

Oct. 31, 1939.

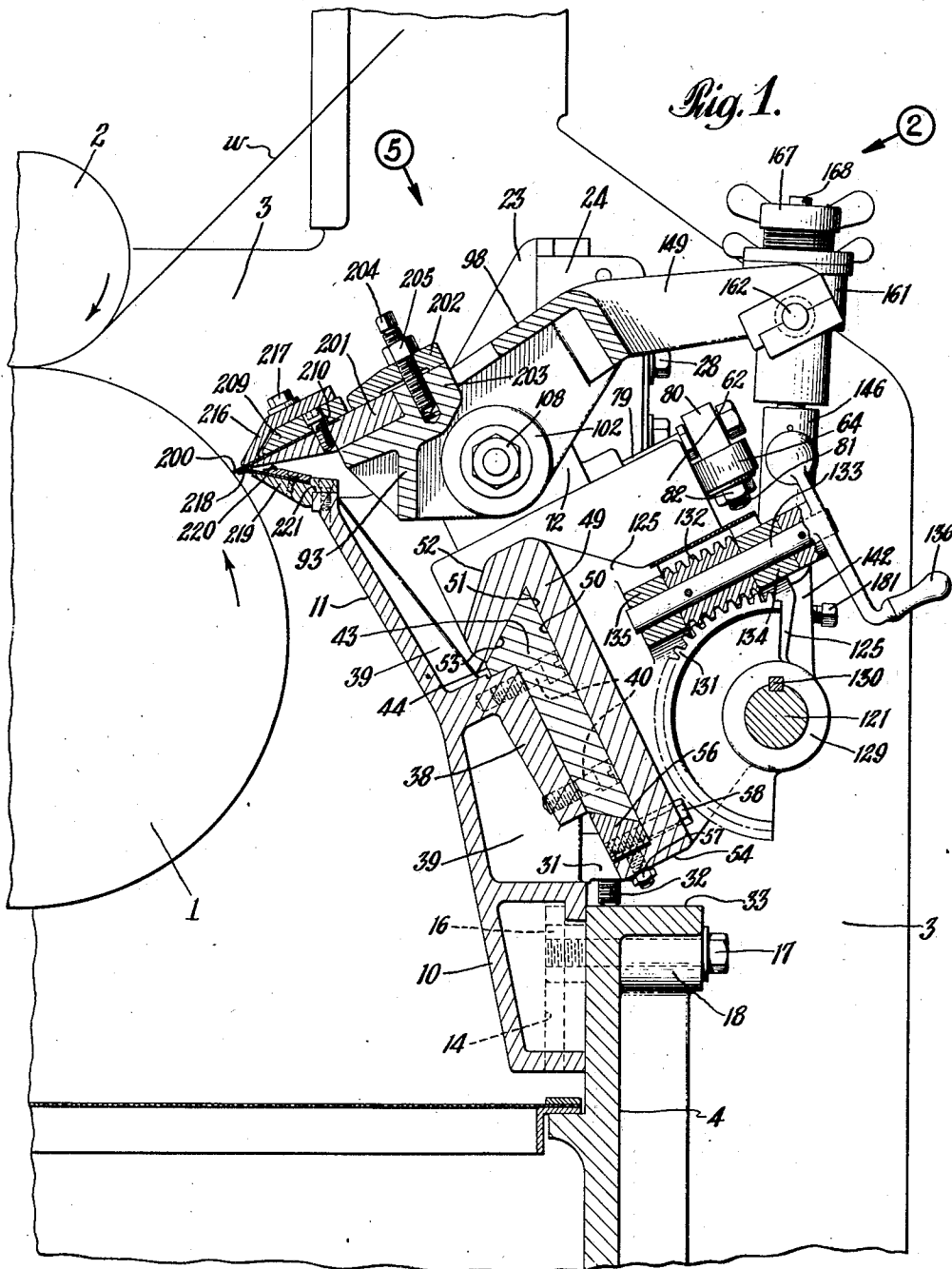
C. S. CRAFTS

2,178,069

ROTARY INTAGLIO PRINTING PRESS

Original Filed May 6, 1937

8 Sheets-Sheet 1



INVENTOR
C. S. Crafts
BY
Morgan Finnegan and Durham
ATTORNEYS

Oct. 31, 1939.

C. S. CRAFTS

2,178,069

ROTARY INTAGLIO PRINTING PRESS

Original Filed May 6, 1937

8 Sheets-Sheet 2

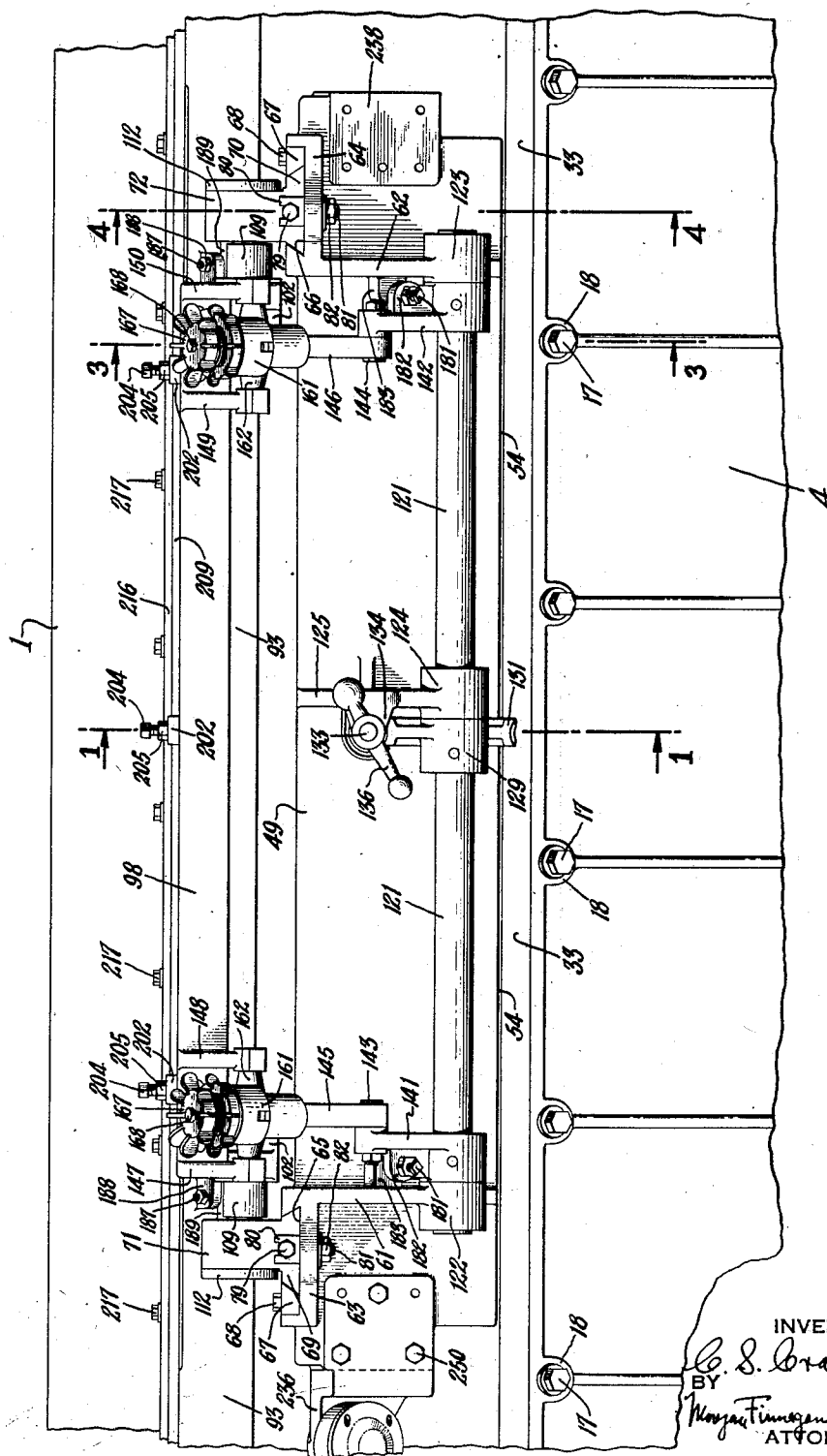


Fig. 2.

