Aug. 26, 1958 T. ROWLANDS ET AL 2,849,234

SHEET FEEDING MECHANISM

Filed June 9, 1955 4 Sheets-Sheet 1

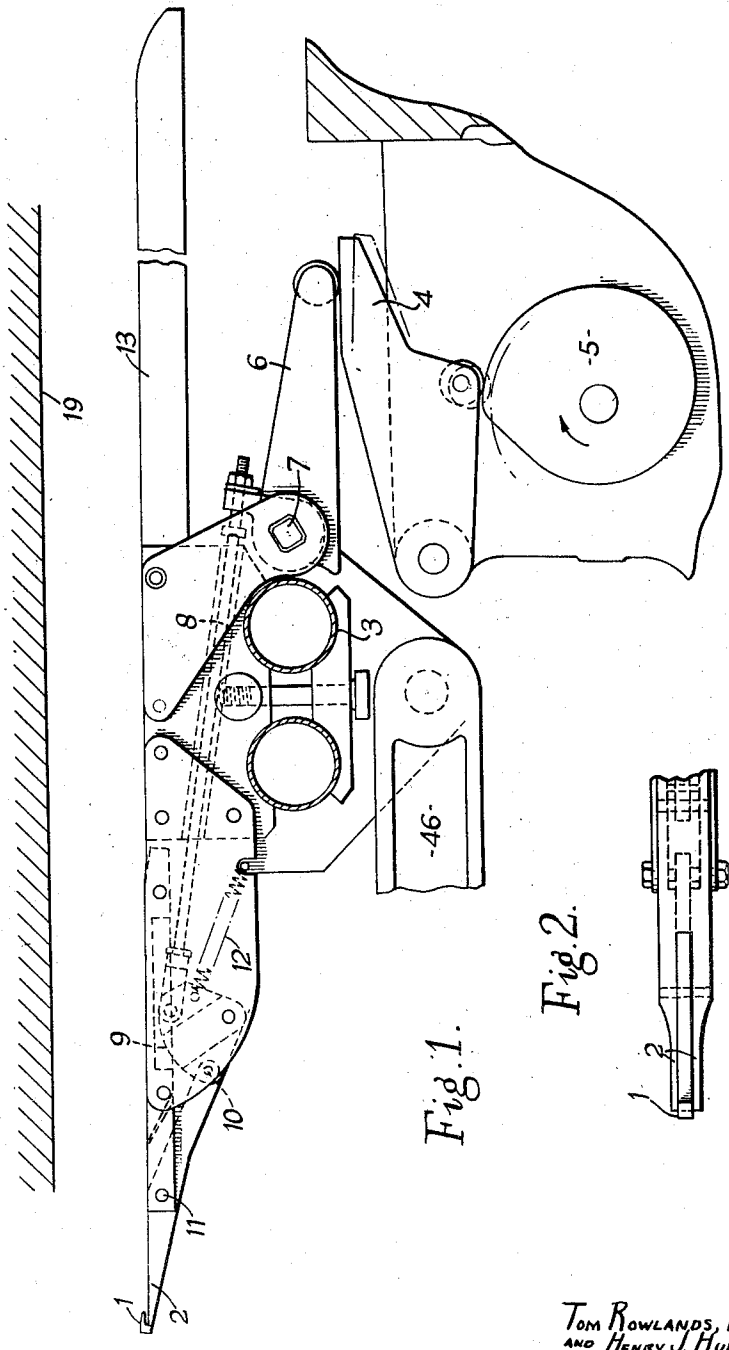



Fig. 1.




Fig. 2.

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SHEET FEEDING MECHANISM

Filed June 9, 1955 4 Sheets-Sheet 2

Fig. 3.

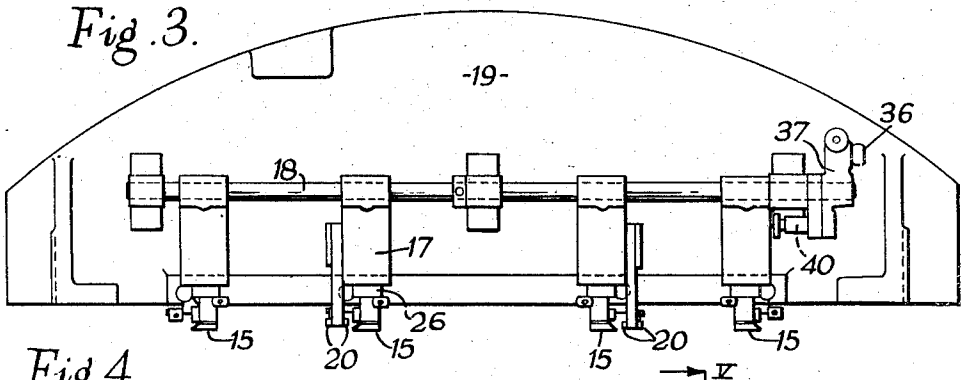



Fig. 4.

