June 10, 1952 H. E. PEYREBRUNE 2,599,776

SHEET GRIPPER STRUCTURE AND SETTING MEANS THEREFOR

Filed May 24, 1947 2 SHEETS—SHEET 1

Fig. 1

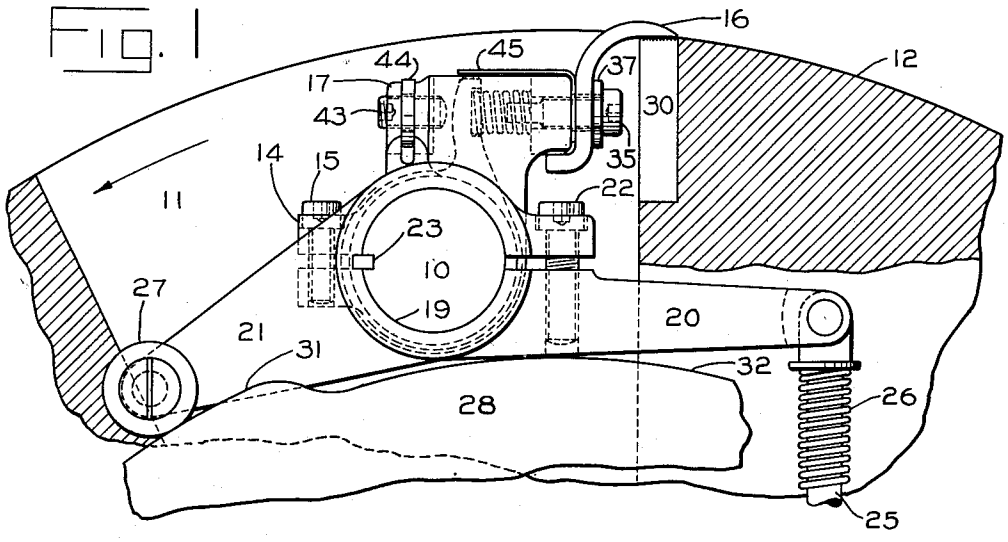


Fig. 2

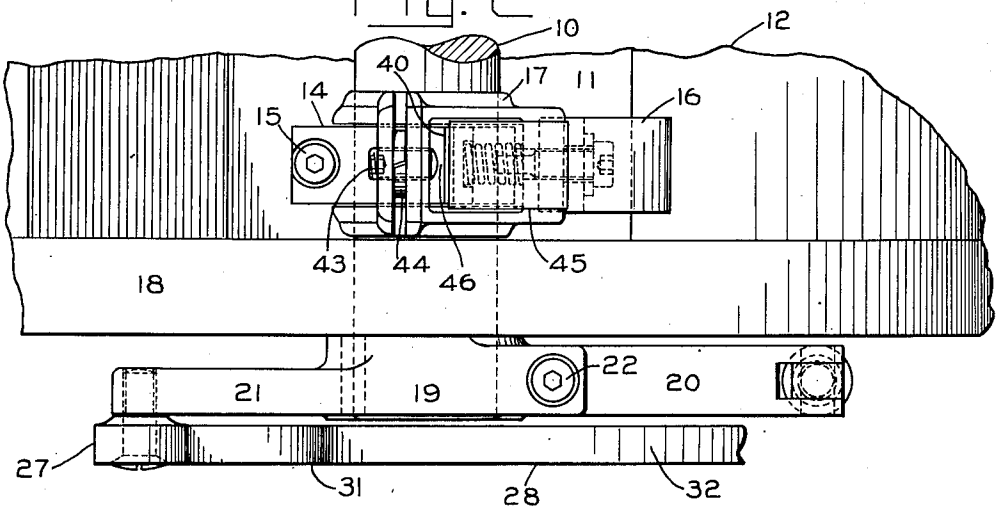
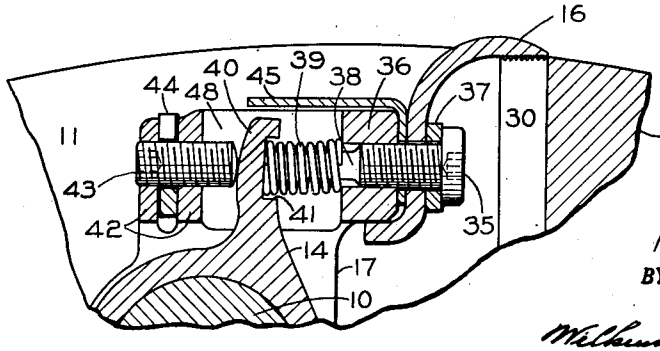