INVENTOR
C. S. Crafts
BY
Morgan, Timmerman and Dinsmore
ATTORNEYS

Oct. 31, 1939.

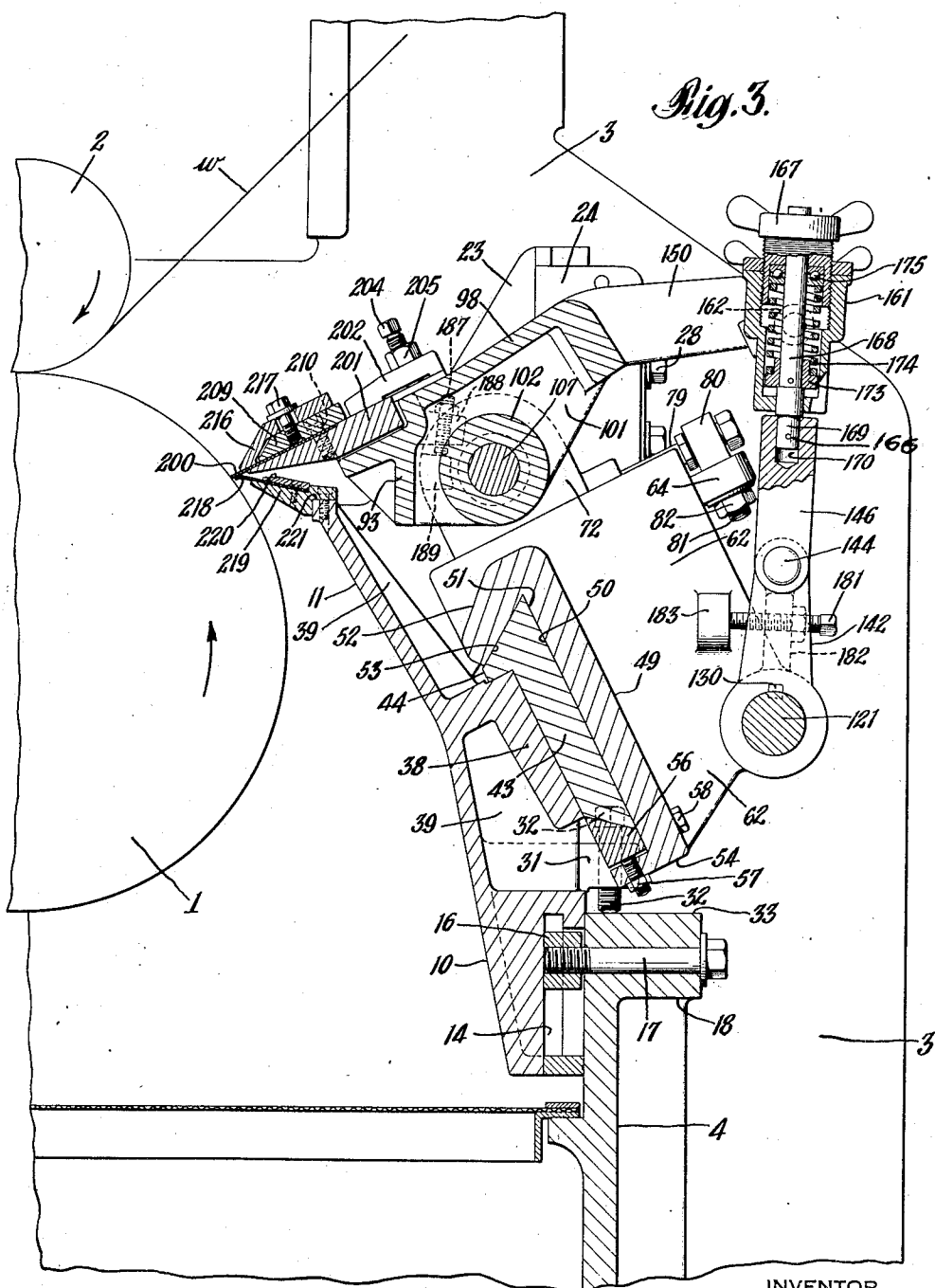
C. S. CRAFTS

2,178,069

ROTARY INTAGLIO PRINTING PRESS

Original Filed May 6, 1937

8 Sheets-Sheet 3



INVENTOR

INVENTOR
C. S. Crafts
BY
Morgan Finnegan and W. L. Williams
ATTORNEYS

Oct. 31, 1939.

