

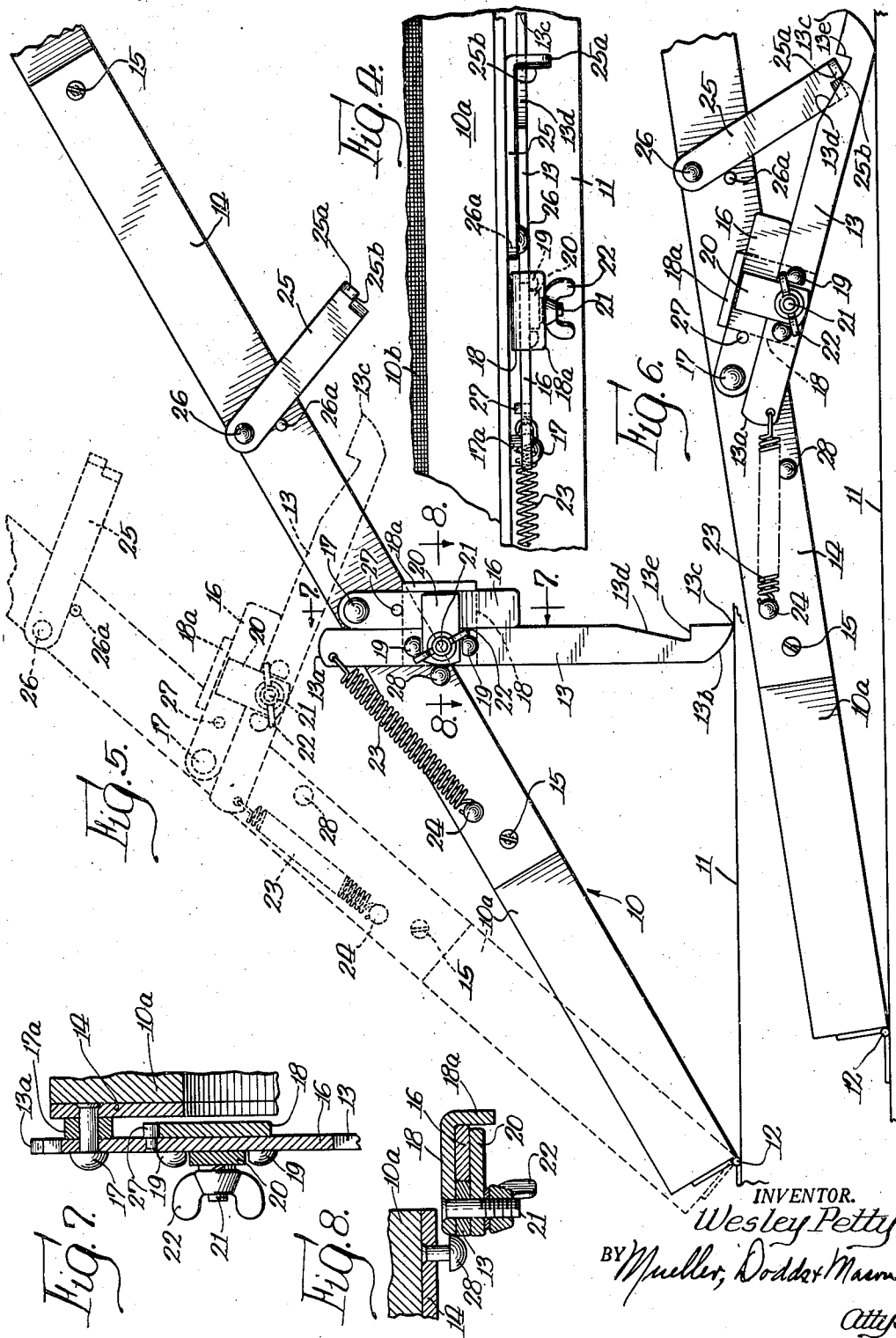
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HOLDING DEVICE

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HOLDING DEVICE

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The present invention relates to an improved mechanism for maintaining one of two relatively movable members in a set position relative to the other, and more particularly to an improved device for releasably holding one of two hinged members in a raised position relative to the other against gravity pull.

