July 26, 1938. H. R. TROTTER 2,125,039

LINE-UP GAUGE

Filed Oct. 21, 1936 3 Sheets-Sheet 1

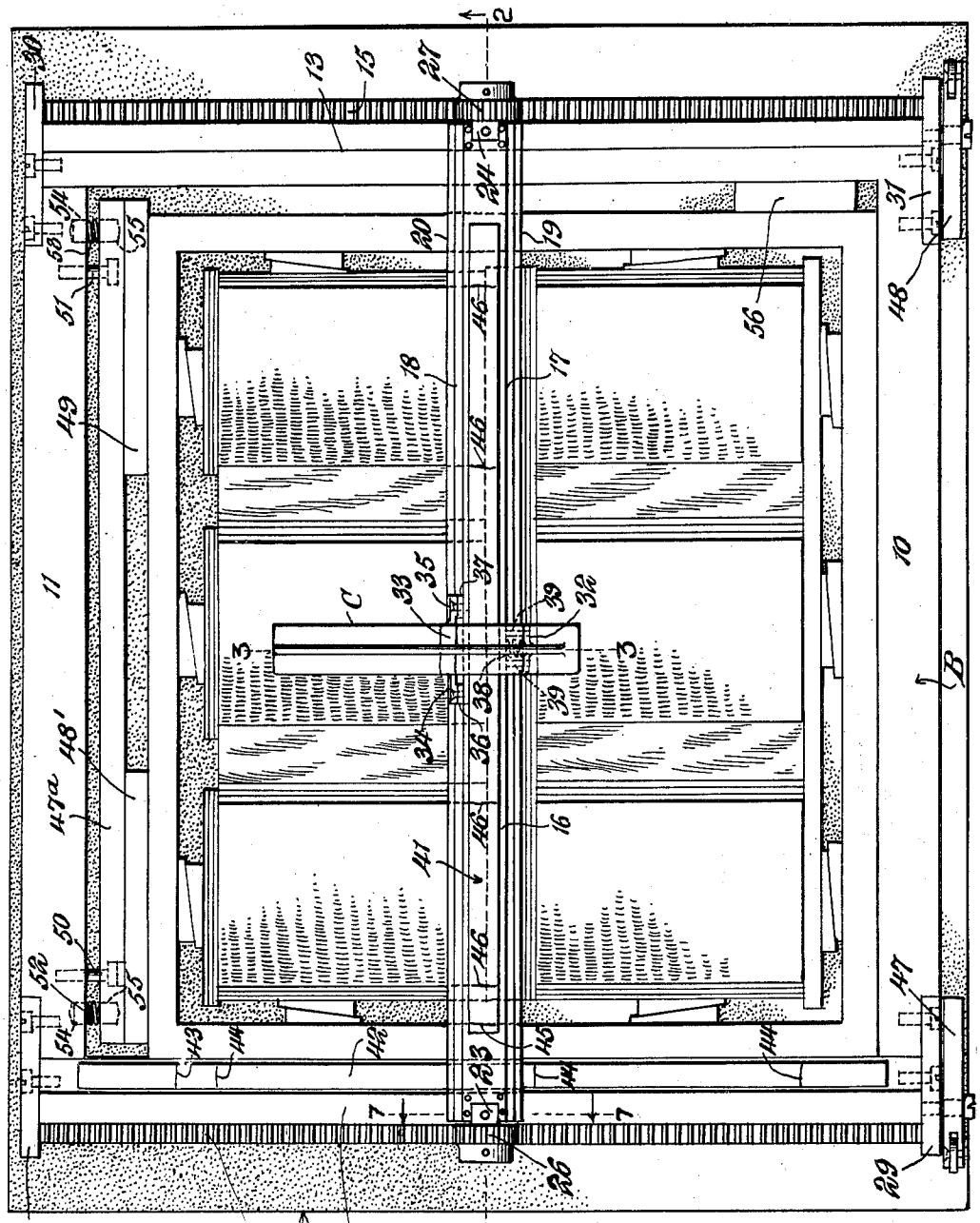


Fig. 1.