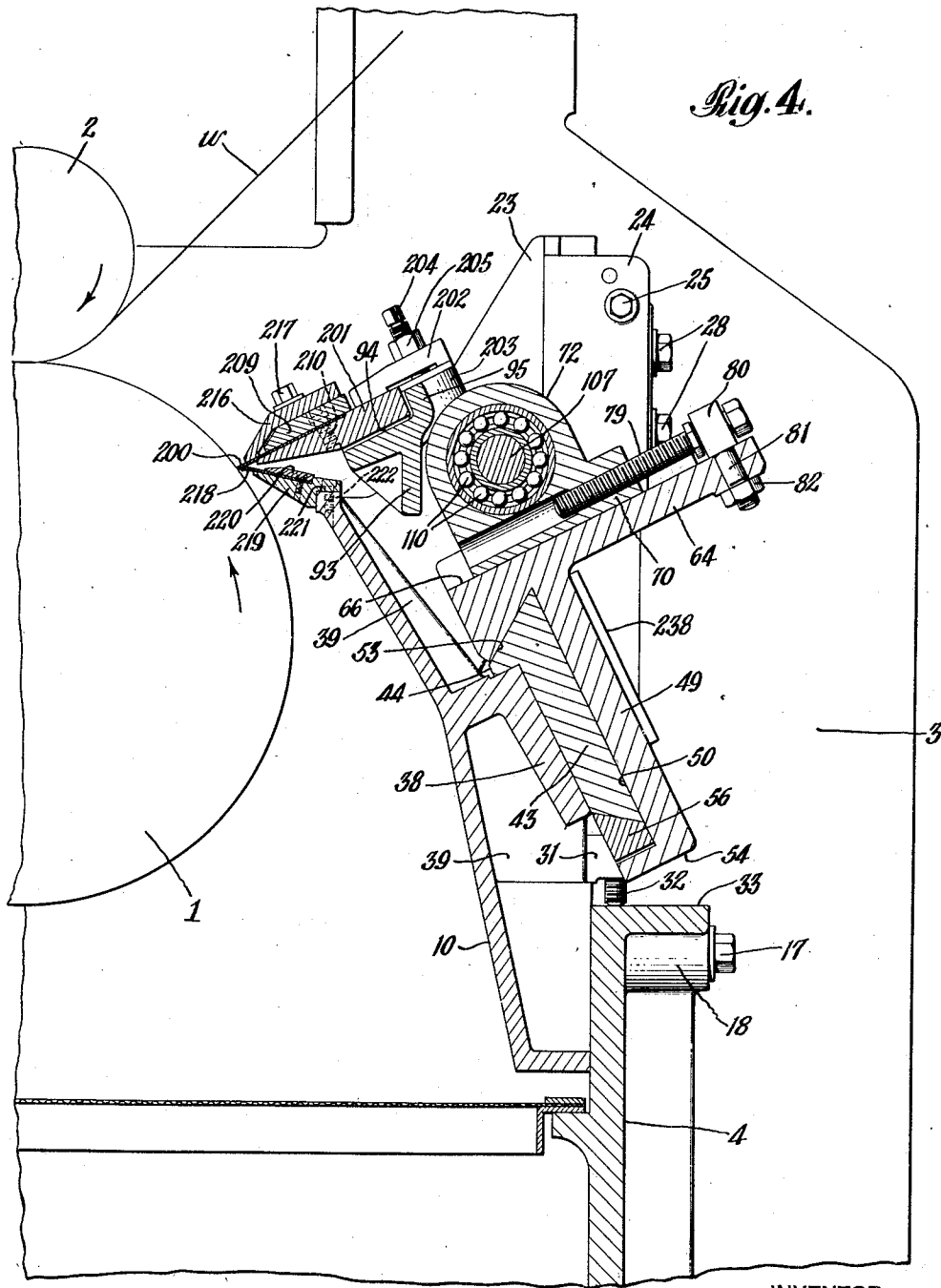
C. S. CRAFTS

2,178,069

ROTARY INTAGLIO PRINTING PRESS

Original Filed May 6, 1937

8 Sheets-Sheet 4



INVENTOR
C. S. Crafts
BY *Morgan Finnegan and Dinkham*
ATTORNEYS

Oct. 31, 1939.

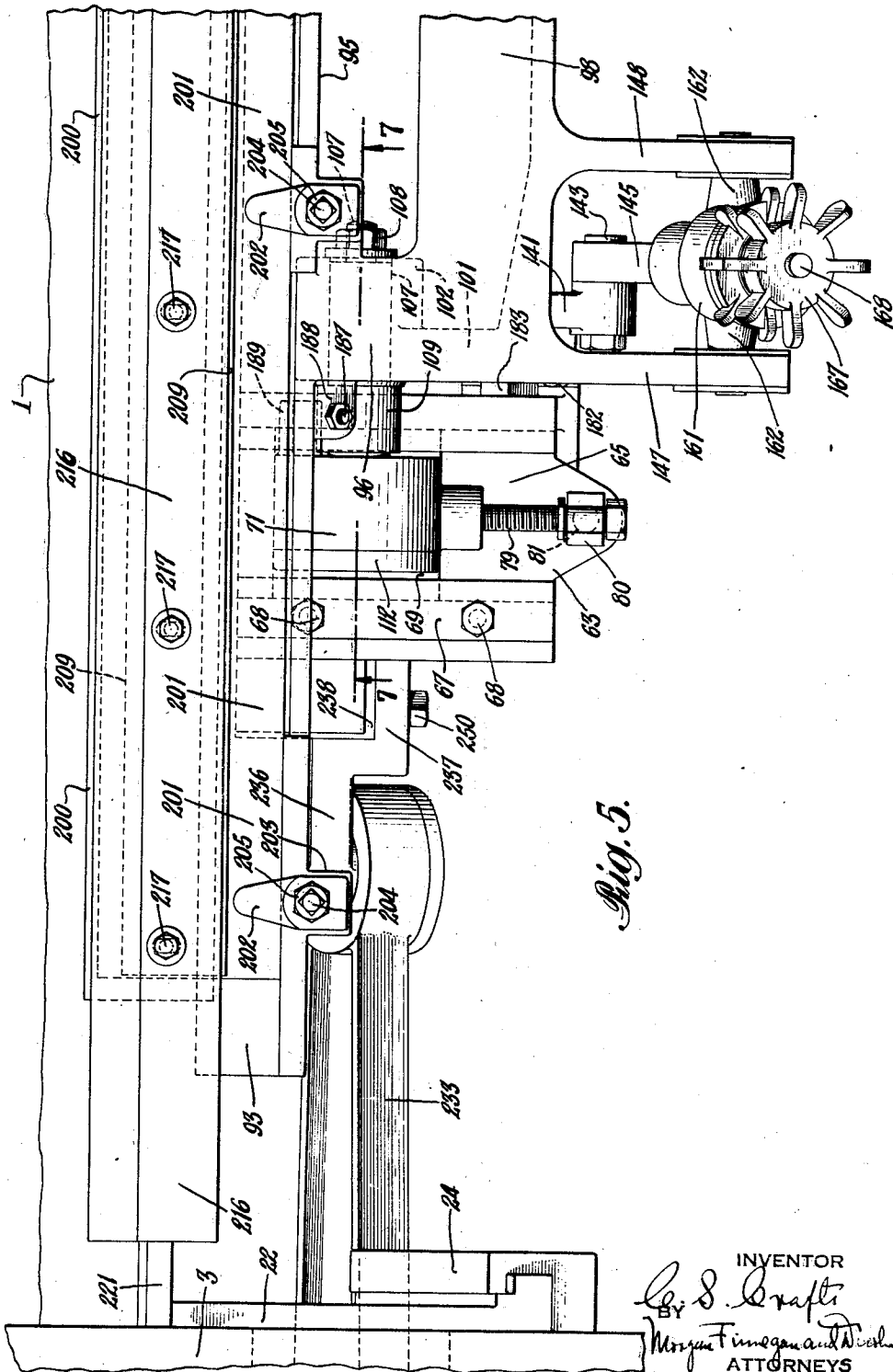
C. S. CRAFTS

2,178,069

ROTARY INTAGLIO PRINTING PRESS

Original Filed May 6, 1937

8 Sheets-Sheet 5



Oct. 31, 1939.

C. S. CRAFTS

2,178,069

ROTARY INTAGLIO PRINTING PRESS

Original Filed May 6, 1937

8 Sheets-Sheet 6

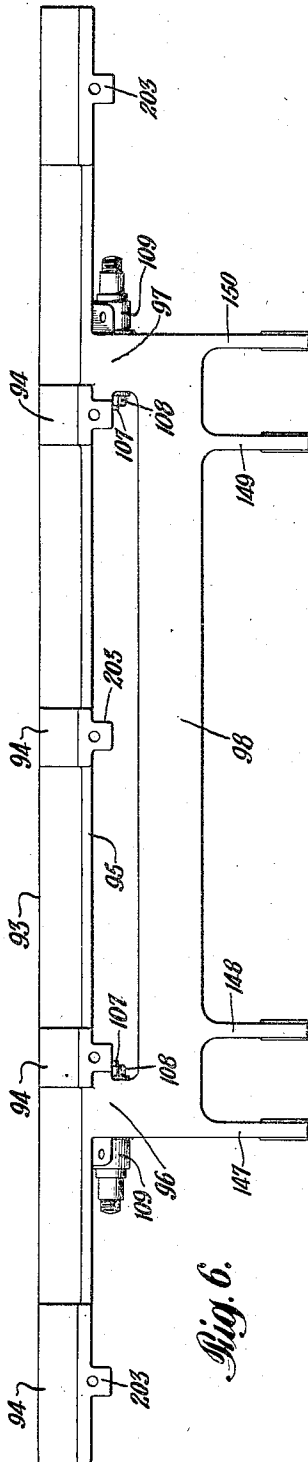


Fig. 6.