Holding devices of the character referred to are useful in many applications, particularly in releasably holding lids, covers, printing frames and the like in elevated positions relative to supporting bases. Comparatively recently there have been developed for this purpose various types of holding devices which operate upon the self releasing principle, i. e., as the movable member is raised from the elevated position in which it is held by the holding device, the holding element of the device is actuated to permit full closing movement of the member. Usually such devices are designed for a particular application, are relatively complicated and hence expensive, and lack the ruggedness required in certain applications.

It is an object of the present invention, therefore, to provide a holding device of the character described which is of simple, economical and rugged construction, may be easily and quickly installed in any of a variety of applications, and is wholly reliable in operation.

It is another object of the invention to provide a mechanism of the character described which is so arranged that a solid and powerful holding bridge is established between the raised member and its supporting structure each time the mechanism is actuated to hold the member in its raised position.

According to still another object of the invention, unnecessary complication of the mechanism is obviated by so arranging the relatively movable parts thereof that a single spring is utilized to move the holding element toward each of its holding and non-holding positions.

The invention, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the following specification taken in connection with the accompanying drawings, in which:

Fig. 1 is a perspective view illustrating the present improved holding device in its embodiment in printing apparatus of the stencil type;

Fig. 2 is a side view illustrating the positions occupied by the parts of the device when the printing frame is elevated;

Fig. 3 is a side-view illustrating the positions

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occupied by the parts of the device when the printing frame is closed;

Fig. 4 is a fragmentary top plan view of the device;

Figs. 5 and 6 are additional side views illustrating the parts of the device in changed positions;

Fig. 7 is a fragmentary sectional view taken along the lines 7—7 in Fig. 5; and

Fig. 8 is a fragmentary sectional view taken along the lines 8—8 in Fig. 5.

Referring now to the drawings and more particularly to Fig. 1 thereof, the present improved holding mechanism or device is there illustrated in its use releasably to hold a printing frame 10 in an elevated position relative to a printing base 11 to which the frame 10 is hinged along one side by means of a hinge 12. This frame carries a screen 10b, formed of silk or the like, which is stretched between the four sides of the frame and is used in an entirely conventional manner in the application of ink to patterned surfaces of work supported upon the base 11.

In brief, the holding device comprises an elongated metal support 14 fixedly attached to the side member 10a of the frame 10 along the edge thereof by means of screws 15, and a holding element in the form of a straight bar 13 which is supported for pivotal and translatable movement relative to the support 14. More specifically, the holding element 13 is slidably supported upon an arm 16 which is pivotally mounted upon the support 14 by means of a pivot pin 17. A spacing sleeve 17a embracing the pivot pin 17 in the manner shown in Fig. 7 of the drawings, is utilized to provide the required lateral clearance between the support 14 and the movable parts of the mechanism. A flanged slide part 18 riveted to the holding element 13 by means of rivets 19 and having a flange 18a overlying the edge of the arm 16, is used in conjunction with a cooperating slide part 20 to provide the desired sliding support for the holding element along the arm 16. The slide part 20 is mounted upon the holding element 13 by means of a threaded stud 21 extending through the parts 18 and 13; and in cooperation with a wing nut 22 threadable along the stud 21, acts as adjustable friction means for preventing free sliding movement of the holding element relative to the arm 16. A stop pin 27 mounted upon the arm 16 and adapted for engagement by the upper edge of the slide part 18 is utilized to arrest relative sliding movement between the

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arm 16 and the holding element 13 in one direction.

With the described arrangement, the holding element 13 may be pivoted with the arm 16 between the non-holding position illustrated in Fig. 3 of the drawings and the holding position illustrated in Fig. 5 of the drawings, the latter position being defined by a stop pin 28 mounted upon the support 14 and projecting outwardly therefrom into the path of movement of the holding element. At its swing end, the holding element 13 is provided with a rounded camming surface 13b which terminates in a relatively sharp point 13c adapted for engagement with the base 11 to thus hold the frame 10 in its raised position when the holding element occupies its holding position.