Fig. 6



INVENTOR.
Henri E. Peyrebrune
BY
Millhiser Hurley Byrne & Hume

June 10, 1952 H. E. PEYREBRUNE 2,599,776

SHEET GRIPPER STRUCTURE AND SETTING MEANS THEREFOR

Filed May 24, 1947 2 SHEETS—SHEET 2

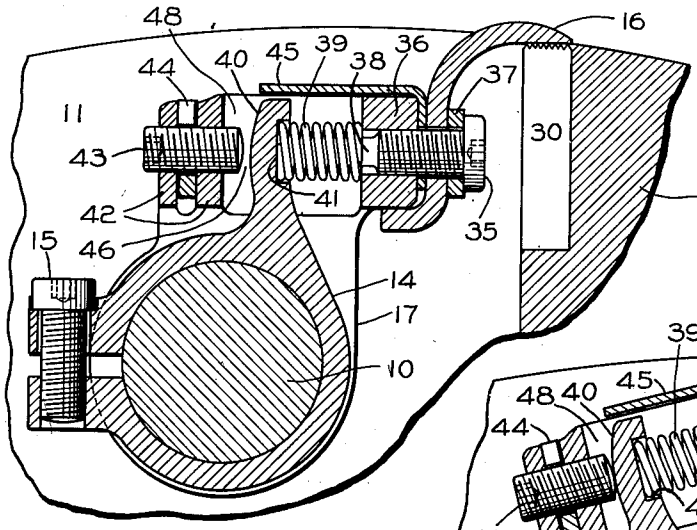


Fig. 3

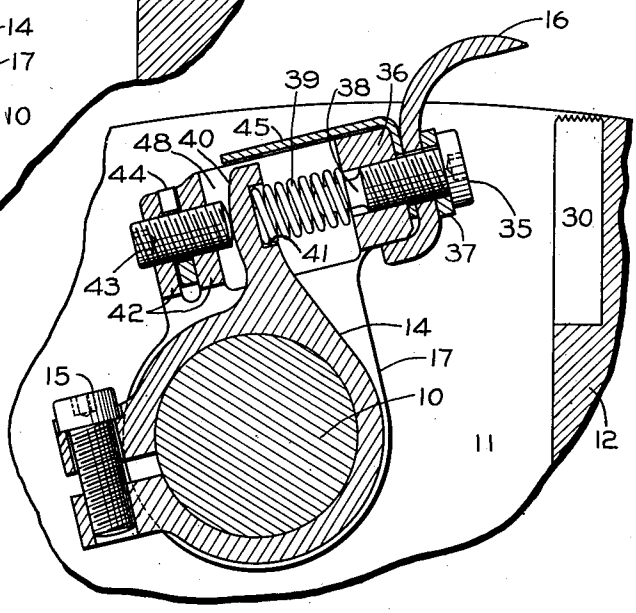


Fig. 4

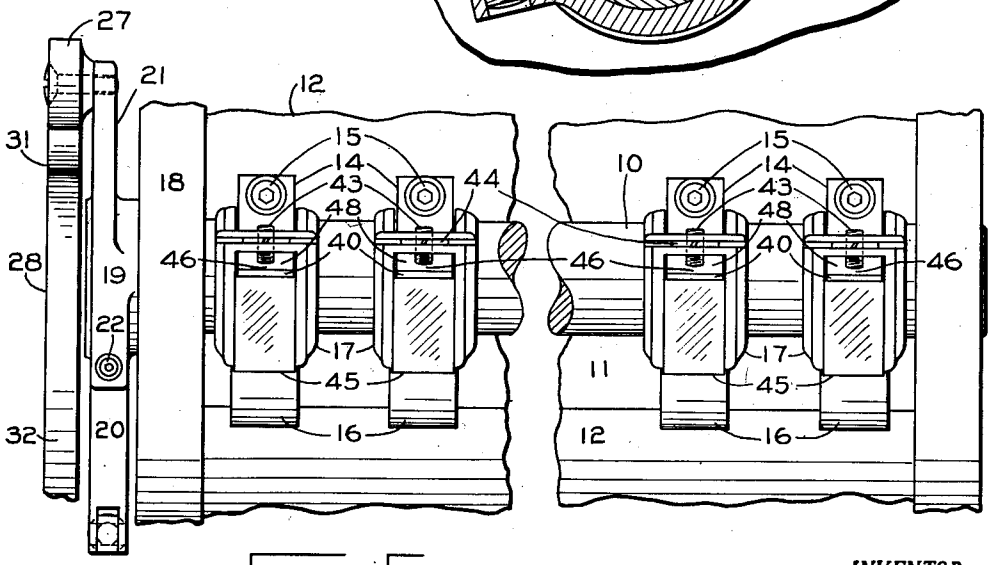


Fig. 5

INVENTOR.
Henri E. Peyrebrune
BY

Wilkinson Huxley Byron & Hume

Patented June 10, 1952

2,599,776

UNITED STATES PATENT OFFICE

2,599,776

SHEET GRIPPER STRUCTURE AND SETTING MEANS THEREFOR

Henri E. Peyrebrune, River Forest, Ill., assignor, by mesne assignments, to Miehle Printing Press and Manufacturing Company, Chicago, Ill., a corporation of Delaware

Application May 24, 1947, Serial No. 750,311

5 Claims. (Cl. 101—409)

1

This invention relates to improvements in the structure of sheet gripper assemblies and to a novel method for setting the gripper fingers with respect to their associated supporting pads. The invention more specifically pertains to that general class of grippers and operating mechanism therefor such as are generally used for the handling of sheets in printing presses and similar paper processing machines.

In multi-color printing, the problem of maintaining accurate register of the sheets during their travel through two or more printing units to receive several color impressions in succession, always presented difficulties in the past. These difficulties become more acute as the productive speed of the printing presses is increased.

I have found that in order to assure the maintaining of accurate register of the sheets in multicolor jobs and particularly so when the sheets, during their travel from one printing unit to an adjacent one, are to be transferred several times in succession, the following principal requirements must be fulfilled so far as the sheet gripper structure is concerned.

