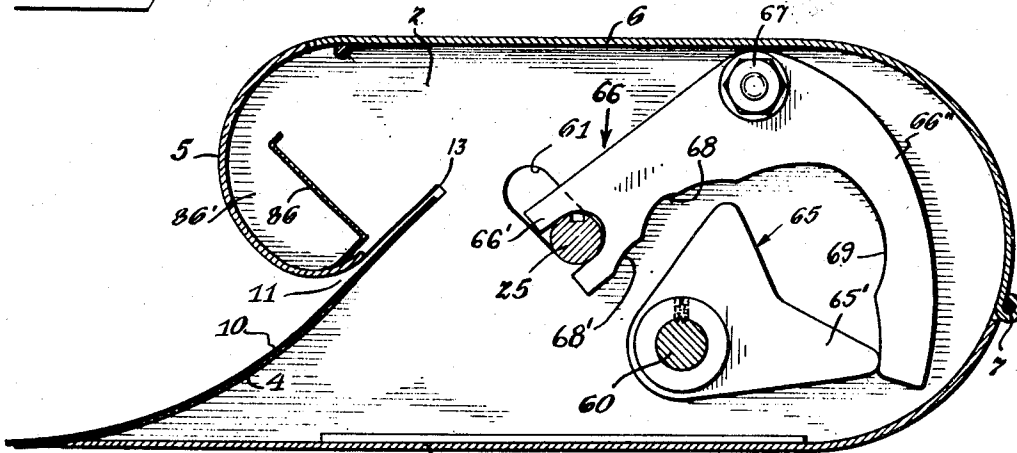
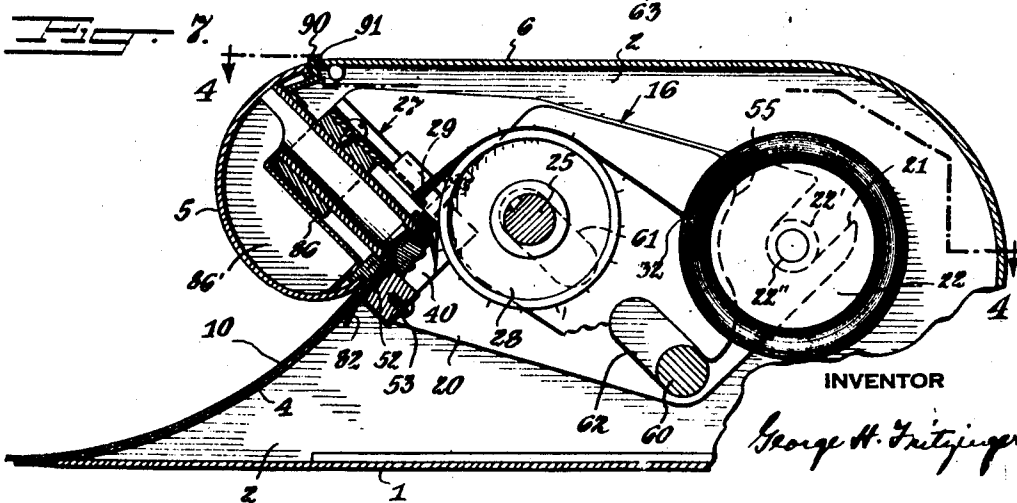
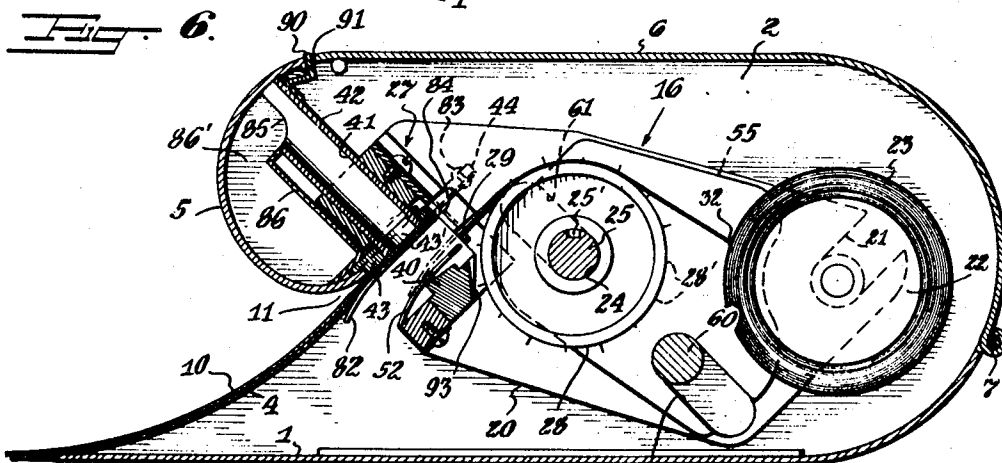


Fig. 6.



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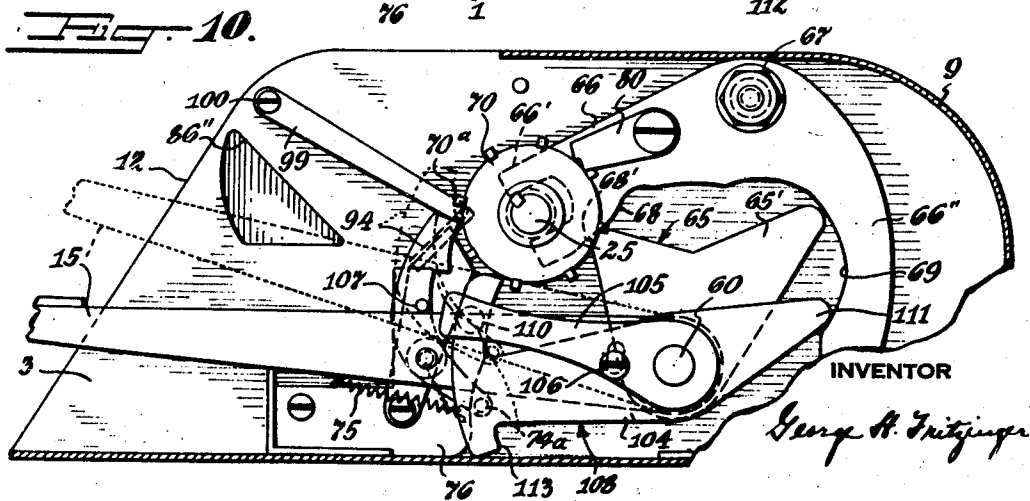
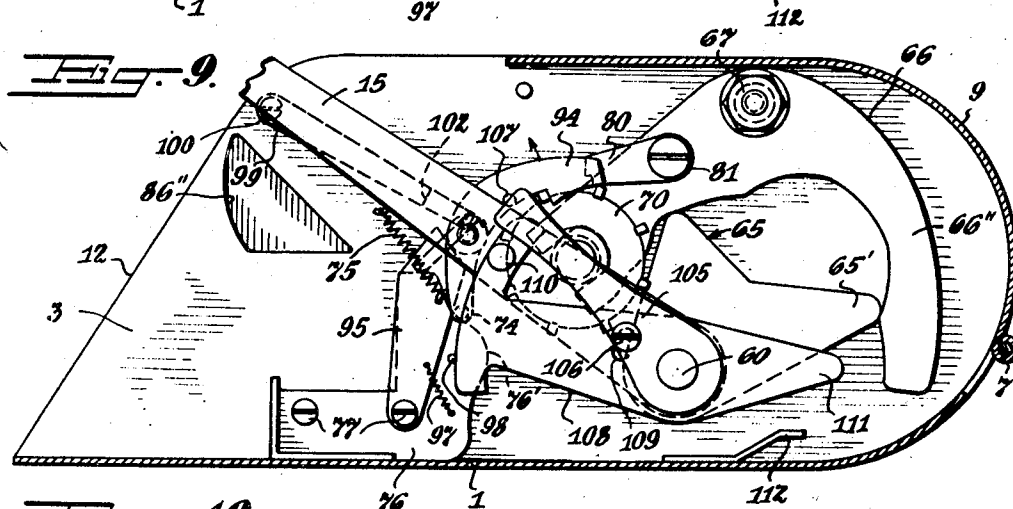
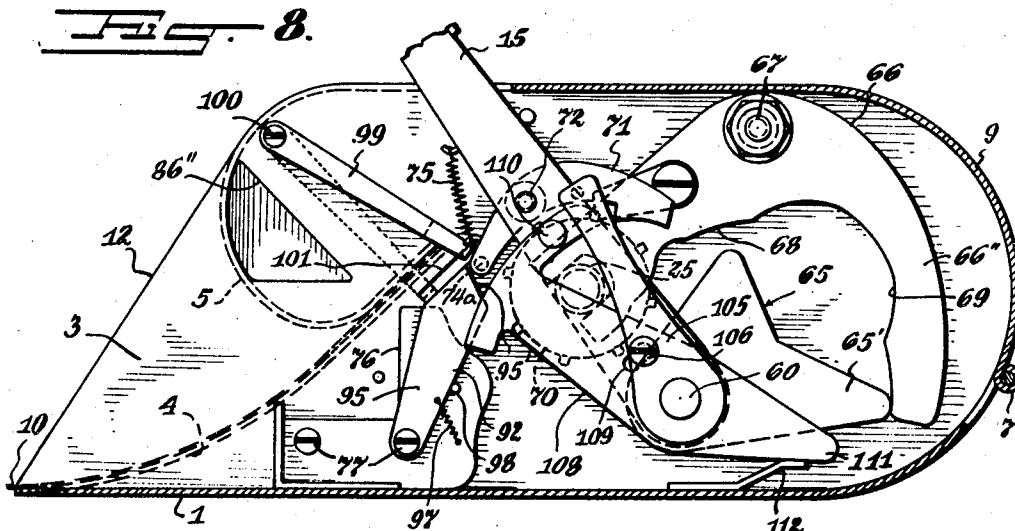
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APPARATUS FOR USING ADHESIVE TAPE