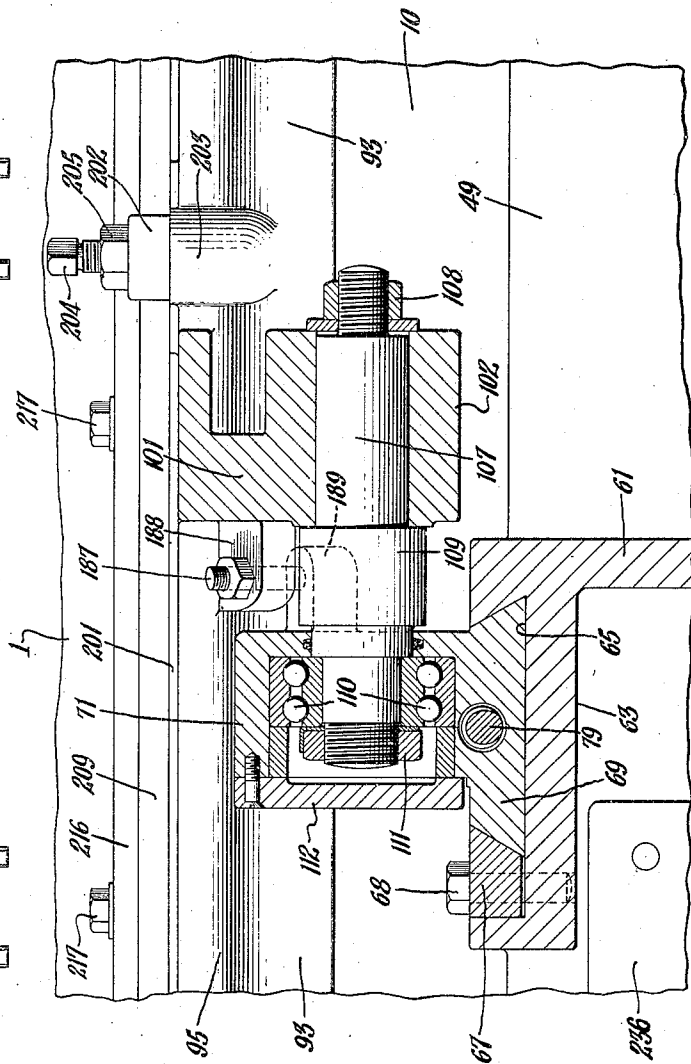


Fig. 7.

INVENTOR
C. S. Crafts
BY
Morgan Timm and Dushane
ATTORNEYS

Oct. 31, 1939.

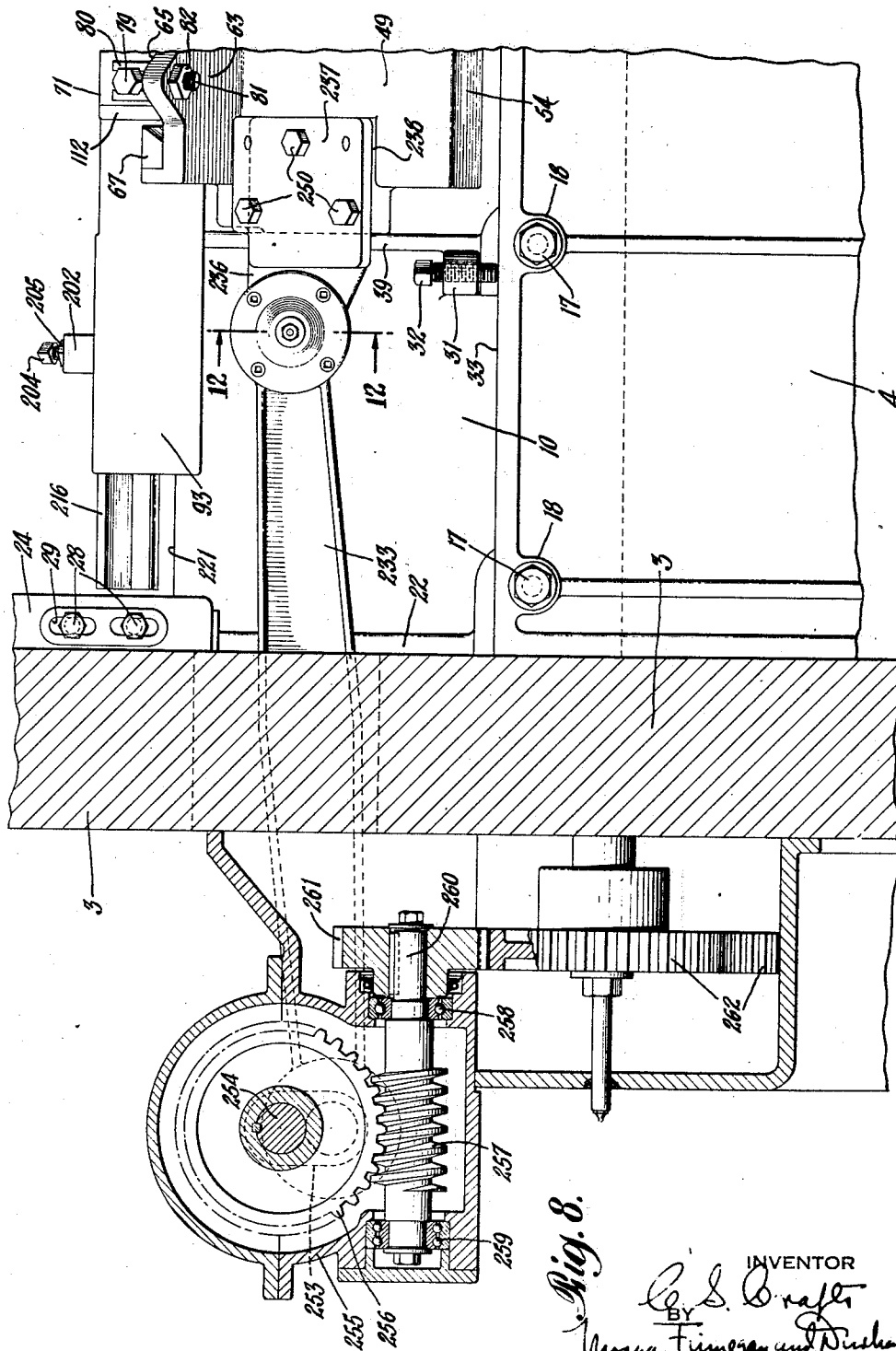
C. S. CRAFTS

2,178,069

ROTARY INTAGLIO PRINTING PRESS

Original Filed May 6, 1937

8 Sheets-Sheet 7



INVENTOR

By L. S. Crafts

Morgan Finnegan and Dickson
ATTORNEYS

ATTORNEYS

Oct. 31, 1939.