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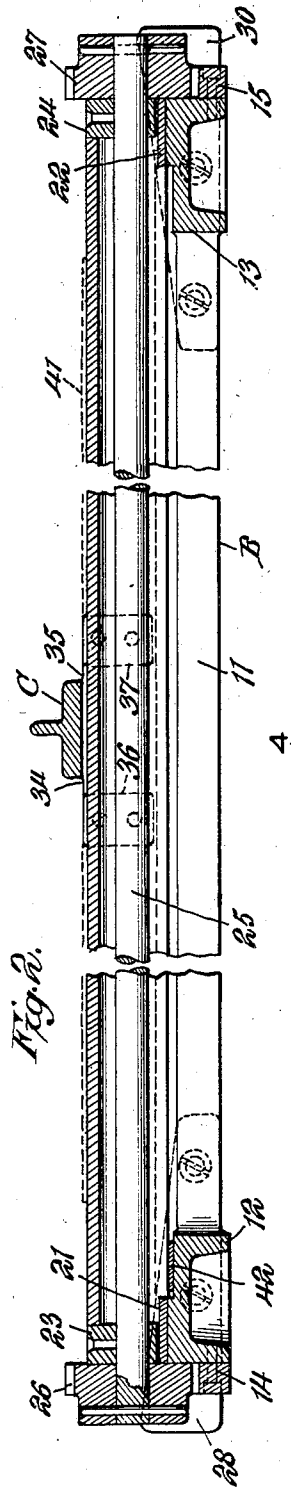


Fig. 2.

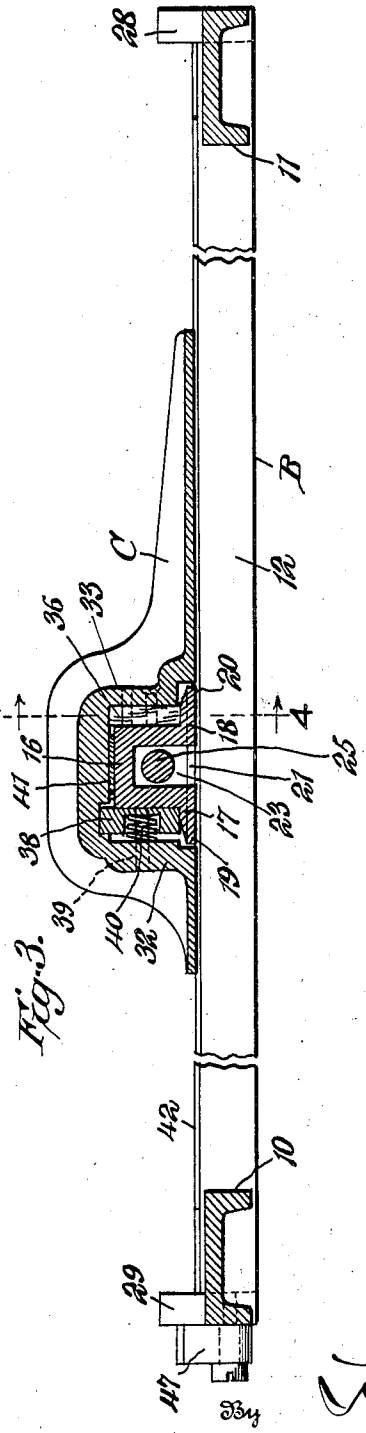


Fig. 3.

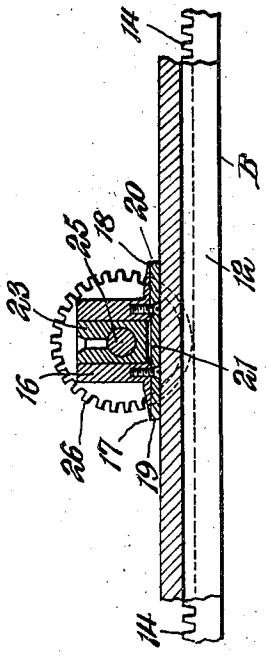


Fig. 7.

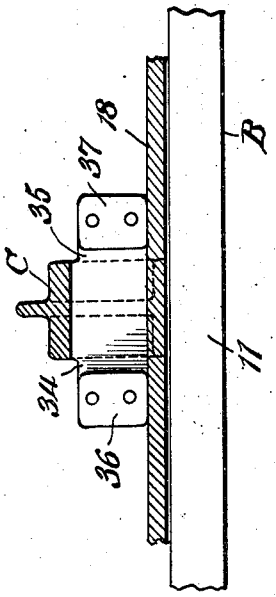


Fig. 4.