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March 2, 1948.

G. H. FRITZINGER

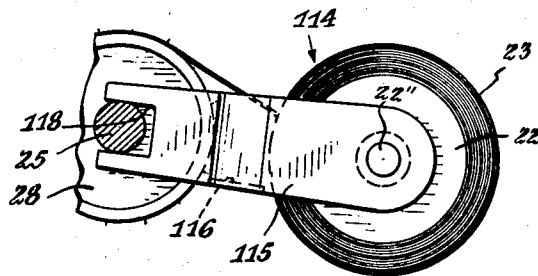
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APPARATUS FOR USING ADHESIVE TAPE

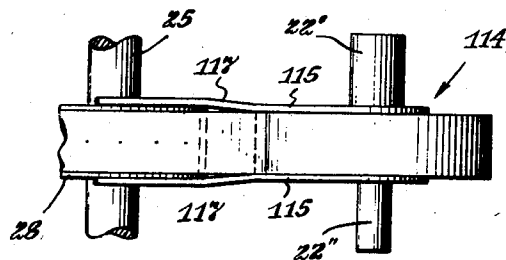
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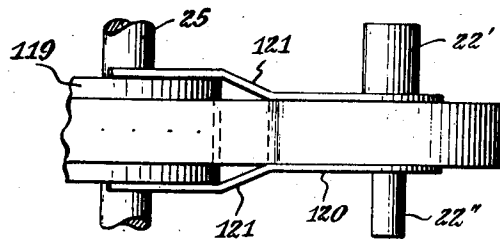
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INVENTOR

George H. Fritzinger

UNITED STATES PATENT OFFICE

2,437,022

APPARATUS FOR USING ADHESIVE TAPE

George H. Fritzinger, West Orange, N. J., assignor of one-half to Harold G. Kendall, Brooklyn, N. Y.

Application December 2, 1942, Serial No. 467,616

30 Claims. (Cl. 164—91)

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My invention relates to machines for reenforcing and punching sheets such as paper sheets, cards, tags, cloth strips, etc., and particularly relates to machines of this character which operate to cut reenforcing patches of adhesive tape from a supply roll, apply the patches to a sheet or other article and punch the patches and sheet, all in one operation.

My invention has especial utility for reenforcing and punching paper sheets for loose-leaf binders, both as a machine for use in factories for reenforcing and punching blank sheets in quantity production and as a manual machine for use in offices. It is in terms of such a manual machine that I herein illustrate and describe my invention, but it will be understood that I intend no unnecessary limitation thereto since various features of my invention have a general application to machines of the character described.

An especially important aspect of my invention lies in the provision of such improvements in machines of the character described as will enable a practical use of adhesive tapes of the non-drying or pressure sensitive type as the reenforcing medium. There is a wide selection of these tapes on the market—known in the trade as Scotch tapes—which are strong and tough and ideally suited as a reenforcing medium for the purposes mentioned, particularly since these tapes can be applied to the work directly without need for any auxiliary or preliminary conditioning operations such as are required by the dry and thermoplastic tapes. This non-drying tape is however difficult to work in a machine, for it adheres tenaciously to any part that touches its adhesive side, making it important to avoid any surface contact of the machine with the adhesive side of the tape other than of course the very minimum line contact which is necessary to shearing reenforcing patches of tape from the supply roll. For simplicity of structure, it is highly desirable that the feeding of the tape be carried out by projecting it to the die unit which performs the shearing and punching operations. There is described and claimed in the pending application of Harold G. Kendall, Serial No. 436,949, filed March 31, 1942, a very simple and reliable means for so feeding the non-drying adhesive tapes, and it is this feed means which I preferably employ in the present machine. There are however encountered special problems in the present machines when the tape is projected to the die unit, particularly in view of the very flexible character of the tape, for the projecting tape must be confined throughout the operation of the machine to a free unobstructed path, and the adhesive side of the tape must be kept out of contact with the machine in order to insure a positive dependable feed of the tape.

I have found that machines of the character

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described can be constructed and arranged to operate dependably with the Scotch tapes and that in view of the non-drying character of these tapes, which permits them to be applied directly to the work without need for any preliminary conditioning operation, there can be realized a practical machine of relatively simple construction and operation; and it is accordingly a general object of my invention to provide an improved machine of a simple economical construction for reenforcing a sheet or other article with Scotch tape, and more especially to provide a machine which is operative dependably without involving any substantial surface contact with the adhesive side of the tape.

It is another object of my invention to provide an improved die unit or mechanism of simplified construction for machines of the character described which is especially adapted for dependable operation in connection with the non-drying adhesive tapes.

It is another object of my invention to provide novel and improved means and arrangements for machines of the character described which are adapted to effect a reliable and dependable feed of the tape to the work in each operation of the machine. In this connection, my invention has in view the provision of a guide channel in association with the die unit for supporting the projecting tape supply and directing it to the work, the provision of simple and improved means for maintaining the tape centralized in relation to the feed means, and the provision of means to break positively any adherence of the tape with the cutting die of the die unit before the die unit is substantially opened for a succeeding operation.

It is another object to provide new and improved safety means and operation-restricting mechanisms for machines of the character described which are adapted to prevent accidental or inadvertent misoperations of the machine. In these respects, my invention contemplates the provision of new and improved means to insure a uniform positive feed of the tape in each reenforcing operation of the machine, to limit the feed mechanism to a single operation between successive shearing operations, and to prevent a reenforcing operation from being carried out unless a sheet is being held in operative position in relation to the machine.

It is another object to provide a novel and improved arrangement of a machine of the character described which is adapted to render the machine more compact and convenient to use. In this connection, my invention contemplates arranging the machine so that the sheets may be inserted therein by sliding them onto a plate or table running from the base level of the machine, and providing a novel enclosing housing which

permits ready visual indication of the positioning of the respective units of the machine.

It is another object to provide an improved actuating mechanism for machines of the character described which is operable to perform reenforcing and punching operations either independently or in sequence as desired.

It is a further object to provide a simplified construction of a machine of the character described the parts of which can be manufactured economically and be easily assembled.

Other objects and features of my invention lie in the details of construction and combinations of parts which are herein pointed out in the following description and the appended claims.