For the purpose of alternately pivoting the holding element 13 toward its holding and non-holding positions in response to alternate movements of the frame 10 away from the base 11, a helical spring 23 is provided. This spring is connected at one end to the pivoted end 13a of the holding element and at its opposite end to a stud 24 mounted upon the support 14. As pointed out below, tensioning of this spring to effect pivotal movement of the holding element 13 towards its non-holding position is produced by moving the frame 10 toward the base 11 after the frame has been raised and the holding element has pivoted to its holding position. For the purpose of tensioning the spring 23 to effect pivotal movement of the holding element 13 away from its holding position toward its non-holding position, means comprising a second arm 25 pivotally supported by a pivot pin 26 upon the support 14 are provided. This arm is provided at its swing end with a laterally extending finger 25a having a lower edge 25b adapted to ride down an inclined edge portion 13d of the holding element to bring the finger 25a into engagement with an inwardly directed shoulder 13e formed at the swing end of the holding element 13. A stop pin 26a projecting outwardly from the support 14 acts to limit downward movement of the arm 25 when the frame 10 is raised, thereby to position the finger 25a for engagement with the inclined edge surface 13d of the holding element during retraction of this element to its non-holding position.

In considering the operation of the above described mechanism, it may first be pointed out that when the frame 10 is closed, i. e. resting upon the printing base 11, the parts of the mechanism occupy the relative positions illustrated in Fig. 3 of the drawings. With the holding element 13 thus disposed in its non-holding position, the spring 23 is tensioned between the stud 24 and a point at the end of the element 13 laterally displaced from the line passing through the two studs 17 and 24. Thus the spring 23 is energized or conditioned to pivot the holding element 13 toward its holding position. Such pivotal movement occurs under the joint influence of gravity pull and the spring 23 when the frame 10 is raised or pivoted away from the printing base 11 about the pivot axis of the hinge 12. As the holding element 13 is thus rotated in a clockwise direction, its lower rounded end 13b drags along the base 11 and the arm 25 is similarly rotated under the influence of gravity until the lower edge thereof engages the stop pin 26a. The spring 23 assists in producing the described pivotal movement until the end thereof connected with the pivot end 13a of the hold-

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ing element is brought into alignment with the line passing through two studs 17 and 24. Slight pivotal movement of the holding element 13 beyond this position is produced by continuing gravity pull upon the holding element, such movement serving lightly to tension the spring 23 and continuing until the element 13 engages the stop pin 28. After the holding position of the element 13 is thus established, the swing end of the frame 10 may be pushed from the position shown in Fig. 2 toward the base 11 to the desired set position relative to this base as shown in Fig. 5. Incident to such reverse pivotal movement of the frame 10, the arm 16 is slid between the slide parts 18 and 20 until the pin 27 engages the upper edge of the part 18. As the end 13a is thus projected upwardly from the line passing through the studs 17 and 24, the spring 23 is further tensioned and hence conditioned to pivot the holding element 13 back toward its non-holding position when the weight of the frame 10 holding the sharp end 13c of the holding element in engagement with the base 11 is removed.

When it is desired to close the frame 10 against the printing base 11, it is only necessary to raise the frame slightly from its set position relative to the base as shown in Fig. 5. In response to this operation, the holding element 13 is lifted from the base 11 and thus freed for rotation in a counter clockwise direction about the pivot stud 17 under the influence of the tensioned spring 23. The pivotal movement thus imparted to the holding element 13 is sufficient to move the rounded end 13b to a position wherein it will engage the upper surface of the base 11 when the frame is lowered. Accordingly, the frame 10 may be lowered with the rounded end 13b of the holding element riding along the surface of the base 11. When the frame is lowered to the position shown in Fig. 6 of the drawings, the inclined edge 13d thereof is brought into engagement with the lower edge 25b of the finger 25a. During continued movement of the frame 10 toward its lowered position, the edges 13d and 25d slide over each other until the finger 25a engages the shoulder 13e. Thereafter, and during still further movement of the frame toward its closed position, the arm 25 is pivoted in a counter clockwise direction about the pin 26 and forces the holding element 13 to slide along the arm 16 away from the pin 27. This relative sliding movement between the two parts 13 and 16 continues until the frame 10 is fully closed or lowered to the position shown in Fig. 3 of the drawings, and serves to tension the spring 23, thereby to condition this spring to effect pivotal movement of the holding element 13 toward its holding position when the frame is subsequently raised.