C. S. CRAFTS

2,178,069

ROTARY INTAGLIO PRINTING PRESS

Original Filed May 6, 1937

8 Sheets-Sheet 8

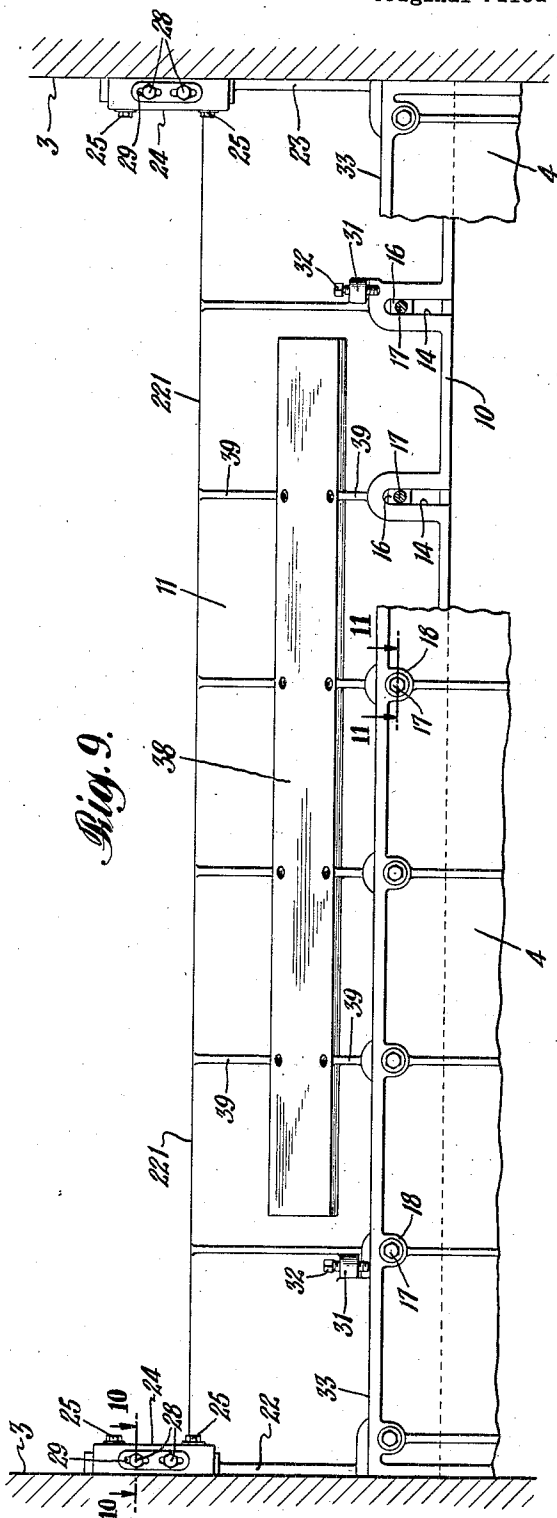


Fig. 9.

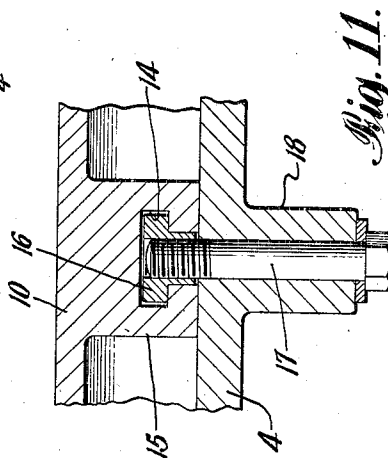


Fig. 11.

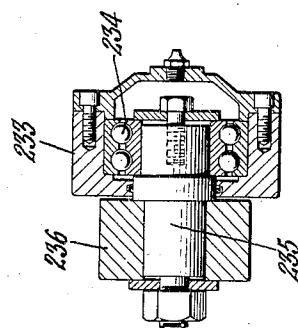


Fig. 12.

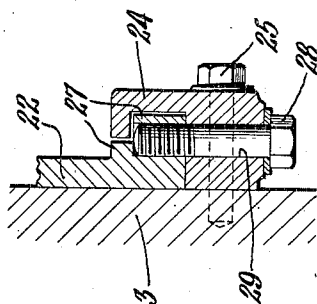


Fig. 10.

INVENTOR
C. S. Crafts
BY
Morgan Finnegan and Durham
ATTORNEYS

UNITED STATES PATENT OFFICE

2,178,069

ROTARY INTAGLIO PRINTING PRESS

Curtis S. Crafts, Oak Park, Ill., assignor to The
Goss Printing Press Company, Chicago, Ill., a
corporation of Illinois

Application May 6, 1937, Serial No. 141,018
Renewed April 4, 1939

23 Claims. (Cl. 101—157)

The invention relates to new and useful improvements in inking mechanisms for rotary intaglio presses, and more particularly to such improvements in the means for mounting and operating the doctor blade.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:

Fig. 1 is a fragmentary vertical transverse section taken on the line 1—1 of Fig. 2;

Fig. 2 is a fragmentary side elevation looking at the upper part of Figs. 1, 3 and 4 from the right, substantially in the direction of the numbered arrow 2 in Fig. 1;

Fig. 3 is a fragmentary vertical transverse section taken on the line 3—3 of Fig. 2;

Fig. 4 is a fragmentary vertical transverse section taken on the line 4—4 of Fig. 2;

Fig. 5 is a fragmentary top plan, on an enlarged scale, of the left-hand end of the mechanism, showing part of the reciprocating means for the doctor blade structure, substantially in the direction of the numbered arrow 5 in Fig. 1;

Fig. 6 is a detached detail plan of the pivoted support for the doctor blade;

Fig. 7 is an enlarged section taken on the line 7—7 of Fig. 5;

Fig. 8 is a fragmentary side elevation of the left-hand end of the mechanism, looking at Fig. 5 from the bottom of the sheet, and showing the drive for the reciprocable structure;

Fig. 9 is a fragmentary elevation of the fountain wall and the base structure on which the doctor blade mechanism is reciprocably supported;

Fig. 10 is an enlarged sectional detail on the line 10—10 of Fig. 9;

Fig. 11 is an enlarged sectional detail on the line 11—11 of Fig. 9; and

Fig. 12 is an enlarged sectional detail on the line 12—12 of Fig. 8.

Objects of the invention are to provide a doctor blade mechanism constructed and capacitated to operate reliably and efficiently under modern high speed, high quality requirements, including such operation with quick-drying inks and with closed fountain constructions, if and when desired or required; to provide novel multiplex independently and conjointly operable agencies for controlling the position and action of the doctor blade to attain best results under differing conditions and requirements and for various kinds of work; to provide structure, mounting and operation whereby multiplex positioning and regulation of the blade can be effected and maintained without being disturbed or affected by or during the printing operations, as well as to effect other objects which are set forth hereinafter or will be apparent to those skilled in the art through practicing the invention or otherwise.

To this end, in a preferred embodiment, herein exemplified, various cooperating structures and principles are embodied, some of which will be briefly and generally here indicated. A supporting and guiding means is firmly supported in fixed position upon the press frame, upon which a carriage carrying the entire doctor blade mechanism is reciprocably mounted. All the devices and agencies for variably positioning and regulating the doctor blade are mounted on this carriage, and thereby their regulation and their operation are not disturbed or affected by the reciprocatory movement, a feature which carries added importance in fast running presses. The carriage supporting and guiding means are primarily variably positionable relatively to the press frame both as a unit or entity and also with respect to various points along the support and across the press and are then firmly fixed in the desired position.

The various blade positioning and regulating means mounted on the carriage comprise mechanisms for varying the position of the blade to and from the design cylinder, which mechanisms act on the blade at a plurality of points along its length. The aforesaid mechanism is mounted on a pivotally supported blade carrier, and that carrier is angularly positionable to swing the blade into and out of operative position with the design cylinder, and also to nicely regulate the pressure of the blade on the cylinder, this latter function being effected and refined by the employment of finely regulated resilient pressure means. The preceding general description, and the following detailed description as well, are illustrative and exemplary but are not restrictive of the invention.

The various blade positioning and regulating means mounted on the carriage comprise mechanisms for varying the position of the blade to and from the design cylinder, which mechanisms act on the blade at a plurality of points along its length. The aforesaid mechanism is mounted on a pivotally supported blade carrier, and that carrier is angularly positionable to swing the blade into and out of operative position with the design cylinder, and also to nicely regulate the pressure of the blade on the cylinder, this latter function being effected and refined by the employment of finely regulated resilient pressure means. The preceding general description, and the following detailed description as well, are illustrative and exemplary but are not restrictive of the invention.