The grippers whereby the sheets are held to the impression cylinder or to sheet transfer members, must hold the sheets sufficiently firm so as to avoid any slippage of the sheets even under the most severe pull. This is particularly apparent in the operation of lithographic offset presses where the ink impression is offset onto the material to be printed by means of a rubber blanket to which the printed sheets cling and therefore must be stripped from it under considerable tension. This is especially true when the printing speed is high.

Furthermore, the gripper units must be adjustable laterally on their support, such as for instance on a shaft mounted within the gap of an impression cylinder, so that they can be most advantageously distributed longitudinally of the support.

All of the grippers of the same series must hold the sheet with the same pressure and be capable of retaining their original holding power under varying conditions for long periods.

The grippers must also open and close accurately and in synchronism in order to maintain the register of the sheet during their transfer from one sheet carrying member to another.

The means for closing the grippers must be such that the fingers close onto their supporting pads with minimum shock and vibration in order to avoid slippage of a sheet between the grippers and their pads. The grippers must also be easy to reset when required and easy to replace.

2

With a view to accomplishing the above requirements and inherent advantages, I have developed an improved sheet gripper assembly and a novel method for setting the grippers, which in their broadest terms are set forth in the following objects.

One of the primary aims of my invention is to provide means whereby, in a spring urged gripper finger, the spring tension of the finger with respect to its associated support or pad, can be preloaded and the preloading varied at will by means of an adjustable element, and whereby positive opening and closing relation of the gripper finger with respect to the pad can be established.