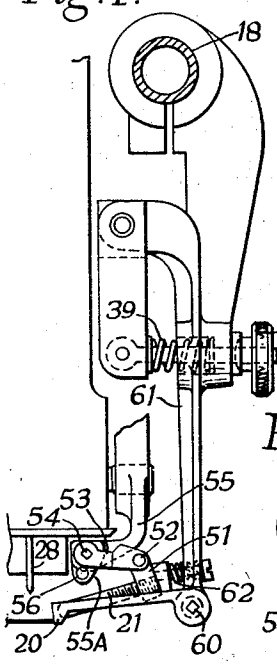



Fig. 5.

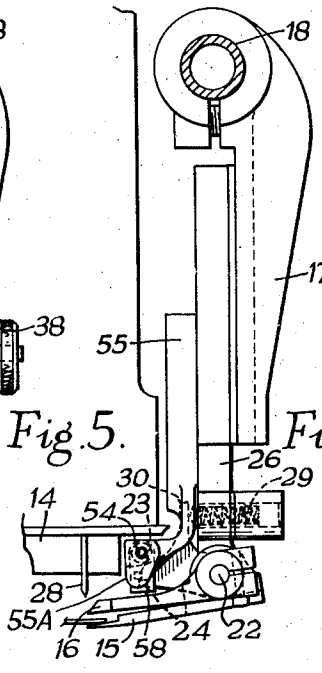



Fig. 6.

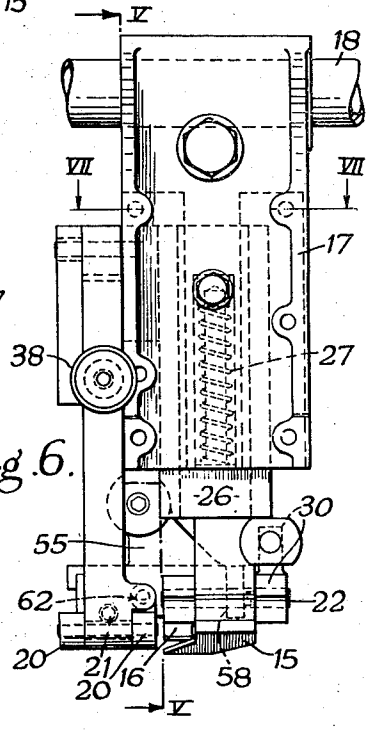
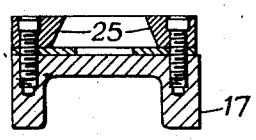



Fig. 7.



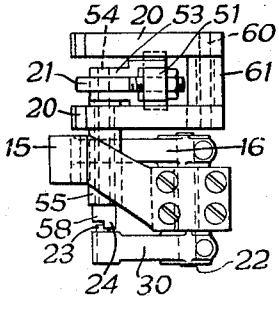




Fig. 8

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SHEET FEEDING MECHANISM

Filed June 9, 1955 4 Sheets-Sheet 3

Fig. 9.