In the description of my invention reference is had to the accompanying drawings, of which:

Figure 1 is a perspective view of a machine according to my invention as adapted for office use;

Figure 2 is a fragmentary view of a sheet which has been operated on by the present machine;

Figure 3 is a sectional view of the sheet taken on the line 3—3 of Figure 2;

Figure 4 is a top plan view, partly broken away, of the present machine as seen from the line 4—4 of Figure 7;

Figure 5 is a vertical sectional view taken substantially on the line 5—5 of Figure 4;

Figure 6 is a vertical sectional view, taken substantially on the line 6—6 of Figure 4 and showing the die unit in open position;

Figure 7 is a vertical sectional view generally similar to Figure 6 but showing the die unit closed;

Figure 8 is a right-hand elevational view of the actuating and control mechanism of the machine as seen from the line 8—8 of Figure 4, showing the parts thereof in the positions which they occupy when the mechanism is in unoperated condition;

Figure 9 is an elevational view similar to Figure 8 but showing the parts in the positions they occupy at the completion of a feed operation but before a punching and shearing operation;

Figure 10 is another view similar to Figure 8 but showing the parts in the positions which they occupy at the completion of a shearing and punching operation;

Figures 11, 12 and 13 represent an exploded view of the die unit;

Figure 14 is a vertical sectional view illustrating an alternative arrangement of die unit for the present machine;

Figure 15 is a vertical sectional view illustrating a second alternative arrangement of die unit for the present machine;

Figure 16 is a sectional view taken substantially on the line 16—16 of Figure 15;

Figure 17 is a side elevational view illustrating a replacement (tape supply) unit as applied to the feed wheel;

Figure 18 is a top view of the mechanism of Figure 17; and

Figure 19 is another view similar to Figure 18 illustrating a modified replacement unit for the present machine.

The embodiments of my invention herein shown have a housing comprising a base plate 1 provided with left and right side frame plates 2 and 3 having respectively the outlines shown in Figures 5 and 9. The side plate 2 extends along the left edge of the base plate 1, but the side plate 3 is set in from the right end of the machine to provide a space to the right thereof for the actuating mechanism shown in Figures 3, 9 and 10. Bridging the side plates 2 and 3, at the front

of the machine, is a lower arcuate table or plate 4 and an upper closure member 5 which is substantially semi-circular in cross section as appears for example in Figure 5. At the top the machine has a cover plate 6 which curves downwardly at the rear to conform to the rearward arcuate portions of the side frame plates. This cover plate is hinged at 7 to the rearward end of the base plate 1, the base plate having its rearward portion curved up along the side frame plates so that this hinging may be made at a level above the base of the machine to permit a wide opening of the cover plate, there being a knob 8 on the cover plate by which the cover may be opened. There is a separate closure member 9 at the right side of the machine for the actuating mechanism abovementioned, which is also hinged to the base plate at 7 for ready opening. All of these frame and housing members of the machine are preferably sheet metal parts formed by stamping and welded together for economy of manufacture.

The plate 4 serves as a table onto which a sheet 10 or other similar article is to be held by the hand when the sheet is to be operated on by the machine. To place the sheet into operative position in relation to the machine, it is slid up across the plate 4 through a gap 11 provided between the plate and the front closure member 5 (see Figure 5), until the rearward edge of the sheet abuts against a suitable stop hereinafter described. The sheet is located laterally by abutting it against the right side frame plate 3, this side plate being terminated along a straight downwardly inclined line 12 above the table as is shown in Figure 8. The left side plate however follows the contour of the arcuate table 4 and closure member 5, and is provided with a slit 13 (see Figure 5) which extends back from the top surface of the table through which the sheet may extend when it is inserted into the machine. As will hereinafter appear, the die units which operate on the sheet must necessarily be placed above the level of the base plate. By having the table 4 extend upwardly however from the base of the machine, a sheet may be fed to the die units merely by sliding it up onto the table from the top surface of a desk or table supporting the machine. This is an advantageous feature for machines that are to be used on one's desk or table as in offices or the like.

The machine herein shown is adapted to apply reenforcing patches of tape to a sheet and to punch holes through the sheet and patches upon applying a single downward stroke of movement to a handle 15 provided at the right side of the machine. In the present illustrative example, the machine is adapted to both reenforce and aperture the sheet at each of three places, as at the central and opposite end portions of the sheet, and for each such place there is provided a reenforcing and punching unit 16. In practice, it may not be necessary to reenforce the sheet at its central portion since the strain on a looseleaf sheet in a binder is merely on the holes at the ends, and the central unit may thus be simplified to perform a punching operation only.

The punching units 16, which are shown in detail in Figures 4, 6 and 7, each has a frame including a pair of side plates 20. The rearward portions of these plates are provided with downwardly inclined slots 21 and 21' to receive the shaft of a supply roll 23 of adhesive tape. At the central portions of the plates there are aligned circular holes 24 which form bearings for a shaft

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25 of a tape feed mechanism, and clamped between the forward portions of the plates is a die unit 27, it being through the frame of this die unit that the plates are held together.

The tape feed mechanism herein employed, which is the feed mechanism disclosed and claimed in the Kendall application aforementioned, comprises a wheel 28 having a series of sharp pins 28' projecting from the periphery thereof, which may be ordinary store pins anchored into the body of the wheel. The tape from the supply roll 23 is applied to the periphery of this pin wheel and pierced by the pins 28'. At a short distance from where the tape enters onto the wheel there is a plate 29, which is held substantially in tangential relation to the wheel, for stripping the tape from the wheel as the wheel is turned, there being a narrow slit 31 in the stripper plate 29 (see Figure 13) which is for clearing the plate from the pins 28'. So long as the tape exerts a small resisting force to a rotation of the pin wheel—which force is obtained naturally with Scotch tape by the adherence which the tape has to the supply roll—the pins 28' will pierce the tape consecutively and maintain a continuous drive connection of the tape to the wheel; also, as the pin wheel is turned, the tape will be stripped progressively from the wheel by the stripper plate 29 and be directed forwardly to the die unit.

In installing a supply roll of tape into the machine the roll is first set in place in the slots 21 and 21' and a short length of the tape is pulled from the roll and applied manually to the periphery of the wheel so as to cause the tape to be pierced by several of the pins 28'. It will be understood that it is necessary that it be the non-adhesive side of the tape that is applied to the periphery of the wheel, and that therefore the roll is to be set in place so that the tape which is pulled therefrom towards the pin wheel will have its adhesive side facing upwardly. In order to prevent a user from accidentally installing the roll in a reverse way, and getting the adhesive side applied to the pin wheel, the slots 21 and 21' aforementioned are made different in width, and the supply roll is provided on a spool 22 having shaft extensions 22' and 22'' of different diameters adapted to fit these respective slots, as is shown in Figures 4 and 6. This feature is not claimed herein as the same is described and claimed in the pending application of Harold G. Kendall, Serial No. 616,785, filed September 17, 1945, and having common ownership with the present application.

It will be seen that no surface contact is made by the machine with the adhesive side of the tape in the operation of the feed mechanism above described, both in the pulling of the tape from the supply roll and in the removal and directing of the tape from the pin wheel to the die unit by the stripper plate 29. It will be further noted that there is a tendency for the tape to maintain itself flat against the stripper plate, for the tape receives a sharp bend at 32 where it is pulled from the supply roll which gives the tape projecting from the pin wheel a slight downward curl against the stripper plate. These features are important to insuring a positive dependable feed of the tape.

The die unit 27 is adapted to apply the tape to the sheet 10 and to shear reinforcing patches of the tape from the tape supply and punch the patches and sheet. For dependable operation this unit should involve no contact with the ad-

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hesive side of the tape other than the minimum line contact which is necessary to the performance of the shearing operation. Also, the die unit should have die members arranged in the machine to engage without crimping or bending the sheet; yet it should have inclined cutting edges adapted to engage with a progressive point contact—i. e., with a scissors action—to insure a positive shearing operation. In the present instance these desirable conditions are fulfilled by very simple structure as is now described.

The preferred form of die unit which I employ is constructed according to the exploded view thereof shown in Figures 11, 12 and 13. This unit includes a frame member 35, formed for example by die casting, which comprises a lower flat portion 36 and an upper block portion 37, these portions being joined at the back by side ribs 38. Set into the lower portion 36 is a punch 40. It is this lower portion together with the punch 40 and a shearing member 46 hereinafter described that I refer to as the lower die of the unit. The block portion 37 has a cylindrical hole 41 in line with the punch 40 and slidably fitting this hole is a guide sleeve 42. This guide sleeve has a plate 64 secured to the lower end thereof and secured by riveting to the plate 64 is a die plate 43 which constitutes the upper die of the unit. To permit the guide sleeve 42 and die plate 43 to be installed into the frame 35 as a unit, the block portion 37 is split on a transverse plane extending diametrically through the opening 41, as at 37', and the removable section thereof is held detachably in place as by screws not shown. The die plate 43 has a central hole 43' (see Figure 6) to receive the punch 40 when the die unit is closed, and is made wider than the frame 35 and provided with rearwardly extending side wings 44, these wings being provided for reasons hereinafter explained. Between these wings the die plate has a cutter formed by providing the plate with a sharp edge 45. This cutting edge constitutes one element of a scissors mechanism for shearing off strips or patches of tape fed to the die unit.

