April 18, 1939. W. R. MORSE 2,154,860

HINGE

Filed Nov. 11, 1936

Fig. 1

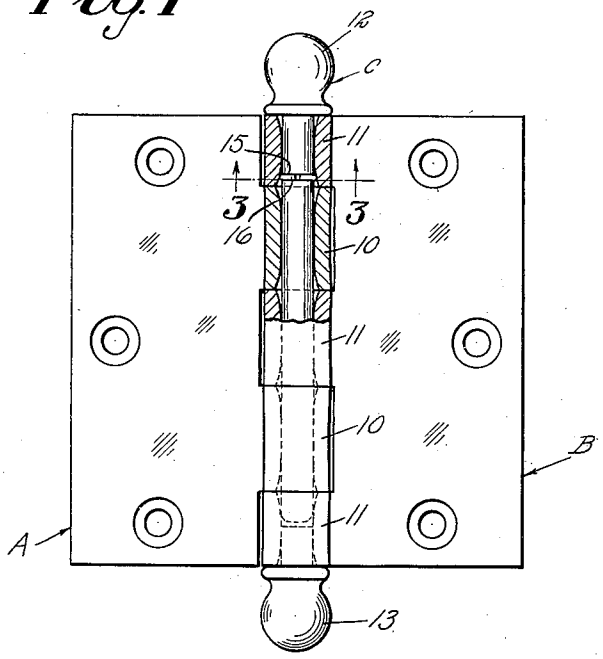


Fig. 2

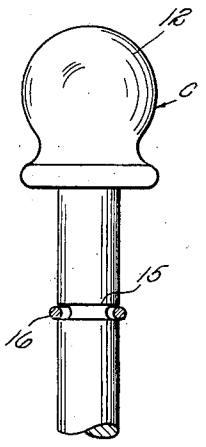


Fig. 4

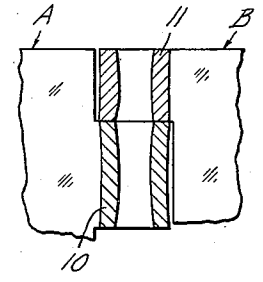
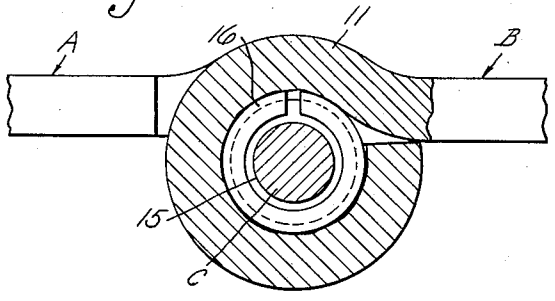


Fig. 3



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2,154,860

HINGE

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3 Claims. (Cl. 16—169)

This invention relates to hinges of the type having a pair of leaves with aligned knuckles and a removable pin engaging in the knuckles. In hinges of this type, the pin has a tendency to work up or "rise" with the result that the effective bearing engagement between the pin and the knuckles is reduced, and the portion of the pin extending above the uppermost knuckle is objectionable from the appearance standpoint. Various arrangements for preventing the pin from rising, while, at the same time, permitting the pin to be removed when desired, have been suggested, and of these suggested arrangements, the more practical ones have certain inherent objections and disadvantages arising either from the additional cost of manufacture to make the pin non-rising or the failure of the carpenter or other person installing the hinges to properly assemble the pin in the knuckles.

The aim of the present invention is to provide an improved non-rising pin arrangement for hinges wherein the above and other objections to structures heretofore made are avoided and, more particularly, to provide an improved arrangement which is characterized by its extreme simplicity in construction, by its effectiveness in operation, and by the ease and economy with which it may be manufactured and assembled. More particularly, I provide an improved arrangement which does not require any special or additional operations on any of the knuckles of the hinge leaves in order to obtain the non-rising feature while, at the same time, retaining the advantage of permitting the hinge pin to be inserted in place without going to the trouble of registering a fin on the pin with a groove in one of the knuckles.

Other objects will be in part obvious, and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the appended claims.

In the accompanying drawing:

Figure 1 is a face view of a hinge in which my improvements are incorporated, some of the knuckles being shown in longitudinal central section;

Fig. 2 is an enlarged view showing the upper end of the pin and the retaining ring, the latter being in section;

Fig. 3 is a transverse sectional view taken substantially on line 3—3 of Fig. 1; and

Fig. 4 is a detail view taken sectionally through the upper two knuckles, the pin being omitted.

As shown in the drawing, the hinge has two leaves A and B formed of sheet metal and respectively provided with knuckles 10 and 11 adapted to be aligned, as illustrated. The letter C designates a hinge pin engaging in the aligned bores of the knuckles and having the usual head 12. The hinge may have an ornamental tip 13 secured in the lower knuckle, as is usual.