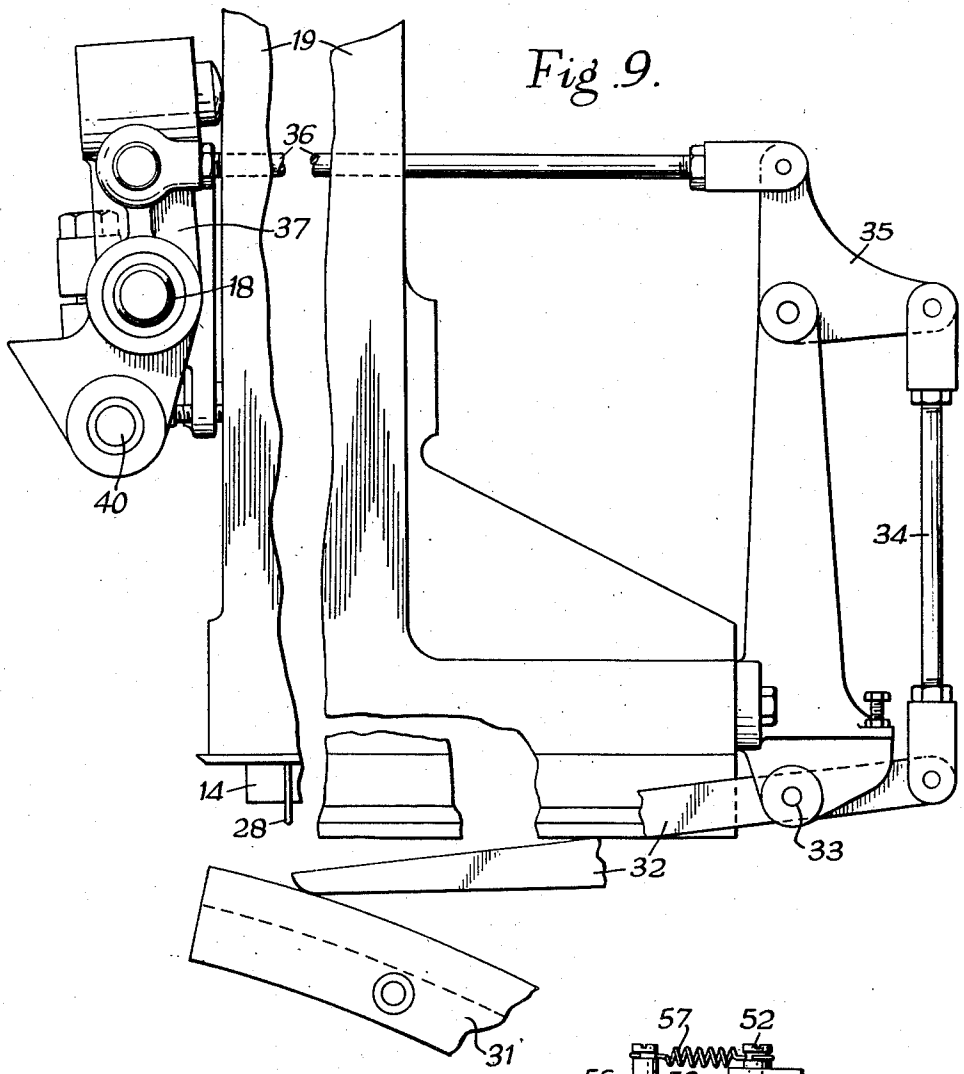
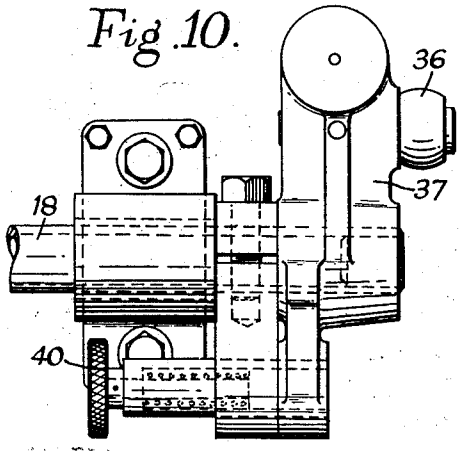



Fig. 10.



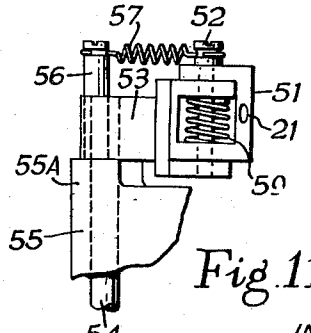




Fig. 11.