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LINE-UP GAUGE

Filed Oct. 21, 1936 3 Sheets-Sheet 3

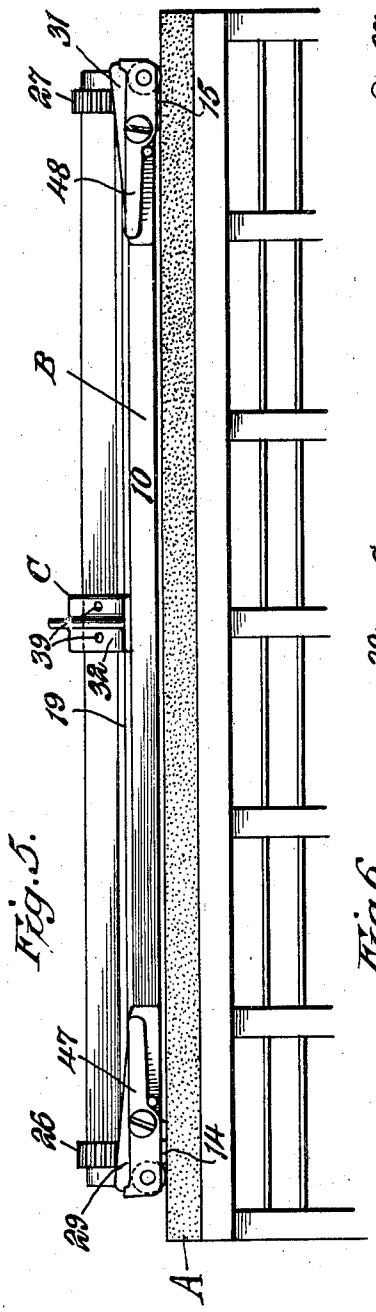


Fig. 5.

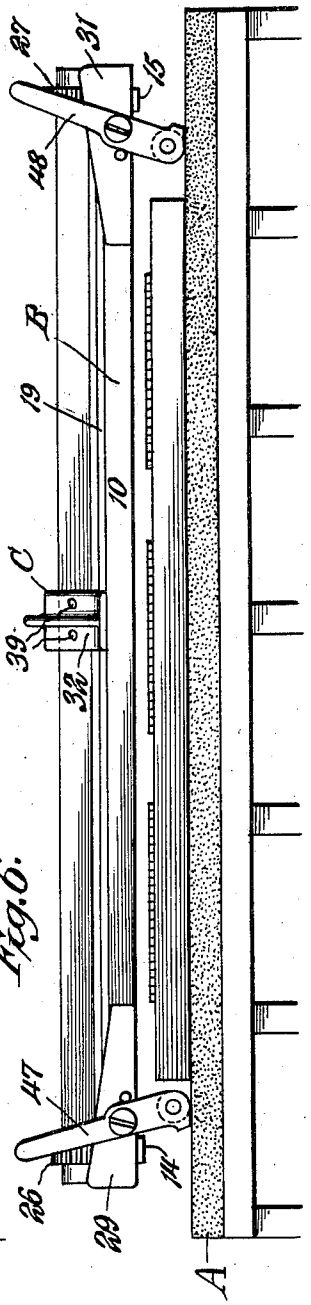


Fig. 6.

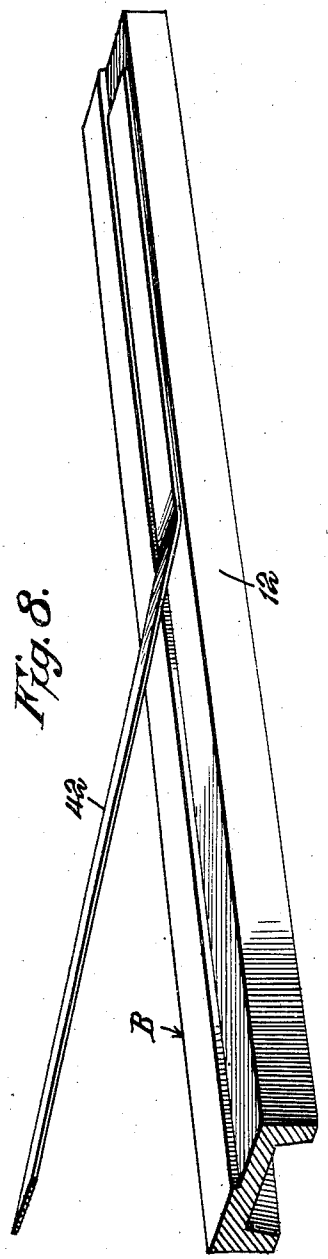


Fig. 8.