The cooperating shearing element for the die unit comprises a flat hardened spring member 46 hereinabove referred to. This spring member is held by a screw 47 to the back side of the block 37 in the channel between the ribs 38, and extends downwardly to bridge the space between the upper and lower portions of the frame 35. Between the upper and lower dies the spring member has a window 48 located centrally of the width thereof. It is through this window that the tape is fed to the die unit from the pin wheel; accordingly, the window is made suitably wider than the tape, say $\frac{1}{8}$ " for a tape $\frac{1}{2}$ " wide. The lower side of the window is inclined to the horizontal and bevelled to provide a sharp cutting edge 49 at the side of the spring member towards the dies, the average level of this cutting edge being typically about $\frac{1}{8}$ " above the face of the lower die. The spring member 46 may have a natural forward curvature so that it will be biased forwardly against the cutting edge 45 of the upper die plate. When the upper die plate is moved downwardly into engagement with the lower die, the sections of the spring member at the sides of the window slidably engage the upper die plate and guide the two cutting edges into shearing engagement with a scissors action.

Secured against the back side of the spring member 46, as by the screw 47 abovementioned, is a flat member 50 made suitably of brass which has a central window therein conforming ap-

proximately at its edges to those of the window 48. The lower part of this member is turned back along the inclined cutting edge 49 and forms the stripper plate 29 hereinabove described, and turned back also from this member 50 at the sides of the window are vertically extending wings 51. Preferably, according to my invention, the forward edge of the stripper plate is set slightly above the cutting edge 49 and the wings 51 are set in slightly from the side edges of the window. In this way the stripper plate and side wings form a guide channel for confining the tape to a path free from the side and bottom edges of the window, to prevent the end or corners of the tape from catching on these edges. This is an important feature in realizing a practical construction permitting the tape to be projected from the feed mechanism to the die unit.

Across the face of the lower die is a spring member 52 held thereto by screws 53. This spring member, which is provided for stripping the work from the punch 40 as the die unit is opened, is suitably spaced from the lower die and provided with a central aperture 54 to clear the member from the punch. Preferably, the aperture 54 is made in slot form and extended forwardly from the back side of the punch at least as far as the point of most forward travel of the tape fed to the die unit. Also, the spring member is preferably bent concave, as viewed from the top (see Figure 6), to conform to the natural downward bend of the tape hereinbefore mentioned. In this way the spring member is prevented from offering any resistance to the tape fed to the die unit and presents no edges onto which the tape might catch and buckle, this being again an important feature to assuring a positive and dependable feed of the tape.

It is important that the tape be confined laterally within close limits, in its travel to the die unit, not only to keep the tape centered relative to the punch 40 but also to assure against such sidewise deviation in the feed of the tape as might cause the adhesive side of the tape to contact the side walls 51 of the guide channel. This requires that the tape be kept centered relative to the width of the pin wheel. It has been tried to effect this centering by providing the pin wheel with side peripheral flanges, but it is found that the very flexible character of the tape prevents it from being held centered in this way, for the tape will run up on these flanges and, moreover, then receive curled edges which may interfere with the proper functioning of the die unit. According to the present invention, however, this centering of the tape is accomplished positively without deforming the tape or making any contact with its adhesive side. This is done by mounting the supply roll on the side plates 20 with axial play and then locating the roll axially in relation to the pin wheel by a guide member having a pair of side plates 55 which bear against the sides of the pin wheel and extend rearwardly to embrace the supply roll and spool 22, as is shown in Figures 4 and 6. These guide plates 55 are journaled on the shaft 25 of the pin wheel, between the pin wheel and spacing washers 56 which hold the pin wheel centered between the side plates 20, and are held locked against rotation on the shaft 25 by a cross shaft 60 of the actuating mechanism of the machine hereinafter described, there being slots 63 in the guide plates 55 through which the shaft 60 extends.

It will be understood that in herein considering the die unit I refer to the adjacent cooperating

sides of the dies as the die faces and that I refer to the corresponding sides of the shearing elements as their cutting faces, the cutting face for the lower die being the bevelled lower side of the window 48.

The reenforcing and punching units 16 are mounted on the shafts 25 and 60 in positions wherein the die units are supported just back of the rearward edge of the arcuate table 4 with the faces of the dies parallel to the back tangent line of the table, as is shown in Figure 6. The upper die plate 43 is locked between upper and lower sections of the closure member 5 by an abutment of the upper end of the guide sleeve 42 against the underside of the top part of the closure member and by a lapping of the plate 64 over the top side of the lower part of the closure member, the upper die plate being thus held stationary, in respect of movements in a vertical plane, at such a level as to form a substantially even rearward and upward extension of the lower part of the closure member 5. The lower dies of the units are held integrally to the side plates 20 of the units and occupy positions, when the die units are open, which are below and back from the table 4 as is shown in Figure 6.

The shaft 25 has a fixed journal to the side plates 20 of the units 16 and is received in slots 61 provided in the side frame plates 2 and 3 of the machine. Conversely, the shaft 60 is received in slots 62 provided in the side plates 20 of the units (see Figure 7) and has fixed journals to the side frame plates 2 and 3. These slots 61 and 62 are in line with one another and parallel to the guide sleeves 42 of the die units. Thus the movable portions of the units 16 are slidably mounted for up and down movement parallel to the guide sleeves 42, this movement being effected by moving the shaft 25 back and forth in the slots 61 and sliding the units 16 on the shaft 60. When the shaft 25 is moved upwardly in the slots 61, the lower dies are moved up into engagement with the upper die plates 43 to close the die units, the lower dies coming into positions just back of the rearward edge of the table 4 as is shown in Figure 7.

For actuating the shaft 25 to close and open the die units there are interposed cam mechanisms, one at each side of the machine, between the shafts 25 and 60. These cam mechanisms are actuated by the handle 15 aforementioned, which is pinned to the right end of the shaft 60 as is shown in Figure 4. The cam mechanisms comprise respective cam levers 65 which are pinned to the shaft 60 at positions just to the right of the side frame plates 2 and 3, and cooperating levers 66 which are pivoted at 67 to the upper rearward portions of the side frame plates, as is shown in Figures 5 and 8. The levers 66 extend forwardly and downwardly from their pivot axes and terminate in slotted end portions 66' which engage the shaft 25. When the handle 15 is moved downwardly, the cam levers 65 engage cam surfaces 68 on the undersides of the levers 66 and raise the shaft 25 in the slots 61 to close the dies. The cam mechanisms are identical so as to move the shafts 25 in parallel motion and thus close the die units in unison. Since the force to close the die units is greatest at the end of the stroke of the handle, because it is there that the punching and shearing operations are both performed, the cam surfaces 68 are shaped to engage the cam levers 65 at a diminishing cam angle, and accordingly with an increasing force transmission ratio. This has the advantage of distributing evenly through the

actuating stroke of the handle 15 the work which is required to close the die units.

The handle 15 is also coupled to the units 16 on its return stroke to assure a positive opening of the die units when the handle is raised. This coupling is effected by providing a second lobe 65' on the cam levers 65 and cooperating arms 66'' on the levers 66, as is shown in Figures 8, 9 and 10. The arms 66'' have cam faces 69 which are so shaped as just to clear the lobes 65' on the down stroke of the handle 15. Thus, on the return stroke of the handle there will be applied a force to open the die units having substantially the reverse distribution as that generated on the down stroke of the handle; that is, the force transmission ratio will be at first great and will taper off as the handle is raised. This has the advantage of permitting easy raising of the handle, for the die units require initially a considerable force to open them because of the punching and shearing elements being then both in tight engagement. When restoring springs are used for opening the die units, the handle being then uncoupled to the units on the return stroke, the die units tend to stick and then to open suddenly with a clashing of parts unless the restoring springs are made very strong, in which case they then have the disadvantage of greatly loading the actuating mechanism of the machine on the down stroke of the handle. By coupling the handle to the units 16 on the return stroke, as is here described, these disadvantages are circumvented and a smooth easy operation of the machine is assured.