Another object of the invention consists in the provision of a novel combination of elements including a spring actuated gripper finger supported on a movable bracket and coacting with a support whereby the gripper unit is securely attached to a mounting such as a gripper shaft. The improvement also includes means for preloading the spring whereby the gripper finger is held to its supporting pad, and adjustable means whereby each gripper can be set in a manner that all of the grippers of a series mounted on a shaft or the like, will open in synchronism at a predetermined point.

A more specific object of the invention resides in a novel gripper assembly and mounting therefor in which each gripper unit includes a gripper finger support arranged for free movement on the mounting and a bracket rigidly secured to the latter. For the purpose of preloading the bite of the gripper finger, and for varying such bite, a spring is interposed between the gripper support and the bracket, the tension of which can be varied by adjustable means which latter also serve to provide a predetermined relative movement between the gripper support and the bracket to thereby establish positive opening relation between the gripper finger and its pad.

A further object of the invention and characteristic departure from known operating mechanism for the grippers is the provision of cam means whereby they are positively closed, and of spring means for opening them. Heretofore, the closing of the grippers was effected by springs and the opening by cam means.

I find that with this novel principle of closing the grippers, the shock, usually imparted to the gripper fingers by closing them with the aid of spring means, is eliminated, therefore the possibility of sheets slipping between the fingers and their supporting pads is minimized.

A still further object of my invention resides in the provision of a novel method of applying

a series of sheet gripper units to a shaft or equivalent mounting, and setting them with respect to the gripper pads. This method preferably includes the steps of preloading the gripper finger actuating spring of all units of a series, prior to securing the gripper units to their supporting means, thereby establishing a definite predetermined pressure of the gripper fingers on their cooperating pads for holding a sheet tight. Thereupon, the means whereby the preloading is effected is released and a certain predetermined clearance is established, preferably between said latter means and the brackets which form part of the gripper and which are rigidly secured to the gripper supporting means.

This clearance is to be exactly the same for all the grippers of one series and has to the effect that the grippers are opened in synchronism, thereby assuring that all the grippers of a series will release the sheet simultaneously to avoid any disturbance in the register of the sheet.

The importance of opening the grippers in synchronism may well be likened to that of a tappet adjustment of valves in automobile engines which also demands a most accurate setting to function satisfactorily, namely to open and close at certain predetermined points in the cycle of an engine, and the fact that my improved gripper structure is the first one whereby I have been able to definitely accomplish the above requirement, is proof that it has distinct novel and advantageous features over and above gripper structures used heretofore.

Still another object of the invention resides in the provision of means whereby the tension with which the gripper fingers are to engage sheets can be readily preloaded and in a manner that all of the gripper fingers of one series attached to a common supporting member shall apply onto a sheet with the same pressure. Furthermore, that the extent of preloading can be readily varied at will so that the bite or gripper tension may be more, or less, in one series than in another.

Another aim of my invention resides in a novel gripper setting procedure, whereby a synchronous opening and closing of all the grippers in one series is assured.

A further aim and object of the invention is to provide a gripper unit structure which is simple in design and economical to manufacture.

Still further objects and advantages of my invention will be apparent from the appended claims when read in conjunction with the following description and accompanying drawings which illustrate merely by way of example one preferred form whereby the principles of my invention may be accomplished.

In the drawings, which illustrate one preferred embodiment of my invention, and wherein like reference characters are used to designate like parts,

Figure 1 represents a side elevational view of my improved sheet gripper unit, shown as applied to a sheet carrying cylinder, and including conventional means for actuating the gripper finger, the cylinder being shown in section;

Figure 2 is a plan view of the parts illustrated in Figure 1;

Figure 3 is a sectional view, at a somewhat enlarged scale, of the gripper unit and showing the gripper finger closed on its associated pad;

Figure 4 is a similar view but showing the gripper finger open;

Figure 5 illustrates the arrangement of a series of gripper units applied to a gripper shaft of a

sheet carrying cylinder and including actuating means therefor, and

Figure 6 is a sectional view, similar to Figures 3 and 4, but depicting the relative positions of the parts when the bite of the gripper finger has been preloaded to a maximum.