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Patented July 26, 1938 2,125,039

UNITED STATES PATENT OFFICE

2,125,039

LINE-UP GAUGE

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Application October 21, 1936, Serial No. 106,874

7 Claims. (Cl. 33—184.5)

My invention relates to line-up gauge adapted to attain correct marginal line-up and squareness of pages and units in printing forms while disposed upon a printer's make-up stone in a chase, so that the forms will reach the press in their final positions with respect to each other.

In the development of my device it is my purpose to provide rigid straight edges supported at uniform height slightly above type high, over a press form in chase, said straight edges moving freely over the entire form area, and furnishing parallel and right angle checks at all points in the form in order that the stone man may achieve correct alignment in his first and original assembly. The prevailing method with hand rules gives only an approximation so that a press proof must be taken and shifts made by trial and error on the press, causing much delay.

Another purpose of my invention is to provide a frame to lie flat and loose upon an ordinary make-up stone in the same manner as a chase, thereby eliminating the need for a special support for the forms.

Another purpose of my invention is to eliminate fixed scales and the necessity of computation on them of marginal distances by the stone man, substituting therefor simple means whereby the stone man generates his own scale of marginal spacing on two adjacent sides of the form.

With the above and other purposes in view, my invention will be more fully understood from the following detail description.

In the drawings chosen to illustrate my invention the scope whereof is set forth in the appended claims,

Figure 1 is a plan view of my invention disposed upon a make-up stone in operative relation to chase surrounded forms also disposed upon the make-up stone;

Figure 2, a section on the line 2—2 of Figure 1;

Figure 3, an enlarged section on the line 3—3 of Figure 1;

Figure 4, a section on the line 4—4 of Figure 3;

Figure 5, a front edge view of the device positioned on a make-up stone;

Figure 6, a view similar to Figure 5 with the front edge of the frame elevated to permit the removal of alined chase carried forms from the stone for transport to a press,

Figure 7, a section on the line 7—7 of Figure 1; and

Figure 8, a detail perspective view of one side of the frame of the device showing scale marked tape partly removed in the operation of effecting its complete removal and the application of unmarked tape for receiving scale markings applicable to a new item of work.

Referring to the drawings A is a make-up stone of well-known construction upon which my improved line-up gauge is adapted to lie flat and loose when in use, as shown in Figure 1. My improved gauge comprises a frame B including opposite parallel sides 10—11 and 12—13, adjacent sides of the frame being disposed at right angles to each other. Secured to the outer vertical faces of the sides 12 and 13 respectively, are rack bars 14 and 15, the teeth of one rack bar being in alignment with the teeth of the other.

Slidably supported on the frame sides 12 and 13 respectively are the ends of a member 16, said member being arched in cross section, as shown in Figure 3, to provide arms 17 and 18 terminating at their free ends in straight edges 19 and 20 respectively, said member 16 with its straight edges being slightly above type high with respect to type forms disposed upon the stone A. The member 16 carries at one end a bearing plate 21 engaging the frame side 12 and at its other end a bearing plate 22 engaging the frame side 13. Slidably interfitted with the related end of the member 16 is a bearing block 23. A similar bearing block 24 slidably interfits with its related end of the member 16. A shaft 25 is located between the arms 17 and 18 of the member 16 and journalled in the blocks 23 and 24. The ends of this shaft are extended outwardly of the bearing blocks and have fixed thereon respectively pinions 26 and 27, the former of which meshes with the rack bar 14 and the latter with the rack bar 15. The lower ends of the bearing blocks are always spaced from their related bearing plates and the blocks 23 and 24, shaft 25 and pinions 26 and 27 are free to float at all times in unison vertically while their combined weight is constantly imposed upon the racks 14 and 15 so that variations in the pitch lines of the racks with respect to the side surfaces engaged by the bearing plates will not affect or disturb the member 16 during sliding movement of the latter. It will be further noted that the bearing plates 21 and 22 serve to maintain the member 16, blocks 23 and 24, shaft 25 and pinions 26 and 27 in assembly during their removal from and application to the frame, it being sometimes desirable for the operator to effect such removal and reapplication of these parts. In respect to the utility of the structure just described it is important to point out that it is commercially im-