It will be seen that the cam levers 65 do not engage the levers 66 to close the die units until the handle 15 reaches the intermediate position it occupies in Figure 9. This is done to reserve the first part of the downward stroke of the handle for actuating the tape feed mechanism, and so that the feed mechanism and die units may be actuated in sequence upon applying a single downward stroke to the handle.

The means to actuate the tape feed mechanism of the machine comprises a ratchet wheel 70 which is pinned to the right end of the shaft 25 between the lever 66 and the handle 15, and a feed pawl 71 which is pivoted at 72 to the handle. When the handle is in its uppermost position, the pawl overlies the ratchet wheel and engages the same under the influence of a biasing spring 75. Thus, upon moving the handle downwardly from this uppermost position, the pawl will turn the ratchet wheel in a counter-clockwise direction. This feed stroke of the handle is, however, ineffective to produce any closing movement of the dies since the direction of the force of the pawl on the ratchet wheel is substantially at right angles to the direction of freedom of movement of the shaft 25. When the handle approaches its intermediate position abovementioned, a pin 74a carried on a short depending arm 74 of the feed pawl encounters a cam plate 76 that is secured by screws 77 to the side frame plate 3, and disengages the feed pawl from the ratchet wheel as in the manner illustrated in Figure 9. The tape feed operation is thus terminated as the handle is moved through its intermediate position and, as is above explained, the die units are closed as the handle is moved on to its most downward position. In the tape feed operation the ratchet wheel is turned through an angular distance from one tooth to the next. This angular movement of the ratchet wheel is imparted to the pin wheels, through

spline connections 25' which these wheels have with the shaft 25, and turns the pin wheels through the angular peripheral distance between alternate ones of the pins 28', this distance being about $\frac{1}{8}$ '' in the present instance. For limiting the feed mechanism against reverse movement, there is provided a stop pawl 80 which is pivoted at 81 to the lever 66 at the right side of the machine and held by its own weight into engagement with the ratchet wheel.

While I preferably actuate the feed mechanism and close the die units in sequence, it will be understood that these two operations may overlap provided the distance of opening of the dies is sufficient, it being only necessary that the feeding of the tape come to a stop well before the dies are closed sufficiently to possibly bring the tape into contact with the work.

The most rearward position of the sheet 10 on the table is defined by the abutment of the rearward edge of the sheet against the spring members 46 of the die units. Thus, when the sheet is held in operative position, its rearward part overhangs the table 4 by a distance equal to the length of the lower die. This part of the sheet is however held closely to the face of the upper die plate 43 by spring members 82 provided at the sides of the die units as is shown in Figure 6. These spring members are riveted, as at 83, to the side wings 44 of the upper die plate, and extend forwardly to engage the underside of the table 4. Just back of the shear line of the die units—that is, back of the rearward edge of the sheet—the spring members 82 are offset downwardly at 84 so as to provide sufficient spacing of the same from the upper die plate to permit easy insertion of the sheet therebetween. Since these spring members 82 are at the side of the die units, they do not obstruct the closing of the die units.

From the foregoing description it will be seen that the functional operations of the feed mechanism and reinforcing and punching unit are as follows: First a predetermined length of tape is fed across the lower cutting edge 49 between the upper and lower dies, with the adhesive side of the tape facing upwardly toward the sheet 10 but at a suitable clearing distance therebelow. Then the lower die is moved upwardly into engagement with the upper die plate 43, the pin wheel and guide channel being moved in unison therewith. As the dies are closed, the spring 52 overlying the lower die is compressed and the strip of tape between the dies is applied to the lower side of the sheet; also, this strip or patch is sheared from the supply roll at the edge of the sheet, and a hole is punched through the sheet and reinforcing patch, there being a disk blanked from the work which is moved up into the guide sleeve 42. When the dies are next opened the spring member 52 moves out to strip the work from the punch 40 and thus free the sheet for removal from the machine. In all these operations, however, it is seen that no contact is made by the adhesive side of the tape with any part of the machine other than with the very cutting edge 45 of the upper die plate.

The face of the punch 40 is inclined to facilitate the punching operation. In the present instance, this inclination is made so as to bring the shorter length of the punch to the back side of the machine, as this facilitates a freeing of the sheet from the punch to permit the removal of the sheet from the machine.

The disks which are pressed up through the guide sleeve 42 flow out into the closure member

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5 through a side opening 85 cut down from the top of the sleeve. If desired there may be provided a lateral partition wall 86 in the closure member 5 adjacent to the front side of the housings of the die units to form a chamber 86' in the machine for catching these disks or punchings, which chamber may have an opening 86'' in the right side frame member 3 to permit the punchings to be removed by opening the side closure member 9 and tilting the machine to the side.

By providing three reenforcing and punching units 16, each sheet will receive three reenforcing patches 87 and centrally located apertures 87', as is shown in Figures 2 and 3. It will, however, be understood that any other spacing or numbers of these units 16 may be provided as desired. For instance, the units 16 may be slid along the shafts 25 and 60 merely by raising the cover plate 6 and moving the units to one side or the other by the hand. However, to retain the units releasably in their adjusted positions there are provided laterally extending spring members 88 on the upper die plates 43, which spring members have V-end portions that slidably engage a notched lower edge 89 of the closure member 5 as is shown in Figure 4, the notches being so spaced as to locate the units at standard relative spacings.

To permit the user to observe the positioning of the units 16 and to know where the apertures will be made by the machine, there are provided pointers 90 on the guide sleeves 42 which project up through a slit 91 in the housing between the closure member 5 and the cover plate 6, as is shown in Figures 1 and 6. These pointers register with a scale 92 provided on the closure member 5 and enable ready observation of the respective positionings of the units.

In the preferred arrangement of my invention herein shown the tape is projected forwardly across the guide channel which is between the pin wheels and the die units, with the guide channel arranged to serve as a support for this free projected length of the tape to hold the tape in place while the machine is idle. In so doing, however, the adhesive side of the tape must be faced upwardly and the sheets must be held against the face of the upper die as is herein described.

When the tape is fed to the die unit with the adhesive side facing upwardly, the pin wheel must necessarily project below the die unit with the result that the die unit must be supported well above the base of the machine. It is however preferable in machines for office use that the sheets be insertible into the machine from the base thereof, so as to reduce to a minimum the necessary handling of the sheets. This objective is accomplished in the present instance by providing a table for supporting the sheets which curves gradually upwardly from the base of the machine to the die units, as is above explained.

When the apertures 87' are made $\frac{1}{4}$ " in diameter and $\frac{1}{4}$ " from the edge of the sheet, as is standard practice, and the reenforcing patches 87 are made $\frac{1}{8}$ " long as has been indicated above, the patches will extend $\frac{1}{8}$ " beyond the apertures as is shown in Figure 2. A sufficient reinforcement may however be obtained by the use of patches of shorter length, say $\frac{3}{8}$ " long, in which case the patches would terminate at the diameter line of the apertures. The use of such shorter patches has the advantage in enabling many more reinforcements to be obtained from a roll of tape.

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It will be understood the machine may be adapted to produce such shorter length of reinforcing patch as by merely selecting a ratchet wheel 70 having a suitably shorter spacing between successive teeth.

It is also desirable that the supply rolls may be replaced easily without need to tilt or upset the machine. In the present instance easy replacement of the supply rolls is had by rendering the rolls accessible from the top of the machine. In mounting the rolls at the general level of the pin wheel for easy accessibility, the peripheral length of the pin wheel over which the tape may be applied is however limited, the length depending upon the diameters of the pin wheel and supply roll and their relative elevations from the base of the machine. A minimum elevation of the pin wheel is desirable to permit the table 4 for the sheets to have a minimum curvature. A relatively small pin wheel may however be used and the pin wheel may be supported at a low level, while yet permitting the use of a large supply roll and securing a firm drive connection of the tape to the feed wheel. This is done by providing the pin wheel with a double set of pins 28', two for each patch that is to be applied to the sheets. By this expedient five pins are maintained in engagement with the tape when the tape is applied over approximately only a 90 degree arc of the pin wheel. These pins are however so located that one alternate set thereof will engage the tape within the areas which are blanked out in the punching operations and the other set will engage the tape substantially at the lines where the tape is cut in the shearing operations, as is disclosed in the aforementioned Kendall application.