Referring now to Figures 1 and 2 of these drawings, one of the improved gripper units which embodies the principle of my invention, is shown by way of example as applied to a gripper shaft 10 mounted within the gap 11 of a sheet carrying cylinder 12 portion of which is shown in section.

The preferred structure of the unit includes a bracket 14 which is securely clamped to the shaft 10 in its operative position, by any conventional means, such as bolts 15.

The gripper finger 16 is carried by a supporting member 17 which is arranged on the shaft 10 to freely rotate with relation thereto. One end of this shaft extends through the cylinder wall 13 and has secured thereto a bell crank lever 19 which transmits rocking motion to the shaft 10 and which is formed with the arms 20 and 21. The lever 19 is clamped to the free end of the shaft 10 by means of bolts 22 and is secured in its operative position by a Woodruff key 23 or the like. To the free end of arm 20 is pivotally mounted a spring controlled rod 25 which is urged upwardly by means of a coil spring 26 mounted on it. The outer end of the arm 21 carries a cam roller or follower 27 which rides on a stationary and continuous cam disc 28. The lower end of this connecting rod is guided, and the spring supported in any conventional manner such as by a bearing block, not shown, so that it will follow the movement imparted to the arms 20 by the cam roller 27 following the contour of the cam 28 whereby the shaft 10 is rocked for the purpose of opening and closing the gripper 16.

In the position of the relative parts so far described with reference to Figures 1 and 2 of the drawings, the follower roller 27 rides over the high portion 31 of the cam 28 which is concentric with cylinder 12, consequently the gripper finger 16 is closed on its associated supporting pad 30, and the coil spring 26 on the rod 25 is then compressed.

The stationary, continuous cam disc 28 is shaped so as to provide the following actions:

It will hold the grippers closed positively while holding a sheet. This is accomplished by providing a high cam surface which is concentric within very close limits to the axis of the sheet carrying cylinder 12.

This concentric surface occupies an angle substantially equal to the included angle between the points of transfer from one sheet carrying member to another.

The grippers of a series will all open at a predetermined point to release a sheet and will provide the required clearance with the leading edge of the sheet being released.

It will keep the grippers open until the next point of closing is reached. This is done by providing a low surface or its equivalent, on the cam disc, which surface is substantially concentric to the axis of the sheet carrying member.

The grippers will close at the desired rate of motion in order to first clear the edge of a subsequent sheet and then apply the gripper fingers smoothly onto its associated pad to hold the sheet.

The opening and closing motions of the grippers are controlled by suitably shaping those cam

portions which connect the high and low points of the disc.

This novel manner of bringing the gripper finger and associated pad into cooperative or sheet gripping relation with each other, is an important function of my invention. It eliminates any vibration of the gripper finger usually present when grippers are closed onto their associated pads by means of springs as heretofore. Therefore, the possibility of disturbing the register of a sheet while in the bite of the grippers is minimized.

Upon continued rotation of the cylinder 12 in the direction indicated by the arrow in Figure 1, the follower 27 will eventually reach the low portion 32 of the cam 28. Consequently the shaft 10 will be rocked in the anti-clockwise direction by the pressure of spring 26 exerted on the arm 20 of the lever 19, and the gripper will open, a position indicated in Figure 4.

For a more detailed description of the gripper unit, I will now refer to Figures 3, 4 and 6 of the drawings and which are cross sections taken along a vertical plane extending through the center of a gripper unit such as is illustrated in Figures 1 and 2.

The gripper finger 16 is preferably secured to its supporting member 17 by means of a bolt 35 which is threaded into a tapped bore provided in the cross piece or brace 36 which connects the side walls of the gripper finger supporting member 17. The bolt 35 is locked against accidental loosening by means of a locking washer 37. At its inner end the bolt 35 is formed with a reduced extension 38 which extends into a compression spring 39 and serves to support the latter in its operative position.

The bracket 14 is formed with an upwardly extending arm 40 provided with a recess 41 for accommodating one end of the spring 39.