From the above explanation it will be apparent that the only operations required in raising and lowering of the printing frame are such as may be accomplished by one hand manipulation of the swing end of the frame. Further, the mechanism is simple in the extreme and requires the use of no parts which may not be formed by die forming or stamping operations. The only adjustment which may be required in the use of the device is that of adjusting the wing nut 22 to vary the force with which the arm 16 is clamped between the two slide parts 18 and 20 and thus determine the static friction restraining the arm and holding element 13 against relative sliding movement. In this regard it is pointed out that the friction

must be sufficient to prevent the spring 23 from sliding the holding element 13 along the arm 16 when the shoulder 13e is disengaged from the finger 25a and when the frame 10 is raised from its elevated position to effect pivotal movement of the holding element toward its non-holding position. The desired degree of frictional restraint against relative sliding movement between the parts 15 and 16 may be readily attained by suitably adjusting the wing nut 22 along the threaded stud 21.

Although the mechanism has been described with particular reference to its use in conjunction with printing apparatus of the character conventionally used for stencilling operations, it will be understood that the device is equally applicable to many other structures where simple and economical means are required for maintaining one of two hinged members in an elevated position relative to the other member against gravity pull. Further, since the mode of using printing apparatus of the illustrated type is well understood in the art, no detailed explanation of such use is deemed necessary herein.

While there has been described what is at present considered to be the preferred embodiment of the invention, it will be understood that various modifications may be made therein which are within the true spirit and scope of the invention as defined in the appended claims.

I claim:

1. A mechanism for releasably holding one member in a set position relative to a second member which is biased toward said one member, comprising a holding element pivotally supported for gravity pull actuation to a holding position in response to relative movement of said members apart, and means responsive to said relative movement followed by partial relative movement of said members toward each other for rotating said holding element to a non-holding position when said members are subsequently moved apart.

2. A mechanism for releasably holding one member in a set position relative to a second member which is biased toward said one member, comprising a holding element pivotally supported upon said one member for gravity pull actuation to a holding position in response to relative movement of said members apart, and spring means tensioned by subsequent relative movement of said members toward each other for rotating said holding element to a non-holding position in response to subsequent movement of said members apart.

3. A mechanism for releasably holding one member in a set position relative to a second member which is biased toward said one member, comprising a holding element pivotally supported upon said one member for gravity pull actuation to a holding position in response to relative movement of said members apart, spring means tensioned by subsequent relative movement of said members toward each other for rotating said holding element toward a non-holding position in response to subsequent movement of said members apart, and means responsive to rotation of said holding element toward the non-holding direction for tensioning said spring, whereby said spring assists in moving said holding element to its holding position in response to subsequent movement of said members apart.

4. A mechanism for releasably holding one member in a set position relative to a second member against gravity pull, comprising a holding element pivotally supported upon said one

member for movement between non-holding and holding positions, and spring means tensioned in response to movement of said holding member into said non-holding position for at least in part rotating said element to its holding position and again tensioned in response to partial movement of said members toward each other to rotate said element toward its non-holding position when said members are subsequently moved apart.

5. A mechanism for releasably holding one of two hinged members in a set position against gravity pull, comprising a holding element, means supporting said holding element upon said one member for pivotal and translatory movement relative to said one member, said element being pivotally movable between non-holding and holding positions, means for translating said element relative to said one member in one direction in response to movement of said element into its non-holding position, said element being translated relative to said one member in the opposite direction in response to partial closing movement of said members after said element is pivoted to its holding position, and spring means tensioned in response to each such translatory movement for alternately pivoting said element toward its holding and non-holding positions in response to alternate opening movements of said members.

6. A mechanism for releasably holding one of two hinged members in a set position against gravity pull, comprising a holding element, means supporting said holding element upon said one member for pivotal and translatory movement relative to said one member, said element being pivotally movable between non-holding and holding positions, stop means cooperating with said element to determine said holding position, means for translating said element relative to said one member in one direction in response to movement of said element into its non-holding position, said element being translated relative to said one member in the opposite direction in response to partial closing movement of said members after said element is pivoted to its holding position, and spring means tensioned in response to each such translatory movement for alternately pivoting said element toward its holding and non-holding positions in response to alternate opening movement of said members.