To shorten the free length of tape projected from the pin wheels to the die units, the lower part of the frame of each die unit is recessed at 93, as is shown in Figures 6 and 11, and the pin wheel is set in these recesses as closely as possible to the die units.

To insure against the end of the tape supply adhering to the cutting edge 45 of the upper die plate and being lifted from the guide channel as the die unit is opened, with a likelihood of causing the tape to become blocked in the next feed operation thereof, I provide means to retract the tape to break any adherence thereof with the upper die plate 43 as an incident to opening the die unit. This retraction of the tape is preferably carried out by retracting the pin wheel before the upper die plate is moved substantially above the level of the stripper plate 29 of the guide channel. To effect this retraction of the pin wheel the feed pawl 71 is provided with a nose 94 which is adapted to engage one of the teeth of the ratchet wheel 70 as the handle 15 is moved through the initial portion of its travel from its lowermost position. Reference being had to Figure 10, for instance, there will be seen the relative positions occupied by the feed mechanism when the handle 15 is in its lowermost position. As the handle is raised from this lowermost position to the position shown dottedly in this figure, the cam lever traverses a flat 68' on the lever 66 and, as a result, the ratchet wheel remains stationary. The nose 94 of the pawl now however engages the lower side of the tooth 70a of the ratchet wheel—which is the tooth on the radius line of the ratchet wheel substantially at right angles to the pawl—and retracts the ratchet wheel in a clockwise direction. When, by this retraction of the pin wheel the end of

the tape is withdrawn from the die unit typically by an amount of about $\frac{3}{32}$ ", the pin 74a engages the lower side of the hump 76' of the cam 76 and disengages the nose 94 from the ratchet wheel.

It will be understood that the stop pawl 80 aforementioned is ineffective to obstruct the retraction of the feed mechanism above described since this pawl is itself retracted relative to the direction of advance of the ratchet wheel as the die unit is closed, this retraction of the pawl 80 following from the fact that the lever 66, to which the pawl 80 is pivoted, is turned in a clockwise direction about the shaft 25 incidental to closing the die unit. In the return stroke of the handle 15, however, the pawl 80 is returned to its former position relative to the ratchet wheel and, in so doing, it engages the tooth it last left and advances the ratchet wheel substantially through the distance of its retraction. The advantages in so restoring the feed mechanism as the die unit is opened are that the free tape supply projecting ahead the pin wheel is moved down flat against the guide channel, and the distance which the handle must be raised to bring the feed pawl into engagement with the next tooth of the ratchet wheel for a succeeding feed operation is less to reduce the necessary length of stroke of the handle.

It is highly important that machines of the character described using the non-drying adhesive tapes be so restricted in their operation as to prevent the user, through inadvertence or mistake, from so misoperating the machine as possibly to cause a jamming in the feed of the tape. One such possible misoperation is to actuate the feed mechanism and then proceed on to close the die units while there is no sheet inserted in the machine, the effect of this misoperation being to apply a patch of the adhesive tape to the face of the upper die plate. This misoperation is however herein guarded against by the provision of a mechanism to prevent actuation of the feed mechanism by the handle 15 while there is no sheet in the machine. While it is in some instances desirable to provide individual such prevention mechanisms for the respective reinforcing and punching units 16, I herein illustrate this feature of my invention by providing one prevention mechanism operating in common to the several units 16. This mechanism, which is shown in Figures 8, 9 and 10, comprises an upstanding arm 95 pivoted at its lower end to one of the screws 77 aforementioned, and is biased lightly to the rear by a spring 97 against a stop pin 98. In this biased position of the arm it presents an inclined cam surface 95' directly below the position occupied by the pin 74a when the handle 15 is in its uppermost position. To the front of this arm there is a light lever 99, made for instance of aluminum, which is pivoted at 100 to the front upper part of the side plate 3. From its pivot axis the lever 99 extends downwardly and rearwardly almost to the front side of the arm 95, is there bent at right angles to the left to extend through an opening 101 in the side plate 3, and is then bent forwardly at a short distance to the left of this side plate, to form an arm 102 that extends across the gap 11 between the table 4 and closure member 5, as is shown in Figure 4. When there is no sheet in the machine, the lever 99 is held lightly by its own weight in a lower position—the position indicated dottedly in Figure 8—wherein the lever confronts the arm 95 and locks it in its biased

position abovementioned. Should the handle 15 be now moved down to actuate the feed mechanism, the pin 74a immediately engages the cam surface 95' and cams the feed pawl out of engagement with the ratchet wheel. Thus the feed mechanism will not be actuated, but only the die units will be closed by the down stroke of the handle. When a sheet is however inserted into the machine, the rearward edge thereof abuts against the arm 102 of the lever 99 and moves the lever above the arm 95. Upon now applying a down stroke to the handle 15, the arm 95 is itself cammed forwardly by the pin 74a, in view of the light bias of the arm, and the feed pawl engages the ratchet wheel in the usual way to actuate the feed mechanism. In order that the sheets may be so confined as not to be crimped or buckled by their abutment against the arm 102, the respective right end portions 4' and 5' of the table 4 and closure member 5 are extended rearwardly in spaced face-to-face relationship, as is shown in Figure 4, and provided with slots 103 through which the arm 102 extends.

Another misoperation of the character mentioned which it is highly desirable to avoid is the accidental or inadvertent feed of more than one length of tape to the die unit before proceeding to close the die unit. This misoperation is however prevented positively by a mechanism which renders the feed mechanism inoperative after one actuation thereof and retains the feed mechanism in inoperative condition until the die unit is fully closed. This mechanism comprises a spring latch member 105 which is held by a screw 106 to the right side of the handle 15 as is shown in Figures 4, 8 and 9, and a pin 107 on the feed pawl which cooperates with the member 105 to latch the feed pawl in disengaged position at the completion of a tape feeding operation. Between the latch member 105 and the handle, however, there is a flat lever 108 pivoted on the shaft 60, the lever having a slot 109 to clear it from the screw 106. Formed on the forward portion of the lever is a knob 110, and extending back from the pivot axis of the lever is a short arm 111. When the handle 15 is moved into its uppermost position, the arm 111 impinges against a bracket member 112 on the base plate 1 and is moved to the handle to place the knob 110 below the spring latch member. The latch member now bears against the end of the pin 107, permitting the pawl to engage the ratchet wheel and effect a feed operation as the handle is lowered. As the handle is moved past its intermediate position aforementioned, the feed pawl is cammed out of engagement with the ratchet wheel and the spring latch member snaps below the pin 107 to latch the pawl in its disengaged position. Should the operator now inadvertently fail to complete the down stroke of the handle but return it to attempt another feed operation, the pawl will be maintained out of engagement with the ratchet wheel and a second feed is prevented. When he however completes the down stroke of the handle to close the die units, a foot 113 on the lever 108 abuts against the base plate 1, as the handle nears its lowermost position, and holds the lever stationary to cause the handle to move relative to the lever. By this relative movement between the handle and the lever 108, the knob 110 is pressed between the handle and latch member 105 to cam the latter beyond the end of the pin 107. As the handle is now returned to its uppermost posi-

tion the feed pawl is free to reengage the ratchet wheel and effect another feed of the tape on the next downward stroke of the handle. Again, though in the terminal movement of the handle into its uppermost position, the knob 110 will be moved from between the handle and the spring latch member and the latter will again bear against the end of the pin 107 to be effective to latch the pawl 71 into disengaged position at the completion of a single actuation of the feed mechanism.

It will be understood that the various operations described above in relation to one of the reenforcing and punching units 16 is applicable to each of these units, since these units are operated in unison in the above described embodiment of my invention.

Instead of mounting the guide means provided for holding the tape roll centralized axially relative to the pin wheel 28 on the machine as a permanent part thereof, as in the manner above described, this guide means may be advantageously provided as a part of a tape roll replacement unit for the machine. In Figures 17 and 18 there is for example shown such a replacement unit for the machine. This replacement unit, which is referred to as 114, comprises the spool 22 carrying the tape roll 23, as before, but additionally provided with a pair of guide plates 115. These guide plates are journaled on the shaft extensions 22' and 22'' and are bridged together at the bottom by a cross piece 116. The guide plates bear slidably against the sides of the tape roll and have their forward portions offset apart at 117, to fit the pin wheel 28, and provided with end slots 118 to receive the drive shaft 25 when the replacement unit is mounted in the machine.