Referring now in detail to the embodiment of the invention illustrated by way of example in the accompanying drawings, an intaglio printing couple comprising a design cylinder 1 and an impression cylinder 2 are shown journaled in the vertical side press frame 3, the web *w* running through the impression. The supporting structure for the doctor blade carrying, regulating and actuating mechanism as exemplarily illustrated and described is adapted for use with the closed fountain type of intaglio press, as well as with other types of intaglio presses. The supporting structure for the doctor blade mechanism is connected with and carried by the vertical side frame members 3 of the press and also by the vertical wall 4 which is part of the ink fountain structure and extends across the press, being fixed to and carried by the side frames 3 of the press.

The doctor blade mechanism, as here exemplified, comprises a stationary support or base 10, supported by the wall 4 and by the press frames 3, and is variably positionable relative thereto by suitable screw-threaded means (Figs. 1, 2, 9, 10 and 11). With the closed type of fountain shown, this support 10 may comprise an upwardly and inwardly inclined wall, which constitutes part of the fountain closure, and with other types of intaglio inking mechanism, this preferably vertically, upwardly and inwardly inclined structure will serve as a guard or splash plate for the ink. In accordance with certain features of the invention, supporting and guiding means are carried on and fixed to the support 10, and the entire doctor blade mechanism is reciprocable on this supporting and guiding means. Said embodied form of reciprocable mechanism comprises means for regularly positioning the doctor blade toward and away from the surface of the design cylinder, means for relatively positioning the doctor blade angularly with respect to the design cylinder, and means for exerting regulable yielding pressure on the positioned doctor blade, together with other facilities and adjustments.

The support 10 comprises a long plate 11 which extends entirely across from one vertical side frame of the press to the other, and has at either end vertically disposed, rearwardly extending plates or flanges abutting on and supported by the press side frames, as later more fully described. The plate 11 is inclined inwardly from its bottom edge toward the upper edge thereof, the latter being relatively close to the design cylinder and the doctor blade being mounted adjacent thereto. To provide for height regulation of the supporting member 10, there are provided in the bottom part thereof (Figs. 1, 3, 9 and 11), a plurality of vertically-disposed, undercut, channeled slots 14, formed in outwardly-projecting bosses 15 formed in the support 10. In the undercut channels 14 are shouldered nuts 16, into which are threaded bolts 17, which bolts are carried in cylindrical, outwardly-projecting bosses 18, formed on the outer vertical wall of the cross frame member 4. These height or level regulating mechanisms are spaced apart at intervals across the press so as to furnish regulation and support at a relatively large number of points.

As previously mentioned, at either end of the support 10 are vertically-disposed plates or flanges 22 and 23, extending backwardly from the inwardly curved member 11, and adapted to fit within and against the inner sides of the vertical press frames 3. These plates 22 and 23 are

connected to and supported by the side frames by suitable supports provided with height-regulating means (Figs. 4, 9 and 10). As embodied, vertically-disposed, undercut guides 24 rest against the inner faces of the press frames 3 and are held in place by tap bolts 25, threaded into the side frames 3. The plates 22 and 23 have at their outer edges vertically-disposed projections 27, lying within the undercut channels of the members 24. Tap bolts 28 are threaded into the projections 27 of the plates 22 and 23, and extend through longitudinal slots 29 in the guiding supports 24, which gives the desired height-regulating and supporting means. Further supporting and height-regulating means may be provided, and as shown a plurality of lugs 31 are integral with and project from the outer face of the support 10 (Figs. 1, 3, 4, 8 and 9). Into each of these lugs is threaded a bolt 32, the bottom end of which rests upon the flat top 33 of the frame member 4.

On the outer face of the support 10 is formed a long and relatively narrow horizontally-disposed pad or supporting surface 38, integral with which are a plurality of outwardly-projecting, transversely-disposed reinforcing ribs 39, which are integral with and merge into the cored, box-like base of the support 10. Supported upon and fastened to the pad 38 by suitable means, such as countersunk bolts 40, is a beveled-edge or undercut guide 43, which has a shoulder 44 running along within its upper edge, the shoulder fitting over the upper horizontal surface of the pad 38, whereby the guide piece 43 has hanging support on the pad 38.

The carriage which supports the entire doctor blade mechanism, including the various regulable positioning means, is mounted to reciprocate upon and along the guideway 43, and as embodied a flat plate 49, which may be considered as the doctor blade carriage, has its inner surface 50 contacting the surface 51 of the guide 43 with a slidable fit. The plate 49 extends upwardly and inwardly as at 52, and has a beveled surface 53 in sliding engagement with the upper undercut edge of the guide 43. At its lower, horizontally-extending edge, the carriage 49 has an inwardly-extending flange 54 extending inwardly past the undercut guideway 43, and in connection therewith means cooperating with the undercut lower horizontal edge of the guideway 43 to hold the carriage closely to the guideway while permitting the free sliding reciprocatory motion. As embodied, a longitudinal bar 56 (Figs. 1, 3 and 4) lies within the flange 54 of the carriage, and has a beveled top edge which has sliding fit with the lower undercut edge of the guide 43. To permit assembly and also adjustment of these parts, the bar 56 rests on the inner ends of a plurality of bolts 57, which are threaded into the flange 54, and a series of screw-bolts 58 extend through the carriage and are threaded into the bar 56 with slotted connections to hold the bar firmly in adjusted position.

In addition to the position regulating means for the support previously described, as embodied, the doctor blade is mounted on the slidable carriage 49 so as to be variably positionable to and from the design cylinder 1 to compensate for cylinders of different sizes, and also to be variably positionable angularly to regulate the pressure on the cylinder, and to also exert a regulable yielding when so positioned. As embodied, this is effected by a straight line movement of the blade carrier upon its carriage and to and from

the cylinder. Accordingly, two bracket-like integral parts 61 and 62 are formed on the outer face of the carriage 49 and extend outwardly therefrom. The upper end of the members 61 and 62 form two flat, laterally-extending plates or supports 63 and 64 (Figs. 1, 2, 4, 5 and 7), and the doctor blade carrier is supported on these plates 63 and 64, means being provided for moving the doctor blade carrier inwardly and outwardly relatively to the carriage 49 to regularly vary the position of the doctor blade edge with respect to the design cylinder 1. In cooperation with said mounting of the doctor blade carrier, means are provided for effecting regulable annular movement of the blade carrier, as will be later more fully described.

Each of the supports 63 and 64 has on its upper surface a transverse, undercut guideway, 65 and 66 respectively, each of these guideways having on its outer side an undercut bar 67, forming the outer side of the guideway, and held in place by screw-bolts 68. Slidably mounted in the respective guideways 65 and 66 are bases 69 and 70, having sliding fit within the undercut guideways, and formed integral with and extending upwardly from the bases 69 and 70, respectively, are pedestals 71 and 72, which constitute bearings upon which the doctor blade carrier 93 is rotatably mounted in a manner to be later described. The bar 67 also acts as a clamp to lock brackets or pedestals 71 and 72 in position after adjustment is made. The effect the positioning of the doctor blade carrier 93 and the doctor blade toward and away from the design cylinder, a screw-threaded rod 79 lies in the semi-cylindrical top of a supporting lug 80, resting upon and fixed to the top surface of the respective supports 63 and 64, each lug 80 having a shank 81 projecting downwardly through an aperture in the support, and having a nut 82 screw-threaded onto the end of the shank to hold the stud 80 in position. The rod 79 is screw-threaded into the respective bases 69 and 70, and the pedestals 71 and 72 for the doctor blade carrier are thus accurately positionable along the guideways 65 and 66.