Opposite to the cross piece 36 of the supporting member 17 is provided another cross piece or brace 42 formed with a tapped bore, into which is threaded an adjusting screw 43 which latter is also secured against accidental loosening by means of a locking washer 44 applied within a slot formed in the brace 42, as is clearly shown in the drawings.

The effect of the lock washer 44, which is of the "split" type, and which is placed into said slot with the expanding ends at the top, tends to force the outer section of the brace 42 away from its body section in a manner that friction will be applied between the thread of the adjusting screw 43 and that in the brace.

Preferably a cover plate 45 is arranged to extend over the upper open portion of the gripper supporting member 17 and between the side walls of the latter. This cover plate is clamped between the gripper finger 16 and the cross piece 36 by means of the bolt 35 which secures the finger to its support 17.

In Figure 3, the relative parts which constitute the gripper unit just described are shown when the gripper 16 is closed on its associated pad 30, whereas in Figure 4 the gripper 16 is shown in its open position.

The adjusting screw 43 has two functions, first, to preload the spring 39 through which contact pressure between the gripper finger 16 and its pad 30 is accomplished. This is illustrated in Figure 6, showing the screw 43 in its practically innermost or maximum preloading position, contacting the arm 40 thereby compressing the spring 39.

The second function of the adjusting screw 43 is that of providing a predetermined gap or clearance 46 between the outer face of arm 40 of the bracket 14 so that there will be a predetermined movement permitted between the bracket 14 and the gripper finger supporting member 17, see Figure 3. Preferably this gap should not exceed .003" to .004", however, for reasons of clearer illustration this gap is shown in this and other figures as greatly exaggerated, as will be readily apparent from the description of the method of setting the grippers to be given hereafter and in which the purpose of this clearance will be explained.

Upon opening of the gripper finger 16 by the mechanism herein described with reference to Figures 1 and 2, the outer or operating face of the arm 40 will be forced into contact with the adjusting screw 43 by the expansion of the preloaded spring 39, a position shown in Figure 4.

I will now proceed to describe the manner by which an individual gripper unit is applied to the rock shaft 10 and set for operation.

Upon placing the bracket 14 and supporting member 17 onto the rock shaft 10, and setting the cam follower 27 onto the high portion 31 of the cam 28, the spring 39 is preloaded as shown in Figure 6 by turning the adjusting screw 43 inwardly against the arm 40 of the bracket 14 to establish the desired gripper bite between the gripper finger 16 and its pad 30. Thereupon, the finger 16 is brought manually into contact with the pad 30 and the bracket 14 is securely locked to the shaft 10 by means of the bolt 15. It will be understood therefore, that upon locking the bracket 14 onto the shaft 10, there can be no relative movement between said bracket and the gripper supporting member 17 until the shaft 10 is rocked to open the gripper finger 16. Therefore, by loosening the adjusting screw 43 until contact with the arm 40 is broken, a predetermined gap or clearance between it and the operating face of said arm can be established, and as a consequence the spring pressure previously applied to the screw 43 will be transferred to the gripper finger 16 in contact with the pad 30. The purpose of this gap 46 is to provide a predetermined point at which the gripper finger 16 will positively be moved out of contact with the pad 30. It will also be understood that the gripper finger will not open until the arm 40 has contacted the adjusting screw 43 during the rocking motion of the shaft 10 in the anti-clockwise direction as shown in Figures 3 and 4, the latter figure depicting the arm 40 in such contact relation with the adjusting screw 43, and showing the gripper finger open. Furthermore, the provision of said slight clearance limits positively the extent of movement of the finger 16 away from its pad 30.

In Figure 5, I have illustrated a series of gripper units applied to the gripper shaft 10 of a sheet carrying member such as the cylinder 12 and I have also indicated the operating means for that shaft such as is illustrated in Figures 1 and 2 hereinbefore described.