A particular advantage in providing this guide means as part of the replacement unit is that it permits a user to adapt his machine to use different widths of tape merely by installing the desired replacement unit into the machine. For instance, the machine may be provided with a pin wheel 119 made wide enough to accommodate tapes as wide as $\frac{3}{4}$ " or more, as is shown in Figure 19. A replacement unit of $\frac{3}{4}$ " width tape would then have only mildly offset guide plates as is the case in Figures 17 and 18. A replacement unit for a narrower width of tape, say one $\frac{1}{2}$ " wide, would however have guide plates 120 provided with sharp offsets 121 to fit the wider pin wheel 119.

In Figure 14 there is shown an alternative form of die unit 122 of a double action type. This die unit comprises a lower die 123 provided with a hardened tubular insert 124. Integral with this lower die is an upper apertured block 125 into which slidably fits a tubular member 126. This tubular member carries at its lower end an upper die 127 for the unit, which die rests on the lower part of the closure member 5 between the block 125 and lower die 123. This upper die has a rearward cutting edge 129 which cooperates with a cutting edge 130 of the lower die to shear the tape when the dies are closed, this cutting edge 130 being about $\frac{1}{8}$ " above the face of the lower die. Extending slidably through the tubular member 126 is a punch rod 131. This rod has a head 132 which bears against the upper part of the closure member 5 under the influence of a compression spring 133 between this head and a flange 134 on the tubular member 126. When the lower die is raised to close the die unit the spring 133 does not yield substantially to the

force required to effect the shearing operation, but with added pressure on the dies as they close the spring yields and the punch rod 131 projects below the face of the upper die and engages the lower die to punch the sheet and tape. When the die unit is next opened the spring 133 restores itself and retracts the punch rod from the upper die and, thus also, from the work.

In Figures 15 and 16 there is shown a second alternative form of die unit 135. This die unit has a flat lower die 136 provided with a hardened tubular insert 137. Secured by screws 139 to the rearward corner portions of this lower die are upright posts 140 which carry an upper apertured block 141 of the unit, and slidably fitting this block is a punch rod 142. The upper end of this rod abuts against the upper part of the closure member 5, and the lower end portion thereof carries an upper die 143 for the unit which rests on the lower part of the closure member 5. At the back side of the upper die there is a shear blade 144. This blade has a hub 144' fitted with a pivot pin 145 which pivots in the leftward one of the posts 140. Under pressure of a compression spring 146 acting on the pivot pin the blade 144 is biased rearwardly against an upturned arm 147 at the left end of a blade 148 that is held by screws 149 to the lower die between the posts 140. When the dies are open the pivoted blade 144 is held in an upwardly inclined position, shown in Figure 16, by the coaction of a pin 150 on the blade with a slot 151 in the rearward end of the upper die. By this same coaction the blade 144 is moved downwardly—and guided by the arm 147—into shearing engagement with the lower blade 148 as the dies are closed, and is returned upwardly as the dies are next opened.

It will be understood that a sheet 10 is to be inserted into the die unit as far as to the lower blade 148 so that the edge of the sheet will be placed at the shearing line of the blades. In order for the sheet to be so placed the hub 144' of the pivoted blade is offset rearwardly of this shearing line, as into a recess 152 in the leftward post 140. Thus, in inserting the sheet against the arm 147 of the lower cutting blade it is placed below the cutting face of the upper pivoted blade 144. As the dies are closed this cutting face of the blade moves into the plane of the face of the upper die, as is shown dottedly in Figure 16, and cooperates thus with the upper die to apply the sheet to the tape.

The embodiments of my invention herein disclosed are intended to be illustrative and not limitative of my invention since these may be changed and modified within the range of engineering skill without departing from the scope of my invention, which I undertake to express according to the following claims.

I claim:

1. In a machine of the character described: the combination of upper and lower cooperating dies, the upper one of said dies comprising a plate terminating in a cutting edge at one side thereof and said lower die including a cutting member cooperable with said cutting edge; means to hold a sheet adjacent to the face of said upper die in position wherein an edge of the sheet is aligned with said cutting edge; and guide means carried by said lower die for directing an adhesive tape across said cutting member for application to said sheet.

2. In a machine of the character described: the combination of a die unit comprising a stationary upper die plate across the lower face of which a

sheet is held for operation thereon by the unit, and a lower cooperating die member mounted to move upwardly into engagement with said upper die; and means carried with said lower die member for feeding adhesive tape between said dies for application to said sheet as said lower die is raised.

3. A die unit for a machine of the character described, comprising closeable upper and lower dies between which an adhesive tape is to be fed; and means to hold a sheet in position wherein the same extends across the face of said upper die for application to said tape when said dies are closed, said means comprising an extension on said upper die member beyond the face thereof and a support member carried by said extension and underlying said sheet at the side of said lower die.

4. In a machine of the character described adapted for operation with the non-drying adhesive tapes: the combination of upper and lower cutting members adapted to engage in scissors relation; means to hold a sheet across the face of said upper cutting member in position wherein the edge of the sheet is aligned with the cutting edge thereof; and means associated with said lower cutting member for holding an adhesive tape in position wherein the tape extends across the cutting face of the lower cutting member with the adhesive side of the tape facing upwardly towards the sheet, whereby the non-adhesive side of the tape is backed by the cutting face of the lower cutting member and the adhesive side of the tape is backed through the sheet by the cutting face of the upper cutting member when said cutting members are engaged.

5. A die unit adapted for applying a strip from a supply roll of non-drying adhesive tape to a sheet and shearing the strip from the roll, comprising a pair of die members adapted to engage in parallel relation and across the respective faces of which the sheet and tape strip are fed with the adhesive side of the tape facing the sheet; a first cutting edge secured to the die member backing the sheet; a second cutting edge held to the other die member in inclined relation to said first cutting edge, means resiliently mounting one of said cutting edges on the respective die member for engagement with the other cutting edge in a scissors relation when said die members are closed; and means associated with said second cutting edge and moved therewith in directions of closing of said die members for backing the non-adhesive side of a portion of the free length of tape leading from said die unit to said supply roll.

6. A punching and shearing unit for a machine of the character described comprising a pair of cooperating die members; shearing means associated with and actuated by said die members when the same are closed, said die members having rigid portions with aligned holes therein; a punch member slidably fitting the said hole in one of said die members and normally held retracted from the face of the same; and means for closing said die members and concurrently for moving said punch relative to said one die member to project said punch beyond said face.

7. A die unit for a machine of the character described, comprising a pair of cooperating die members; a pair of pivotally connected scissors cutters, one of said cutters being held fixed to one of said die members in a position between the die members; and means coupling the other of said cutters to the other of said die members to engage the cutters as the die members are closed.

8. A die unit for operation on an adhesive tape fed thereto, comprising a first cutting member; a second cutting member having an extension slidably engaging said first cutting member to guide the cutting edges of said members into shearing engagement when said cutting members are closed; and a guide way for directing said tape past the cutting edge of said second cutting member to said unit, said guide way being held stationary to said second cutting member and having walls set in from the inner edge of said extension and from the cutting edge of said second member whereby to withhold the tape during the feed thereof, from contact with the said edges of said second member.

9. In a machine of the character described: the combination of a die unit adapted for operation on a sheet held in a plane in predetermined relation to the unit, said unit having a shearing edge inclined to said plane; a feed wheel held axially parallel to said plane and adapted for feeding adhesive tape to said unit for application to said sheet by said unit; and means for directing the tape across said cutting edge, said means having the guide surface thereof extending substantially from the periphery of said feed wheel and curved to terminate in line with said cutting edge.

10. In a machine adapted for applying a reinforcing tape to a sheet and punching the sheet and including a shearing die mechanism; the combination of means for feeding a strip of tape of predetermined length to said die mechanism; manual means for actuating said feeding means, and means operated automatically in the actuation of said manual means for operatively disconnecting the latter from said feed means at the completion of feed of a single length of said tape.

11. In a machine adapted for applying an adhesive tape to a sheet and punching the tape and sheet: the combination of a die mechanism; means operable to feed a strip of tape of predetermined length to said die mechanism; manual means operable to actuate said feed member and said die mechanism sequentially; and means operated upon actuating said feed means for rendering said manual means ineffective to produce more than a single operation of said feed means between successive actuations of said die mechanism.