The embodied form of the doctor blade carrier 93 comprises a longitudinally-extending bar having long narrow bottom seat or seats 94, and a rear upwardly-extending flange with rear edge seats 95 upon and within which the immediate doctor blade support is removably mounted. The pivotal mounting for the doctor blade carrier comprises a frame, integral with and extending backwardly from the carrier 93, said frame having rearwardly extending reaches 96 and 97 and a cross piece 98. Extending downwardly beneath the outer ends of the frame plate 98 are integral webs 101 on which are formed, respectively, hubs 102 (Figs. 1, 2, 3, 5, 6 and 7). Mounted in hubs 102, respectively, are stub shafts 107, held in place by lock nuts 108 screw-threaded on the inner ends of the stub shafts. On the other side of hubs 102, spacing collars 109 are formed integral with the shaft. The outer end of each of the shafts 107 is journaled in an antifriction bearing 110, carried respectively in the pedestals 71 and 72 previously described. A retaining nut 111 is screw-threaded on the outer end of each shaft 107 and the housings in the respective pedestals are closed by flat end plates 112.

Means for moving the doctor blade carrier 93 about these pivotal mountings, as here exemplarily embodied (Figs. 1, 2, 3 and 5), comprise

a horizontally and transversely disposed shaft 121, journaled at either end on hubs 122 and 123, formed on the lower end of the projecting brackets 61 and 62, and also journaled in a central hub 124 formed on a central rearwardly projecting bracket 125 projecting rearwardly from the middle part of the carriage 49. The means for effecting the required minute and accurate angular movement of shaft 121 comprises a hub 129, fixed to the shaft by a key 130. Integral with the hub 129 is a gear sector 131, with which meshes a worm gear 132, fixed on a shaft 133, which shaft is journaled at either side of the worm gear 132 in bearing hubs 134 and 135, formed on and extending laterally from the bracket web 125. A handle 136 is formed on the outer end of the shaft 133.

The connections from the gear mechanism just described to the pivotally mounted blade carrier, as here embodied, comprise a plurality of compound or toggle levers actuated by said gear mechanism and having resilient, screw-thread regulated connection to the pivotal blade carrier. Fixed to shaft 121 near either end thereof are arms 141 and 142, and pivotally connected to the outer ends of these arms at 143 and 144, respectively, are arms 145 and 146. The connecting structure from these arms to the doctor blade carrier 93 comprises a pair of rearwardly extending arm 147 and 148 formed at one end of the cross member 98 of the pivotally supported blade carrier, and a pair of rearwardly extending arms 149 and 150 formed at the other end of said member 98, these pairs of arms having apertures in their outer ends. Journaled, respectively, in these pairs of arms 147, 148 and 149, 150 are tension or spring-pressure adjusting means, each comprising a cylinder 161 pivoted by means of outwardly-projecting trunnions 162, journaled in the apertures in the respective pairs of arms. The upper portion of each of the cylinders 161 is internally screw-threaded, and in threaded engagement therewith is an externally screw-threaded head 167. A rod 168 has its lower end 169 nested in a bore 170 formed in the outer end of arm 145 or 146, respectively, and is held by a pin 166. The rod 168 extends loosely within the cylindrical housing 161, which is pivotally mounted on one of the pairs of arms as just described.

Fixed to each rod 168, within its cylinder 161, is a seat 173 upon which rests a compression spring 174, and the upper end of the spring is nested within the hollow bottom end of the head 167, and the spring is in compression between the seat 173 and an anti-friction bearing 175 within the head 167. The head 167 is rotatable to regulate the pressure exerted by springs 174 upon the doctor blade carrier. Limit regulating or determining means are provided for the mechanism just described, said means as embodied comprising limit screw 181 screw-threaded into flanges 182 formed, respectively, on the outer sides of the arms 141 and 142, the ends of these screws abutting on flanges 183 projecting from the inner faces, respectively, of the brackets 61 and 62. Other limiting determining devices (Figs. 2, 3, 5 and 7) comprise stop screws 187, threaded into flanges 188 extending outwardly from the outer faces of the webs 101, the ends of these screws abutting on lug or flanges 189 extending inwardly from the inside faces of the pedestals 71 and 72. This mechanism, it will be seen, serves to move the doctor blade bodily into and away from operative position with the de-

sign cylinder, and also to very nicely regulate the pressure of the blade at various points along the cylinder.

In the embodied form of mounting for the doctor blade and its carrier (Figs. 1, 3, 4, 5 and 7), the doctor blade 200 rests upon and within a seat formed in a longitudinally-extending bar-like support 201 which rests upon the seats 94 of the carrier as already described. The support 201 is firmly but removably held in its place on the carrier by a plurality of clamping fingers 202, resting on the top surface thereof and upon the tops of a plurality of projections 203 formed on the rear side of the carrier 93. Screw-bolts 204 pass through the clamping fingers 202 and are screw-threaded into the projecting portions 203 of the carrier, and are held in place by locking nuts 205. A longitudinally-extending bar 209 rests upon the blade 200 to hold it firmly in position upon the blade support 201, the holding bar 209 being clamped at either end to the support 201 by clamping screws 210.

Means are provided for supporting the part of the doctor blade extending beyond the support 201 and holder 209, and as embodied a longitudinally-extending angle plate 216 rests upon the holding bar 209, with the outer edge thereof bent downwardly and pressing upon the upper surface of the doctor blade 200. The plate 216 is held in position by screw-bolts 217 passing therethrough and screw-threaded into the holding bar 209. Cooperating with the foregoing mechanism is a resilient sealing and backing blade 218, which is seated firmly between two clamping plates 219 and 220 extending along, and supported upon, the top horizontally-extending edge 221 of the supporting frame 11, the support 219 being fastened to the frame by screw-bolts 222, and the plates 220 being screw-fastened to the support 219.

In the embodied form of means for reciprocating the carriage 49 and the entire doctor blade mechanism supported thereby (Figs. 2, 5, 8 and 12), an arm 233 is pivotally connected by an anti-friction bearing 234 to a stub shaft 235 fixed to and extending from a lug 236, integral with and extending from a supporting plate 237, which plate rests against a pad 238, formed on the end of the carriage 49 and fastened thereto by screw-bolts 250. At its other end, the arm 233 extends outwardly through an opening in the side frame 3 of the press, and at its outer end has crank connection 253 with a shaft 254 journaled in a housing 255. Fixed on shaft 254 is a worm wheel 256, with which meshes a worm 257 having bearings 258 and 259 in the housing. Fixed to the worm shaft 260 is a pinion 261, which is driven from suitable gearing 262.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:

1. A rotary intaglio inking mechanism including in combination a guide mounted in fixed position on the frame structure, a carriage reciprocably mounted on the guide, a doctor blade carrier pivotally mounted on the reciprocable carriage, and means mounted on the carriage for regulably moving the doctor blade about its pivotal bearing to vary its position angularly with respect to the design cylinder.

2. A rotary intaglio inking mechanism including in combination a guide, a carriage reciprocably mounted on the guide, a doctor blade carrier pivotally mounted on the reciprocable carriage, and means mounted on the carriage, including a worm gearing, for regulably moving the doctor blade about its pivotal bearing to vary its position angularly with respect to the design cylinder.

3. A rotary intaglio inking mechanism including in combination a guide, a carriage reciprocably mounted on the guide, a doctor blade carrier pivotally mounted on the reciprocable carriage, and means mounted on the carriage, including a resiliently operating device, for regulably moving the doctor blade about its pivotal bearing to vary its position angularly with respect to the design cylinder.

4. A rotary intaglio inking mechanism including in combination a guide, a carriage reciprocably mounted on the guide, a doctor blade carrier pivotally mounted on the reciprocable carriage, and means mounted on the carriage, including a screw-thread regulated resiliently operating device, for regulably moving the doctor blade about its pivotal bearing to vary its position angularly with respect to the design cylinder.