7. A mechanism for releasably holding one of two hinged members in a set position against gravity pull, comprising an arm pivotally supported upon said one member, a holding element slidably supported upon said arm and pivotally movable with said arm between holding and non-holding positions, said holding element being slidable relative to said arm between two different settings, said arm being slid relative to said holding element to establish one of said two settings in response to movement of said one member toward the other member after said holding element is moved to its holding position, means actuated during closing movement of said one member toward the other member for sliding said holding element relative to said arm to establish the other of said two settings when said holding element is moved into its non-holding position, and spring means tensioned each time relative sliding movement is thus produced between said arm and said holding element for alternately pivoting said element toward its holding and non-holding positions in response to alternate opening movements of said one member.

8. A device for releasably holding one of two hinged members in a raised position relative to

the other member against gravity pull, comprising a support, a holding element, means mounting said holding element upon said support for pivotal and translatable movement relative to said support, said holding element being pivotally movable between holding and non-holding positions and being adapted for translatable movement relative to said support each time it is moved to either position, and spring means connected between said holding element and said support and so controlled by the translatable movement of said holding element as to assist in pivoting said holding element toward each of said two positions.

9. A device for releasably holding one of two hinged members in a raised position relative to the other member against gravity pull, comprising a support, an arm pivotally mounted upon said support, a holding element slidably carried by said arm and pivotally movable with said arm between holding and non-holding positions, a spring connected between said holding element and said support, said arm and holding element being adapted for relative sliding movement in one direction to tension said spring each time said holding element is moved to its holding position, thereby to condition said spring to pivot said holding element toward its non-holding position, and means for producing relative sliding movement between said arm and said holding element in the opposite direction each time said holding element is moved into its non-holding position, thereby to condition said spring to pivot said holding element toward its non-holding position.

10. A device for releasably holding one of two hinged members in a raised position relative to the other member against gravity pull, comprising a support, an arm pivotally mounted upon said support, a holding element slidably carried by said arm and pivotally movable with said arm between holding and non-holding positions, a spring connected between said holding element and said support, said arm and holding element being adapted for relative sliding movement in one direction to tension said spring each time said holding element is moved to its holding position, thereby to condition said spring to pivot said holding element toward its non-holding position, and a second arm pivotally mounted upon said support and engageable with said holding element to produce relative sliding movement between said first-named arm and said holding element in the opposite direction each time said holding element is moved into its non-holding position, thereby to condition said spring to pivot said holding element toward its non-holding position.

11. A device for releasably holding one of two hinged members in a raised position relative to the other member against gravity pull, comprising a support, an arm pivotally mounted upon said support, a holding element slidably carried by said arm and pivotally movable with said arm between holding and non-holding positions, a spring connected between said holding element and said support, said arm and holding element being adapted for relative sliding movement in one direction to tension said spring each time

said holding element is moved to its holding position, thereby to condition said spring to pivot said holding element toward its non-holding position, a second arm pivotally mounted upon said support and engageable with said holding element to produce relative sliding movement between said first-named arm and said holding element in the opposite direction each time said holding element is moved into its non-holding position, thereby to condition said spring to pivot said holding element toward its non-holding position, and adjustable friction means for preventing free relative sliding movement between said holding element and said first-named arm, thereby to prevent said spring from producing relative sliding movement therebetween.

12. In an apparatus having a stationary base and a movable member hinged thereto for angular movement on a horizontal axis, means responsive to the movements of said movable member for alternatively causing said member to be held in an elevated position or enabling said member to drop into a lower position, said means comprising an arm pivotally mounted on said movable member, a holding element disposed adjacent to and parallel with said arm, a slip-friction device connecting said element to said arm for relative translatable movement, said element being adapted when in an approximately vertical position to engage said base for holding said movable member and being incapable of holding said member when pivoted away from such vertical position, and a spring extended between points located on said movable member and on said holding element such that the force of said spring is shifted alternatively to one side or the other of the pivot for said arm as said element is shifted in either direction relative to said arm, whereby said spring is effective to pivot said element alternatively in opposite directions between the holding and non-holding positions thereof.

13. In combination with the means recited in claim 12, a second arm pivotally mounted on said movable member and engageable with said holding element for shifting said element in one direction when said movable member is collapsed against said base, said element being shifted in the other direction by forcibly depressing said movable member a limited distance when said element is in its holding position.

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