The method of setting a series of grippers on a common supporting member such as shaft 10, includes the same steps as just described in connection with the setting of an individual gripper unit, but it adds the step of preloading each individual unit exactly alike by applying the same amount of preloaded pressure to the arms 40 of each unit by the adjusting screws 43. It also necessitates the step of providing exactly the same clearance or gap between the arm 40 and the adjusting screw 43 in each unit. In this man-

ner all of the units of a series of grippers will be preloaded exactly alike and by providing a micrometrically measured gap **46** for all units, the point of opening the gripper fingers **16** with relation to their pads **30** will be accomplished definitely by the arm **40** moving into contact with the adjusting screw **43** and consequently, all of the gripper fingers in a series of units will open in synchronism. The closing point of the gripper fingers onto their pads is likewise controlled by the clearances or gaps provided between the arm **40** and the adjusting member **43**.

For the purpose of applying a feeler gauge in order to establish a predetermined and accurately measured gap **46** in each unit of a series, a clearance **48** is provided in the supporting member **17**.

While I have chosen to illustrate and describe herein one preferred embodiment of my invention, I wish it to be understood that I desire to cover any such modifications in the design, arrangement of parts, and in the method of setting the improved grippers units, that will come within the scope and meaning of the appended claims.

I claim:

1. A spring gripper assembly, comprising in combination, an operating shaft for supporting a series of gripper units, each unit including a gripper finger support mounted for free movement about the axis of said shaft and a bracket rigidly secured on the latter, a pad coacting with the gripper finger, spring means interposed between said support and said bracket, means for adjusting the tension of said spring means to thereby vary the pressure exerted by the gripper finger onto its associated pad and to thereby preload the bite of the finger, said means also serving to provide for a predetermined relative movement between said support and said bracket, cam means associated with said operating shaft for closing the gripper finger onto its coacting pad, and spring means acting on said shaft for opening the finger.

2. A spring gripper assembly, comprising in combination, an operating shaft for supporting a series of gripper units, each unit including a gripper finger support mounted for free movement about the axis of said shaft and a bracket rigidly secured on the latter, a pad coacting with the gripper finger, spring means interposed between said support and said bracket, an adjusting screw carried by said spring gripper support for adjusting the tension of said spring means to thereby vary the pressure exerted by the gripper finger onto its associated pad and to thereby preload the bite of the finger, said means also serving to provide for a predetermined relative movement between said support and said bracket, restraining means for maintaining said screw in its adjusted position, cam means associated with said operating shaft for closing the gripper finger onto its coacting pad, and spring means acting on said shaft for opening the finger.

3. A sheet gripper unit having in combination, a gripper shaft, a spring urged support concentrically mounted on said shaft for free movement about the axis thereof, a gripper finger fixed to said support, a member fixedly mounted on said shaft for movement therewith to open and close said gripper finger, and means associated with said support and adjustable whereby to preload the bite of said finger with respect to said member, said means also being movable when said finger is in closed position to vary the opening and closing relation between said support and said member.

4. A sheet gripper unit comprising in combination, an oscillatable supporting shaft, a gripper finger having a rear wall in spaced relation therewith, said gripper finger being mounted on the shaft for free movement about the axis of the shaft, stop means fixed to the shaft and having location between the gripper finger and said rear wall, resilient means interposed between the stop means and the gripper finger and resiliently connecting said stop means and gripper finger so that oscillating movement of the shaft is imparted to the gripper finger, cam actuated mechanism having operation to oscillate the shaft to effect opening and closing of the gripper finger, and adjustable means coacting with the stop means and the rear wall to selectively vary the tension of said resilient means on the gripper finger to predetermine the tension of said gripper finger when in closed position, said adjustable means being movable when said finger is in closed position to vary the relative spacing between said adjustable means and said stop means to selectively control the opening and closing of said gripper finger with respect to said cam actuated mechanism.

5. A sheet gripper unit as defined by claim 4, wherein the adjustable means comprises a screw threaded in the rear wall for adjustment toward and from said stop means.

HENRI E. PEYREBRUNE.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,296,008	Rich	Mar. 4, 1919
1,535,224	Harrold	Apr. 28, 1925
2,088,862	Lang	Aug. 3, 1937

FOREIGN PATENTS

Number	Country	Date
507,522	Great Britain	June 16, 1939
310,177	Great Britain	Apr. 25, 1925
556,710	Germany	Aug. 13, 1932