possible to make the surfaces of the sides 12 and 13 with which the plates 21 and 22 slidably engage exactly parallel with the pitch line of the respective racks 14 and 15. Therefore, if the shaft 25 and bearing blocks 23 and 24 were rigidly connected to the member 16 and its embodied straight edges, then, under certain conditions, the pinions 26 and 27 would bind in their related racks, and under other conditions, when the sides 12 and 13 would support the entire weight of the member 16 and its associated parts, the pinions would be disposed out of full mesh with their related racks and lost motion would arise. This would cause straight edge inaccuracy and impaired freedom of movement of the member 16. Therefore, my construction, whereby the shaft 25 and its carried pinions are beneficially capable of floating vertically independent of the member 16, preserves straight edge accuracy and freedom of movement and in addition avoids the requirement of an impossible precision of manufacture.

In order to prevent the member 16 and the parts carried thereby from being moved off the frame at either end of the rack bars 14 and 15 I provide stop plates 28 and 29 at respective ends of the rack bar 14 and similar stop plates 30 and 31 and the respective ends of the rack bar 15; the plates 28 and 30 being engageable respectively by the pinions 26 and 27 to limit movement of the member 16 and associated parts in one direction and respectively with the plates 29 and 31 to limit movement of the member 16 and associated parts in the opposite direction. The stop plates 28—30 and 29—31 also function to provide a guide or gauge to assure the meshing of the pinions 26 and 27 respectively with aligned teeth of the rack bars 14 and 15, when the member 16 and associated parts are applied to the frame B at the front of the latter. In such application the pinions 26 and 27 are engaged respectively with the stop plates 28 and 30 as the member 16 is dropped into position on the frame sides 12 and 13, which will assure meshing of the pinions with aligned teeth of the rack bars and parallelism of the straight edges 19 and 20 with the frame sides 10 and 11 in all positions thereof within the limits of their movement. The same additional function is served by the stop plates 29 and 31 if the stoneman elects to position the member 16 on the frame sides 12 and 13 at the rear of the frame B.

Slidably mounted on the member 16 at right angles to the straight edges 19 and 20 is a straight edge C having portions extending beyond the straight edges 19 and 20, either of which portions can be utilized by the stoneman as convenience demands and rapidity of the aligning operations requires. Likewise, either of the straight edges 19 and 20 can be utilized by the stoneman to meet the same conditions. The straight edge C is provided with an arched portion having vertical sides 32 and 33, between which the member 16 is received, as clearly shown in Figure 3. The internal width of the arched portion of the straight edge C is greater than the external width of the member 16 to provide space for the introduction of a frictional connection between the straight edge and the member 16 to control the freedom of the sliding movement of said straight edge on the member 16. I effect such frictional connection as follows: Lateral wings 34 and 35 are provided on the side 33 of the arched portion of the straight edge C and attached to said wings are friction blocks 36 and 37, respectively, which frictionally engage the arm 18 of the member 16 at spaced apart points. Between the arm 17 of the member 16 and the side 32 of the arched portion of the straight edge C I provide a friction block 38 which floats or slides on dowel pins 39 carried by the side 32. Interposed between the side 32 and the block 38 and seating in a socket in the latter is a spring 40 which serves to force the block 38 against the side 17 of member 16 and at the same time tends to move the straight edge C in a direction to force the blocks 36 and 37 into engagement with the side 18 of the member 16, thereby providing an effective frictional restraint on too free sliding movement of the straight edge C on the member 16. It is also important to note that the positional relation of the blocks 36, 37 and 38 is such as to provide a three point bearing for the straight edge C which is effective in maintaining said straight edge in essential right angular relation to the straight edges 19 and 20.

As will be obvious the connection between straight edge C and member 16 is such that the straight edge can be moved vertically and separated from said member and then reapplied to the member in reversed position wherein the long arm of the straight edge will lie between the member 16 and frame side 10 instead of between the member 16 and the frame side 11, as shown in the drawings. Such reversal of position of the straight edge C may be desirable at times to meet specific conditions confronting the stoneman in the operation of aligning. The position of the member 16 and its associated straight edges can also be reversed from that shown in the drawings without in any way affecting its utility or mode of operation. In other words it is immaterial in which position the stoneman applies the member 16 and the parts assembled therewith to the frame, it being impossible to apply these parts in a wrong position on the frame so long as the stoneman gets the pinions 26 and 27 in mesh with aligned teeth of the racks 14 and 15.