5. A rotary intaglio inking mechanism including in combination a guide, a carriage reciprocably mounted on the guide, a doctor blade carrier pivotally mounted on the reciprocable carriage, and means for regulably moving the doctor blade about its pivotal bearing including a compound lever and a resilient connection between the lever and blade carrier.

6. A rotary intaglio inking mechanism including in combination a guide, a carriage reciprocably mounted on the guide, a doctor blade carrier pivotally mounted on the reciprocable carriage, and means for regulably moving the doctor blade about its pivotal bearing including a compound lever, a resilient connection between the compound lever and blade carrier, and screw-threaded means for regulating the resilient pressure.

7. A rotary intaglio inking mechanism including in combination a guide, a carriage reciprocably mounted on the guide, a doctor blade carrier pivotally mounted on the reciprocable carriage, and means for regulably moving the doctor blade about its pivotal bearing including a worm gear, a compound lever moved by the worm gear, and a connection from the compound lever to the blade carrier.

8. A rotary intaglio inking mechanism including in combination a guide, a carriage reciprocably mounted on the guide, a doctor blade carrier pivotally mounted on the reciprocable carriage, and means for regulably moving the doctor blade about its pivotal bearing including a worm gear, a compound lever moved by the worm gear, and a resilient connection from the compound lever to the blade carrier.

9. A rotary intaglio inking mechanism including in combination a guide mounted in fixed position on the frame structure, a carriage reciprocably mounted on the guide, a doctor blade carrier pivotally mounted on the reciprocable carriage, and means mounted on the carriage for regulably moving the doctor blade about its pivotal bearing, said means including a plurality of spaced apart members engaging the doctor blade carrier at different points.

10. A rotary intaglio inking mechanism in-

cluding in combination a guide mounted in fixed position on the frame structure, a carriage reciprocally mounted on the guide; a doctor blade carrier pivotally mounted on the reciprocable carriage, and means for moving the doctor blade about its pivotal bearing including a shaft, a plurality of mechanisms spaced apart along said shaft and connected to the blade carrier at spaced apart points, and means for accurately moving and holding said shaft.

11. A rotary intaglio inking mechanism including in combination a guide, a carriage reciprocally mounted on the guide, a doctor blade carrier pivotally mounted on the reciprocable carriage, and means for moving the doctor blade about its pivotal bearing including a shaft, a plurality of compound levers fixed to and spaced apart along said shaft and connected to the blade carrier at spaced apart points, and means for accurately moving and holding said shaft.

12. A rotary intaglio inking mechanism including in combination a guide, a carriage reciprocally mounted on the guide, a doctor blade carrier pivotally mounted on the reciprocable carriage, and means for moving the doctor blade about its pivotal bearing including a shaft, a plurality of compound levers fixed to and spaced apart along said shaft and connected to the blade carrier at spaced apart points, means for accurately moving and holding said shaft, and screw-threaded regulating means between each compound lever and the blade carrier.

13. A rotary intaglio inking mechanism including in combination a guide, a carriage reciprocally mounted on the guide, a doctor blade carrier pivotally mounted on the reciprocable carriage, and means for moving and positioning the doctor blade carrier about its pivotal bearing including a compound lever, a pivotally mounted connection between the lever and carrier including a spring exerting pressure between the lever and carrier, and means for regulating the amount of the spring pressure.

14. A rotary intaglio inking mechanism including in combination a guide, a carriage reciprocally mounted on the guide, longitudinal members engaging and clamping the doctor blade substantially throughout its length, a carrier constituting a support beneath said blade clamping members substantially throughout their length, pivotal supports mounted on said carriage and upon which said carrier is directly supported, and means for moving said pivotal supports and carrier toward and away from the design cylinder.

15. A rotary intaglio inking mechanism including in combination a guide, a carriage reciprocally mounted on the guide, longitudinal members engaging and clamping the doctor blade substantially throughout its length, a carrier constituting a support beneath said blade clamping members substantially throughout their length, pivotal supports mounted on said carriage and upon which said carrier is directly supported, and means mounted on the carriage for moving said carrier about its pivotal supports to regularly press the doctor blade against the design cylinder.

16. A rotary intaglio inking mechanism including in combination a guide, a carriage reciprocally mounted on the guide, longitudinal members engaging and clamping the doctor blade substantially throughout its length, a carrier constituting a support beneath said blade clamping members substantially throughout their length, piv-

otal supports mounted on said carriage and upon which said carrier is directly supported, means for moving said pivotal supports and carrier toward and away from the design cylinder, and means mounted on the carriage for moving said carrier about its pivotal supports to regularly press the doctor blade against the design cylinder.

17. A rotary intaglio inking mechanism including in combination a guide, a carriage reciprocally mounted on the guide, longitudinal members engaging and clamping the doctor blade substantially throughout its length, a carrier constituting a support beneath said blade clamping members substantially throughout their length, a plurality of spaced-apart arms fixed to and extending rearwardly from said pivotally mounted carrier, and means mounted on said carriage and connected to said arms for moving said carrier about its pivotal supports to regularly press the doctor blade against the design cylinder.

18. A rotary intaglio inking mechanism including in combination a guide, a carriage reciprocally mounted on the guide, longitudinal members engaging and clamping the doctor blade substantially throughout its length, a carrier constituting a support beneath said blade clamping members substantially throughout their length, pivotal supports mounted on said carriage and upon which said carrier is directly supported, a plurality of spaced-apart arms fixed to and extending rearwardly from said pivotally mounted carrier, and means mounted on said carriage and connected to said arms for moving said carrier about its pivotal supports to regularly press the doctor blade against the design cylinder.

19. A rotary intaglio inking mechanism including in combination a horizontally extending guide, a carriage reciprocally mounted on the guide, longitudinal members engaging and clamping the doctor blade substantially throughout its length, a carrier constituting a support beneath said blade clamping members substantially throughout their length, pivotal supports for said carrier mounted on said carriage above said guide, and means mounted on the carriage and acting to rotate the carrier about its pivotal supports to regularly press the doctor blade against the design cylinder.

20. A rotary intaglio inking mechanism including in combination a horizontally extending guide, a carriage reciprocally mounted on the guide, longitudinal members engaging and clamping the doctor blade substantially throughout its length, a carrier constituting a support beneath said blade clamping members substantially throughout their length, pivotal supports for said carrier mounted on said carriage above said guide, and means for moving said pivotal supports relatively to the carriage to move the doctor blade toward and from the design cylinder.

21. A rotary intaglio inking mechanism including in combination a guide, a carriage reciprocally mounted on the guide, a doctor blade and doctor blade carrier pivotally mounted on said carriage and means for moving the doctor blade toward and away from the design cylinder, said means comprising a toggle lever having one end thereof pivotally mounted on said carriage and the other end thereof pivotally connected to the doctor blade carrier.

22. A rotary intaglio inking mechanism including in combination a guide, a carriage reciprocally mounted on the guide, a doctor blade and doctor blade carrier pivotally mounted on said carriage and means for moving the doctor blade

5 toward and away from the design cylinder, said means comprising a toggle lever having one end thereof pivotally mounted on said carriage and the other end thereof pivotally connected to the doctor blade carrier and means for moving said toggle lever and regulable means for limiting the movement of the toggle.

10 23. A rotary intaglio inking mechanism including in combination a guide, a carriage reciprocally mounted on the guide, a doctor blade and

doctor blade carrier pivotally mounted on said carriage and means for moving the doctor blade toward and away from the design cylinder, said means comprising a toggle lever having one end thereof pivotally mounted on said carriage and the other end thereof pivotally connected to the doctor blade carrier and screw-threaded positioning means at the pivot connection between the toggle lever and doctor blade carrier.

CURTIS S. CRAFTS.