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Aug. 26, 1958 T. ROWLANDS ET AL 2,849,234

SHEET FEEDING MECHANISM

Filed June 9, 1955 4 Sheets-Sheet 4

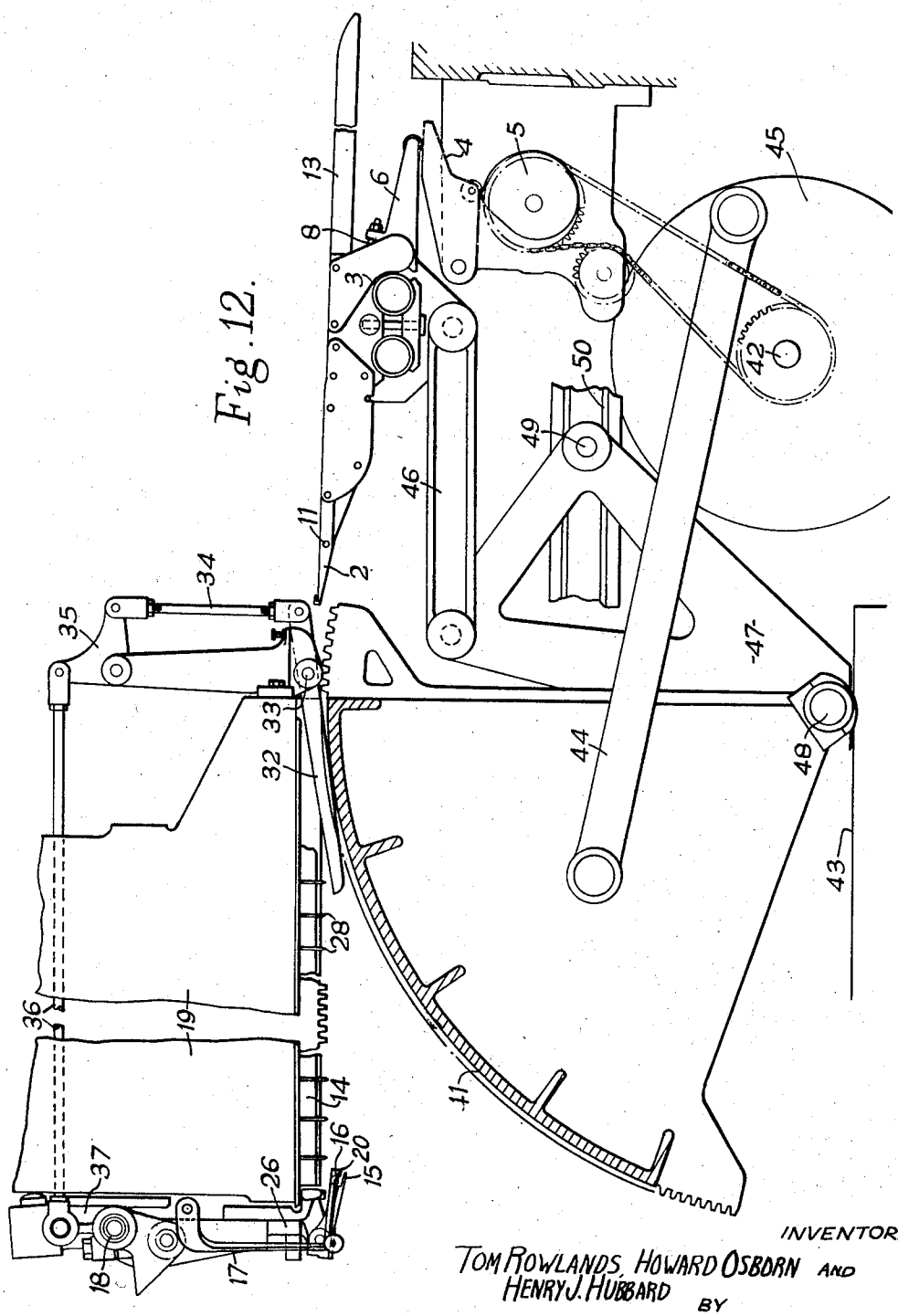



Fig. 12.

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2,849,234

# SHEET FEEDING MECHANISM

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Application June 9, 1955, Serial No. 514,204

Claims priority, application Great Britain June 11, 1954

6 Claims. (Cl. 271—44)

This invention relates to sheet feeding mechanism for use with a cutting and creasing machine of the kind described and illustrated in Rowlands United States Patent No. 2,737,238 granted March 6, 1954. In said machine, a segment of a drum rolls beneath a forme carried by a crosshead and the arcuate face of the segment presses a sheet of material against the forme and effects the desired operations on the sheet. Sheets are fed to the machine by a reciprocating sheet carrier or grill to which sheets are supplied by a suitable sheet feeder. As explained in detail in said specification, a sheet is fed by the grill into the proper position beneath the forme when the segment is at, or near, the end of its movement away from the sheet feed and cutting or like operations are effected as the segment rolls back again towards the sheet feed.