12. In a machine adapted for applying a reinforcing tape to a sheet and punching the tape and reinforced portion of the sheet and including a punching and shearing die mechanism and means to feed a strip of adhesive tape into said die mechanism: the combination of actuating means for said die mechanism and feed means; means to render said actuating means ineffective as to said feed means as an incident to the completion of a single actuation of the feed means; and means operated incidental to closing said die mechanism by said actuating means to restore the actuating means to effective condition as to said feed means.

13. In a machine adapted for applying a strip from a supply roll of non-drying adhesive tape to a sheet and severing the strip free from said roll: the combination of a pair of scissors cutters; means for feeding adhesive tape from said supply roll past said cutters; means to close said cutters; and means operable to retract the free end of the tape supply from said cutters and to open the cutters in the sequence here named.

14. In a machine adapted for applying a strip

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from a supply roll of non-drying adhesive tape to a sheet and shearing the strip free of the supply roll: the combination of a pair of shearing dies and actuating means therefor; means to feed the adhesive tape between said dies; and means operatively associated with said actuating means and operated incidental to opening said dies to retract the free end of the tape supply from said dies.

15. A machine for applying a reenforcement to a sheet comprising an operating mechanism including a closable die unit having an opening for receiving said sheet and held spacedly above the base of the machine with said opening extending in a downwardly inclined direction, and a member for supporting said sheet in said die unit, said member extending upwardly from the base level of the machine to said unit.

16. In a machine adapted for operation on sheets and including an enclosing housing: the combination of a die mechanism within said housing into which the sheet is placed, said die mechanism being adjustable laterally of the machine for operation on the sheet at selected positions; a scale on said housing; and a pointer on said mechanism cooperating with said scale to indicate to the operator the adjusted position occupied by said mechanism.

17. In a machine adapted for operation on sheets: the combination of a housing including a table on which a sheet is to be held; a plurality of unitarily operable die mechanisms in said housing movable along said table; and detent means to hold said respective mechanisms yieldably at predetermined relative spacings.

18. In a machine of the character described comprising a roll of adhesive tape and a rotatable support for said roll affording axial freedom of movement to the roll: the combination of a die mechanism adapted for applying adhesive tape to sheets, said die mechanism having an opening through which adhesive tape is to be fed thereto from said roll; a feed wheel held axially parallel to said roll and in predetermined position relative to said opening for feeding adhesive tape to said mechanism; means extending from the periphery of said feed wheel to one side of said opening for directing the tape from the feed wheel toward said opening; and means cooperating with said feed wheel for holding said roll substantially fixed relative to the feed wheel in directions axial of the roll whereby the tape from said feed wheel is directed through said opening.

19. In a machine including a die mechanism for applying non-drying adhesive tape to sheets: the combination of a pin wheel for feeding tape, with the gummed side facing upwardly, across the lower die of said die mechanism, said pin wheel extending below the die mechanism and requiring the die mechanism to be spaced above the base of the machine, said die mechanism being inclined downwardly toward the front of the machine; and an upwardly inclined support for said sheets extending from the base of the machine to said die mechanism.

20. In a machine for applying strips of tape to sheets: the combination of a die member and a cooperating closable presser plate; cutting means comprising an edge on said plate and a cutting blade associated with said die member, said blade being adapted to engage said edge in scissors relation when said die member and plate are closed; means for feeding adhesive tape past said cutting means between said die member and

presser plate with the ungummed side of the tape facing said cutting blade; and positioning means for the free length of tape extending from said cutting means, said positioning means extending away from said die member and being held fixed in relation to said cutting blade in directions of movement between the die member and said presser plate.

21. In a machine of the character described: the combination of a pair of closable presser members; a blade projecting from a side of one of said presser members toward the other for scissors engagement with an edge of said other member when the presser members are closed; means for feeding adhesive tape across said blade and between said presser members, with the adhesive side of the tape facing said other member; and means for holding a sheet adjacent the face of said other member.

22. The combination as set forth in claim 21, further including a punch associated with said one presser member, and a hole in the other of said members to receive said punch when said members are closed.

23. In a machine of the character described: the combination of a pair of closable presser members; a blade projecting from a side of one of said members toward the other for scissors engagement with an edge of said other member when the members are closed; means for feeding adhesive tape past said blade between said members with the adhesive side of the tape facing said other member; and means carried with said blade and projecting from said presser members for backing the ungummed side of the adhesive tape fed between said members.

24. In a machine of the character comprising a die mechanism including a stationary member and a cooperating movable member: the combination of a blade projecting from said movable member towards said stationary member and adapted to engage the latter in scissors relation when the die mechanism is closed; and a mechanism for feeding adhesive tape past said blade into said die mechanism with the adhesive side of the tape facing said stationary member, said mechanism including means carried with said movable member and transverse to said blade for backing the ungummed side of the tape leading to said die mechanism.

25. In a machine for applying adhesive tape to sheets including a supply roll of adhesive tape: the combination of a die mechanism; means for feeding successive lengths of adhesive tape to said die mechanism; means including a manually reciprocable actuating member for operating said feeding means to feed a length of tape upon each forward stroke of said member; and a coupling between said actuating member and said die mechanism for closing the die mechanism upon the actuating member being moved through the forward stroke of its travel, said coupling being two-way acting whereby to open the die mechanism positively as the actuating member is moved through its return stroke.

26. In a machine for applying adhesive tape to sheets including a supply roll of adhesive tape: the combination of a die mechanism; means for feeding successive lengths of tape to said die mechanism; a manually reciprocable actuating means for operating said feeding means upon each forward stroke thereof; and a lost-motion coupling between said actuating means and said die mechanism for closing the die mechanism as the actuating means is moved through the final

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portion of its forward stroke, said coupling being effective upon movement of the actuating means through the first portion of its return stroke for positively opening said die mechanism.

27. In a machine adapted for applying adhesive tape to sheets, including a die mechanism into which the sheets are held: the combination of actuating means for closing and opening said die mechanism; feed means having driving connection with the tape in both forward and retracting movements thereof and adapted on forward movement to project the tape into said die mechanism; and means operatively associated with said actuating means and operated incidental to opening said die mechanism for effecting a retraction of said feed means.

28. In a machine of the character described comprising a die mechanism including a punch: the combination of a member associated with said punch for stripping the work from the latter when the die mechanism is opened; means for projecting adhesive tape into said die mechanism and across said stripping member, said means being characterized as imparting a bias to the tape tending to cause the tape to curve towards the stripping member, and said stripping member being curved to conform to the natural curvature of the tape under the influence of said bias whereby to reduce the sliding friction of the tape on said stripping member.

29. In a machine of the character described: the combination of a die mechanism including a punch; a spring member overlying said punch for stripping the work from the punch when the die mechanism is opened; means for projecting a length of adhesive tape across said spring member, said spring member having an aperture for clearing the same from said punch when said die mechanism is closed, said aperture extending from said punch in the direction of feed of the tape and at least as far as the distance of feed of the tape across the spring member.

30. In a machine for applying pressure-sensitive adhesive tape to a sheet and punching the sheet and tape: the combination of a pair of die members for pressing the tape into adhesive contact with the sheet, said die members having co-

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operating die faces and being mounted for closing and opening movement, and said die members having rigid portions with aligned holes therein; a punch slidably fitting the said hole of one of said die members and reciprocable relative to the latter; spring means operatively interposed between said punch and said one die member for yieldably holding the punch retracted relative to the face of said one die member; and means, effective to exert a force on said punch relative to the other of said die members sufficient to overcome said spring means, for closing the die members and projecting said punch through said sheet and tape into said hole of said other die member, said spring means being effective to retract said punch relative to said one die member when the force on the punch is relieved whereby to strip the sheet and tape from the punch and concurrently cause the side wall of the punch to be cleaned by said rigid portion of said one die member of gum picked up from the tape.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
456,211	Anderson	July 21, 1891
891,150	Crowley	June 16, 1908
1,089,587	Rowe	Mar. 10, 1914
1,119,506	Gundlach	Dec. 1, 1914
1,380,492	Moore	June 7, 1921
1,697,958	Manker	Jan. 8, 1929
1,952,618	Weller	Mar. 27, 1934
1,977,000	Landrock	Oct. 16, 1934
2,017,865	Morgan	Oct. 22, 1935
2,228,372	Skrebba	Jan. 14, 1941
2,285,447	Lichter	June 9, 1942
2,326,697	Stuart	Aug. 10, 1943

FOREIGN PATENTS

Number	Country	Date
226,668	Germany	Oct. 7, 1910