In my improved line-up gauge I eliminate entirely the use of fixed scales and the confusion and inaccuracies incident to their use. In lieu thereof the stoneman provides the device with scale markings all of which are indicative only of straight edge positions required to effect the desired line-up of chase surrounded forms within the frame B which relate to one item of work, and which markings are removable to permit the stoneman to apply different scale markings to the device, all of which latter are indicative only of straight edge positions required to effect the desired line-up of forms relating to a different item of work.

To this end I removably attach to the top of the member 16 and either frame side 12 or 13 (in the present instance frame side 12) strips of adhesive tape 41 and 42, respectively, beneficially capable of easily receiving markings. In developing the scales individual to the particular item of work in hand the stoneman first determines the gripper edge position for the sheet of paper on which the forms are to be impressed and marks that point on the tape 42, such marking being indicated at 43 in Figure 1. Using the marking 43 as a base line or zero the stoneman, with the aid of the usual ruler, then measures off the marginal distances in the direction of the tape 42 and, utilizing either of the straight edges 19 or 20, draws the scales 44 on the tape 42 at the measured distances. In like manner the stoneman determines the side guide edge position of the

sheet and marks same on the tape 41 as at 45 and with this as his base line or zero measures off the marginal distances on the tape 41 and, utilizing the straight edge draws the scales 46 on the tape at the measured distances. In this manner scales are produced which are individual to the particular item of work and require no computation during the succeeding operation of positioning the straight edges to check marginal line-up and squareness of the forms. When forms of a new item of work are to be lined-up and squared the tape lengths 41 and 42 are removed and new tape lengths applied when the stoneman proceeds to develop new scale markings individual to the new item of work in the manner heretofore described. While I have shown and described the use of tape lengths in providing the device with removable scale markings such disclosure is merely illustrative of a convenient means for reaching the desired end and is in no way to be construed as limiting the invention to such type of removable scales as it will be obvious that removable scales can be attained by employing other means for that purpose, such as providing the sides 12 and 13, and the member 16 with permanent surfaces capable of receiving the desired scale markings but permitting their easy erasure for the application of new scale markings. I consider such variations well within the scope of this feature of my invention wherein the essence resides in the removability of scales individual to one item of work and the substitution therefor of scales individual to another item of work regardless of how the removability and reapplication of the scales are accomplished.

In order to facilitate removal of aligned forms locked in a chase from within the frame of the device I pivot on the stop plates 28 and 30 respectively, cam levers 47 and 48 which, when operated from the position shown in Figure 5 to the position shown in Figure 6, coact with the stone A to raise and hold the front side 10 of the frame of the device to and in an elevation sufficient to permit the chase with the forms locked therein to be slid beneath the elevated frame side 10 onto a truck for transportation to a press. To lower the frame side 10 to a position at rest upon the stone A the levers 47 and 48 are simply operated back to the position shown in Figure 5.

By reference to Figure 1 the manner of using the device will be clearly apparent to those skilled in the art. Any suitable manner of positioning the chase and forms within the frame B may be employed by the stoneman, the only requirement being that the chase be positioned fully against the frame sides 10 and 12, as shown in Figure 1. The scales 44 and 46 having been developed by the stoneman on the basis of the particular item of work in hand, he proceeds to effect the marginal alignment and squareness of the forms in the usual way, checking the accuracy of such alignment and squareness by straight edges 19 and 20 in cooperation with scale markings 44 and straight edge C in cooperation with the scale markings 46. When accurate marginal alignment and squareness has been attained the forms are locked in the chase and again checked and when accurate marginal alignment and squareness in the locked assembly is had the chase and forms are ready for removal from the stone A and transportation to the press.