When material such as carton board is to be fed to such a machine it is too fragile or flimsey to be fed by toothed pushers or the like from beneath a pile in a magazine.

The purpose of this invention is to provide devices to feed carton board by mechanically operated gripper mechanism. Previously it has been customary to use suction-type grippers but these suffer from the disadvantage that the suction cut-off produces inaccuracies in the register of the sheets.

According to the present invention there is provided sheet feeding mechanism for a machine of the kind referred to comprising a sheet feeding gripper attached to the grill and operated to grip a sheet by its front edge and drag it as the grill moves outwards from the sheet feeding magazine to register the sheet against a stop or lay whereupon the gripper releases the sheet and leaves it in position for the cutting and creasing operations. The gripper may be mechanically operated to open for sheet gripping and close on the sheet under the influence of a spring whereby the gripper can slide off the sheet against the spring influence when the sheet is registered against the lay.

Further according to the invention there is provided sheet feeding mechanism as set forth in the preceding paragraph comprising a further gripper located at the lay position said gripper being open to receive a sheet brought against the lay by the sheet feeding grippers and operated to close and grip the sheet as the latter is released by the sheet feeding grippers. Preferably the further gripper is spring-operated for gripping engagement and is held open by catch devices which are released or triggered by the sheet feeding grippers as they pass by on releasing the sheet. On release of the sheet the latter may be still supported on the gripper until the grill moves under it to receive the sheet whereafter the gripper may be swung aside to permit the sheet to drop on to the grill.

The invention will be more fully described with reference to the accompanying drawings in which:

Figure 1 is a side elevation of a gripper sheet feeding device attached to the grill of the machine;

Figure 2 is a plan of the left-hand end of Figure 1;

Figure 3 is a small scale view of the crosshead of the machine, looking from the delivery end of the machine, some parts being omitted;

Figure 4 is a side elevation of a front stop or lay shown towards the middle of Figure 3 and to a larger scale in Figure 6.

Figure 5 is a side elevation of a gripper device shown in Figures 3 and 6 and is a section of Figure 6 on the line V—V;

Figure 6 is a front elevation of a gripper device and an associated lay.

Figure 7 is a section of Figure 6 on the line VII—VII;

Figure 8 is a view of the underneath of Figure 6;

Figure 9 is a diagrammatic side elevation of the crosshead of the machine, shown broken, and showing the attachment of parts in accordance with the present invention;

Figure 10 is an enlarged view of part of Figure 3 showing a latch device;

Figure 11 is an underneath view of a fragment of Figure 4.

Figure 12 is a skeleton sectional elevation of the machine showing the location of the parts illustrated in Figures 1 to 11.

The sheets are first fed one at a time to a front lay mechanism by any suitable sheet feeding mechanism and are side-registered against a fence in the usual manner before mechanism forming the subject of the present invention moves into contact with a sheet.

Referring first to Figures 1 and 2, a gripper sheet feeding device has two members consisting of a hook **1** and jaws **2** which are carried on two tubular members **3** which are fixed to the sheet carrier or grill **13** near the end which is nearer to the feed end of the machine. In practice there are usually four sets of these gripper sheet feeding devices spaced across the machine. As will appear later these devices cooperate at times with stops or lays associated with further gripping devices and they are suitably spaced to ensure this.

When the segment **41**, Figure 12, is rolled towards the feed end of the machine, that is, the right-hand end in Figure 12, each hook **1** is caused to open relatively to the outer lower jaws **2** by reason of mechanism, operated by a cam lever **4**, off a cam **5** which is driven from the main crankshaft **42**. The cam **5** lifts the lever **4** which rocks a lever **6** about a centre **7** and a push rod **8** rocks a further lever **9** to which is pivoted at **10** one end of the gripper member **1**, which is itself pivoted at **11** to the jaws **2**. A spring **12** moves the hook in the reverse direction. The sheet is gripped on its front edge and is pulled by the gripper members into and through the mahine to the cutting position where it is finally registered by its front edge against suitable front stops or lays **20** described below.

In Figure 1 part of the grill is indicated at **13** and the face of the crosshead to which the forme is attached is also shown.