Each of the hinge leaves is formed by stamping out, from a sheet of metal, a blank having, along one edge, spaced tongues which are adapted to form the knuckles. In the present instance, one of the leaves is shown as having three knuckles and the other two knuckles, the number of knuckles, of course, being immaterial. The ends of the tongues are then struck to initially bend them and then the tongues are rolled or coiled into substantially cylindrical shape by engaging the forward ends of the tongues against a parti-cylindrical die and urging the leaf under considerable pressure towards the die. Then the ends of the knuckles are milled to remove the rough edges, the two leaves are brought together with their knuckles aligned, the aligned bores of the knuckles are then reamed, and finally the pin is inserted. This is the usual method of procedure and, ordinarily, is carried out, for the most part, with the use of automatic machinery. In rolling the tongues to form the knuckles, the external wall portions of the cylinders being formed are under tension and the inside wall portions are under compression, and it is found that, due to the strains and stresses set up, the walls of the knuckles are curved or bowed longitudinally to a slight extent so that the internal diameters of the bores of the knuckles gradually increase from the intermediate portions of the bores towards their ends. The outside surfaces of the knuckles are slightly concave in the direction of the length of the knuckles, but this concave curvature is not so pronounced as the convex curvature of the inside surfaces of the knuckles. In Fig. 1, the curvature of the knuckles is somewhat exaggerated for purposes of illustration. In commercial practice, the curvature is more like that illustrated in Fig. 4. In actual practice, the knuckles are not truly cylindrical but are only approximately so, and the longitudinal curvature of the wall of the knuckle is not uniform throughout the length of the tongue from which the knuckle is formed. During the reaming operation, the bores

of the knuckles are not made truly cylindrical but, on the other hand, only sufficient metal is removed to insure a composite hole in the assembled knuckles of such size as to receive the pin without too much play between the pin and the knuckles, there being, however, sufficient bearing surfaces between the pin and the knuckles to prevent undue wear.

In accordance with the present invention, the longitudinal curvature of the uppermost knuckle is taken advantage of in connection with preventing working up or rising of the pin. The pin is provided with a circumferential groove 15 which is so located that, when the pin is in place, this groove is below the medial portion of minimum diameter of the upper knuckle and above the lower end of that knuckle. Located in this groove is a split spring ring 16, the external diameter of which is larger than the diameter of the pin and also normally larger than the minimum diameter of the bore of the upper knuckle. With this arrangement, when the pin is inserted in place, the spring ring, as it is passed through the upper portion of the bore of the upper knuckle, is gradually compressed until it reaches the central minimum diameter portion and then, on further downward movement of the pin, the ring will expand into engagement with the wall of the bore which increases in diameter towards the lower end of the knuckle. It will be seen that this operation may be very easily carried out and that, due to the taper on the lower half of the bore, the pin is cammed or urged to its final position and is effectively maintained in that position. The tendency of the pin to rise when the leaves are swung relative to one another is counteracted by the engagement of the spring against the lower tapered portion of the bore of the knuckle. It will further be observed that, in accomplishing these results, no special or additional operations are required on the hinge leaves and particularly on the knuckle with which the split ring cooperates. In short, a very simple and effective arrangement is had at minimum expense. The only additional expenses in providing the non-rising feature are those of providing the split ring and providing the pin with the groove 15.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim as my invention:

1. In a hinge, a pair of hinge leaves formed of sheet metal and having a plurality of integral knuckles extending from one edge thereof, said knuckles having aligned bores convexly curved in the direction of their lengths, a pin engageable in the aligned bores, said pin having a head on one end and having a groove located between the minimum diameter portion of the bore of one of said knuckles and that end of said knuckle remote from said head, and a split ring in said groove adapted to engage the wall of said bore in the event said pin should rise.

2. In a hinge, a pair of hinge leaves formed of sheet metal and having a plurality of integral knuckles with aligned bores extending from one edge thereof, an outermost knuckle having a bore convexly curved in the direction of its length to provide outwardly tapering portions and a portion of minimum diameter between the tapering portions, a hinge pin in the aligned bores and having a peripheral groove, and a split ring received in and projecting beyond said groove and engaging in expanding relation against the surface provided by the outwardly tapering portion of the bore at the inner end of said outermost knuckle.

3. In a hinge, a pair of leaves formed of sheet metal and having a plurality of integral knuckles extending from adjacent edges thereof, said knuckles having aligned bores, the bore of each knuckle being convexly curved in the direction of its length, a pin receivable in the aligned bores, and spring means carried by said pin and positioned between the minimum bore diameters of adjacent knuckles and normally expanded to a greater diameter than the minimum diameter of the bore.

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