For the purpose of locking the chase shown in Figure 1 within the frame of the device when desired, I provide a spring pressure lock-up embodying a quoin bar 47a carrying quoin devices 48' and 49 on its advance edge. The bar 47a is mounted for limited sliding movement on pins 50 and 51 having fixed connection with the frame side 11. Springs 52 and 53 are seated respectively in sockets 54 and 55 and react from the frame side 11 to normally hold the quoin bar at the limit of its movement away from said frame side as shown in Figure 1. It will be apparent that, in the construction just described, when the quoin devices 48' and 49 are operated to force a chase against the side 10 of the frame they will react from a yielding member which will serve to prevent the operator from applying excess pressure which would distort the frame and cause the pinions 26 and 27 to bind on the frame sides or in their related racks 14 and 15. Carried by the frame side 13 immediately adjacent the corner formed by said side and the side 10 is a quoin device 56. As this quoin device exerts its pressure at frame corners which are the strongest part of the frame it will produce no distortion of the latter when operated against a chase.

I claim:

1. In a device for lining-up printing forms, a pair of racks having fixed parallel relation to each other, a bearing rail adjacent each rack and parallel thereto, a straight edge movably supported by the bearing rails, spaced bearing blocks each having free vertical floating interfit with the straight edge, a shaft journalled in said blocks, and pinions fixed on the shaft and meshing respectively with said racks, whereby the positional relation of the straight edge and pinions will be automatically varied in response to the absence of parallelism between straight edge supporting surfaces of the bearing rails and the pitch lines of the racks as said straight edge is moved over the bearing rails.

2. In a device for lining-up printing forms, a pair of racks having fixed parallel relation to each other, a bearing rail adjacent each rack and parallel thereto, a transversely arched member movably supported by said rails, spaced journal blocks between the sides of said member each having free vertical floating interfit with the member, a shaft journalled in said blocks, pinions fixed on the shaft and meshing respectively with said racks and whereby the vertical positional relation of the member and pinions will be automatically varied in response to the absence of parallelism between the member supporting surfaces of the bearing rails and the pitch lines of the racks as said member is moved over the bearing rails, and a straight edge carried at the free end of at least one of the sides of the member.

3. In combination, a pair of racks having fixed parallel relation to each other, a straight edge movably supported between the racks, spaced bearing blocks having free vertical floating interfit with the straight edge, a shaft journalled in said blocks, and pinions fixed on the shaft and meshing respectively with said racks, whereby the positional relation of the straight edge and pinions will be automatically varied in response to the absence of parallelism between the surface of the straight edge support and the pitch line of the racks as the straight edge is moved over said support.

4. In combination, a pair of racks having fixed parallel relation to each other, a transversely arched member movably supported between the racks, spaced journal-blocks between the sides of said member each having free vertical floating interfit with said member, a shaft journalled in said blocks, pinions fixed on the shaft and mesh-

ing respectively with said racks whereby the vertical positional relation of the member and pinions will be automatically varied in response to the absence of parallelism between the surface of the member support and the pitch lines of the racks as said member is moved over said support, and a straight edge carried at the free end of at least one of the sides of the member.

5. In a device for lining up printing forms, a pair of spaced bearing rails having fixed parallel relation to each other, a straight edge movably supported by said rails, means for maintaining the straight edge at right angles to the rails during its movement, a second straight edge having interfitting slidable connection with the first straight edge and disposed at right angles to the latter and disengageable at all times from the first straight edge solely by movement thereof in one direction transverse the first straight edge, and a frictional connection between the straight edges yieldingly resisting said disengagement and sliding movement of the second straight edge.

6. In a device for lining up printing forms, a pair of spaced bearing rails having fixed parallel relation to each other, a straight edge movably supported by said rails, means for maintaining the straight edge at right angles to the rails during its movement, said straight edge having a transversely arched portion providing spaced parallel sides, a second straight edge slidable on the first straight edge and disposed at right angles to the latter, said second straight edge having a recessed portion receiving the arch portion of the first straight edge, and spring controlled friction members carried by the second straight edge and engaging the sides of said arched portion.

7. In a device for lining up printing forms, a pair of spaced bearing rails having fixed parallel relation to each other, a straight edge movably supported by said rails, means for maintaining the straight edge at right angles to the rails during its movement on the latter, said straight edge having a transversely arched portion providing spaced parallel sides, a second straight edge slidable on the first straight edge and disposed at right angles to the latter, said second straight edge having a recessed portion receiving the arched portion of the first straight edge, laterally spaced friction blocks carried by the second straight edge and engaging one side of said arched portion, and a spring pressed friction block carried by the second straight edge and engaging the other side of said arched portion.

HENRY R. TROTTER.