Referring now to the remaining figures, the sheet is delivered by the gripper sheet feeding devices **1** and **2** into four sets of open gripper jaws **15** and **16**, Figures 5, 6 and 12, which are mounted in brackets **17** on an oscillating tube **18** carried on the delivery side of the crosshead **19**. These sets of grippers are spaced across the machine as shown in Figure 3. With each set of gripper jaws is associated a front stop or lay as will now be described. In Figure 3 the lays of the outer sets of gripper jaws are not shown but in each case the lay is disposed in the same manner as is the case of the gripper set nearer thereto. The sheet comes to rest lying against the adjustable lay members **20**, Figures 3 and 4, and the grippers **1** and **2** then slide off the sheet as the grill moves on. The hook **1** being spring loaded closes immediately

it slides off the sheet so that on the return stroke these hooks pass under the sheet.

Each set of sheet feeding grippers **1** and **2** in sliding forward strikes a movable member shown as a rod **21**, Figure 4, which triggers-off the top gripper jaw **16** of the associated set of gripper jaws so that the gripper closes. The top gripper jaw **16** is fixed to a spindle **22** to which is also fixed a lever **30** on which is fixed a square catch pin **23** which rests on a trigger catch pin **24**, movable with the rod **21** and attached thereto as described below. A strong spring **29** presses on the lever **30** to which the catch pin **23** is attached. As the rod **21** is pushed to the right in Figure 4 the trigger catch pin **24**, Figure 5, moves past the pin **23** and the latter and the lever **30** can then swing down under the pressure of spring **29**, moving the jaw **16** and closing the gripper on the sheet.

Each rod **21** is screwed into a block 51 pivoted at 52 in a slotted lever **53** fixed to a pivot pin **54** rotatable in a bracket **55**. In Figure 4, **56** is a spring pin shown better in Figure 11 and fixed in a lug **55A** of the bracket 55. A spring **57** between pin **56** and the pivot **52** urges the rod **21** towards the left in Figure 4. The other end of pivot pin **54** has a block **58** fixed to it in which is fixed the square pin **23**, see Figure 8. The pivot **52** is surrounded by a torsion spring 59. Further the lay **20** is pivoted at **60** to its adjustable support bracket **61** and pressed into operative position by a spring **62**. The purpose of the pivotal spring-controlled mountings of the rod **21** and the lay **20** is that these parts have to rise as will now be explained as the segment rolls into its extreme position away from the feed end of the machine. As will be understood from Figure 12 the movement of the sheet into the gripper jaws **15** and **16** takes place as the segment **41** nears the end of its rolling movement away from the feed end of the machine. The last part of said movement lifts the leading end of the sheet towards the forme and by pressing on the jaw **15** of each gripper set raises the whole gripper set assembly together with the sheet. The movement also lifts the parts **20** and **21**. The parts **21** and **20** have already done their work before the segment contacts with them and as the segment goes back to the other end of the machine the parts **21** and **20** return to their operative positions ready for the next sheet.

Meanwhile the sheet is held securely in the jaws **15** and **16** of each set of gripper jaws with the front edge "layed" against the associated lay **20** and as the segment **41** rolls to said extreme position each set of gripper jaws which is carried on a slider **26** rides on the tympan of the segment which presses the gripper jaw **15** upwards. Each set is guided by the slider **26** sliding vertically in dovetail guides **25** formed in the bracket **17**.

On the segment rolling back on its return stroke, the sets of gripper jaws **15** and **16** return to the lower position as each slider **26** moves down under the action of a spring **27** and the sheet is thereby ejected from the cutting rules **28**, this ejecting force being additional to that exerted by the usual rubber ejectors fitted in the forme.

Just before each slider reaches the lowest position the trigger catch pin **24** of the set of gripper jaws carried thereby engages catch pin **23** causing the jaw **16** to move and open the gripper but the sheet still rests on the lower jaw **15**, see Figure 5. This feature greatly assists the entry beneath the forme of the delivery mechanism which receives the finished sheet and carries it out of the machine. Since the gripper jaws **15** and **16** move up and down vertically the sheet register is preserved. Delivery mechanism for this machine is fully described in the patent referred to and by supporting the sheet on the jaws the sheet is held above the level of the delivery tapes of such mechanism.

In order that the jaws should finally drop the sheet on to the delivery tapes the tube **18** is caused to swing slightly as the segment reaches the feed-end position in the machine. This swinging motion is obtained by a lift plate **31**, Figure 9, attached to the side of the segment at a suitable position and which raises a lever **32**.



The lever **32** is pivoted to the crosshead at **33** and a rod **34** rocks a bell crank **35** coupled to a link **36** pivoted to a lever bracket **37** fixed to the tube **18**.

The lay **20** can be adjusted as to position by a nut **38** and spring **39**, Figure 4, the arrangement permitting adjustment while the machine is in motion.

It is desirable that the whole lay and gripper assembly should be movable out of its operative position so as to permit access to the underside of the crosshead and allow the chase to be removed. For this purpose the tube **18** is coupled to the lever bracket **37** by a spring plunger **40**, Figure 10. When the plunger **40** is withdrawn the tube **18** and all parts carried thereby can be swung upwards out of the way when desired.

A cutting and creasing machine similar to that described in the patent referred to is shown in outline in Figure 12 and referring now to that figure the segment **41** is rolled to and fro along a surface **43** by a connecting rod **44** driven by a crank disc **45**. The grill **13** is reciprocated by a link **46** connected to a triangular lever **47** which is connected to the segment at **48**. At **49** there is a cam follower running in a track **50** for the purpose of modifying the grill motion relatively to the segment motion. This grill drive which forms the subject of United States application Serial No. 505,496, filed May 2, 1955 has no bearing on the present invention but is briefly described because of the illustration in Figure 12.

What we claim as our invention and desire to secure by Letters Patent is:

1. In a cutting and creasing machine of the kind comprising a segment of a drum which rolls beneath a forme and the arcuate face of the segment presses a sheet against the forme to effect the desired operations on the sheet, mechanism comprising a reciprocating sheet carrier having a gripper for carrying a sheet beneath said forme to register against a front lay, whereafter the gripper slides off the sheet as the sheet carrier continues its motion, a further gripper having jaws and located at the lay position, actuating devices for said gripper jaws arranged to open and hold them open to receive a sheet brought against the lay by the said sheet feeding gripper and means operable thereupon to close said further gripper jaws and hold the sheet in the lay position.

2. Mechanism as claimed in claim 1 wherein the further gripper has a fixed jaw and a movable jaw which latter is moved towards the fixed jaw for gripping engagement on the sheet by spring operated devices, said devices being held inoperative after the jaws have been opened by said actuating devices by catch devices comprising an abutment movable with the movable jaw and a cooperative abutment movable with a movable member and disposed in catching engagement to hold the jaws open as the sheet moves into the open gripper, the catch devices being released from catching engagement by the sheet feeding gripper which strikes the aforesaid movable member as it passes on with the sheet carrier after releasing the sheet, to permit the jaws of said further gripper to close under the action of said spring operated devices.

3. Mechanism as claimed in claim 2 wherein the said further gripper is mounted for upward movement after it has gripped the sheet, said movement being effected by the segment which presses on the lower jaw of the gripper as the segment rolls beneath it and a spring is provided for moving the gripper downwards as the segment rolls away from the gripper position, and said abutment movable with the movable jaw is arranged on first engaging the cooperating abutment towards the end of the downward movement of the further gripper to move said movable jaw and open the gripper against the influence of the spring operated devices whereafter the

abutments remain in catching engagement to hold the gripper jaws open.

4. Mechanism as claimed in claim 1 wherein the said further gripper is mounted for upward movement after it has gripped the sheet, said movement being effected by the segment which presses on the lower jaw of the gripper as the segment rolls beneath it and a spring is provided for moving the gripper downwards as the segment rolls away from engagement with the said further gripper, the downward movement of the gripper aiding in removing the gripped sheet from engagement with the forme.

5. Mechanism as claimed in claim 4 comprising means for opening the jaws of said further gripper towards the end of the downward movement whereby the sheet is released from the jaw grip, the gripper having a movable upper jaw and a fixed lower jaw and the lower jaw at the end of said movement being positioned and held to support the sheet.



6. Mechanism as claimed in claim 5 including means for disengaging said sheet from the lower jaw, said means consisting in that the further gripper is pivoted for movement away from the sheet and means are provided for effecting said movement to swing said lower jaw out of supporting engagement with the sheet.

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