(No Model.)

E. G. HOFFMANN.

CASTER.

No. 543,870. Patented Aug. 6, 1895.

Fig. 1,

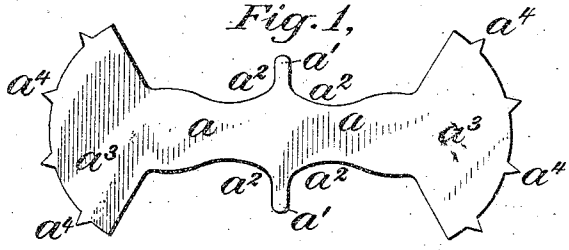


Fig. 4,

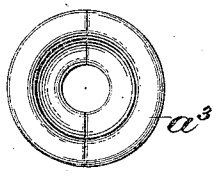


Fig. 2,

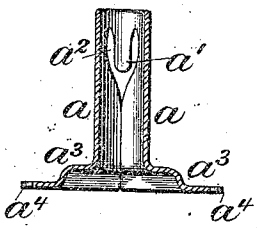


Fig. 3,

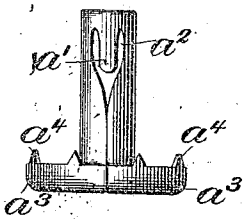


Fig. 5,

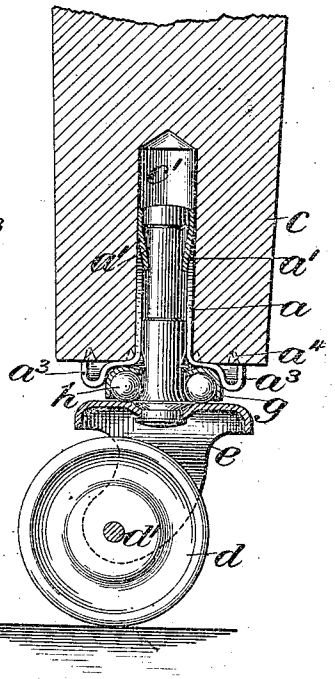


Fig. 7,

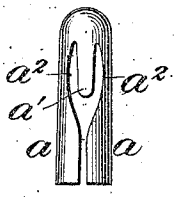


Fig. 6,

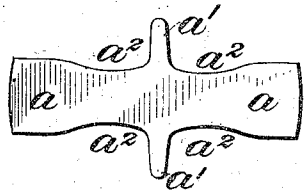
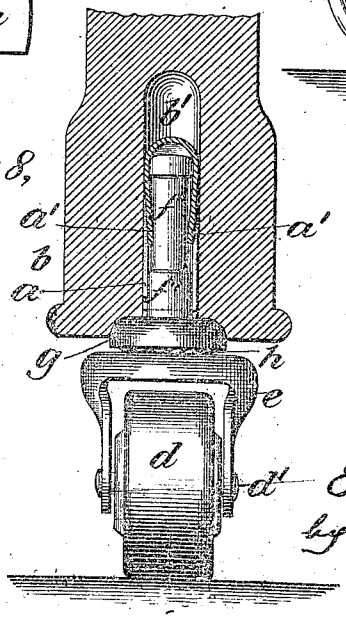


Fig. 8,



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UNITED STATES PATENT OFFICE.

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CASTER.

SPECIFICATION forming part of Letters Patent No. 543,870, dated August 6, 1895.

Application filed February 15, 1895. Serial No. 538,487. (No model.)

To all whom it may concern:

Be it known that I, ERNEST GUSTAV HOFFMANN, a subject of the Emperor of Germany, and a resident of the city and county of New York, State of New York, have invented certain new and useful Improvements in Casters and Caster-Sockets, of which the following is a specification, reference being had to the accompanying drawings, forming part hereof.

This invention relates to casters, such as are employed for supporting articles of furniture and for analogous purposes, and relates more particularly to sockets adapted to be inserted in the articles of furniture for receiving and holding such casters and to the bearings for such casters in the sockets or articles of furniture.

My invention has for its objects to improve and simplify the construction of such devices.

One of the difficulties heretofore encountered in the manufacture of caster-sockets has been in forming the detaining-spring or other detaining device having for its object the holding of the caster with a yielding pressure sufficient to prevent the caster from falling out when the article is lifted, but permitting the caster to be inserted in or removed from the socket upon the exertion of slight force. Various means have been devised for performing this function; but the construction heretofore employed with a detaining spring-tongue stamped inward from the wall of the socket is best adapted for the various forms of casters and sockets and is in all respects the most satisfactory; but it has heretofore been difficult to obtain the proper clearance between this spring-tongue and the wall of the socket such as is necessary to insure free action of the spring-tongue without weakening the blank too much to permit it to be drawn into shape, and the formation of this spring-tongue has required extra operations, which extra operations in articles such as caster-sockets, which are made in large quantities at the minimum cost, means a considerable and substantial extra expense and is, therefore, highly objectionable. The detaining-spring of my improved socket may be cut out or formed in the operation of cutting out or forming the blank from a sheet or strip of metal, and in one or more stamping operations, whereby the blank is stamped or drawn into a complete socket, the detaining-spring may be brought into proper position in the wall of the socket and with a proper clearance of the wall. I prefer to employ two stamping operations for the formation of the complete socket from the blank, and in the first of these stamping operations the detaining-spring is drawn into the wall of the socket, and in the second of these operations the detaining spring is bent inward into desired position to engage with and yieldingly hold the pintle of the caster.

It is highly desirable to employ ball-bearings in casters in such a manner as to substantially do away with sliding friction between the caster and the socket or article supported by the caster, and ball-bearings have to some extent been heretofore employed for such purpose; but no construction has heretofore been devised wherein, as in the construction embodying my invention, hereinafter described, the highly desirable feature of a separate socket has been combined with ball-bearings between such caster and the socket or article supported thereby.

According to my invention complete sockets for casters may be produced by a single cutting operation and one or two stamping operations, and a tubular caster-socket with one or more detaining spring-tongues in the wall thereof may be made by forming a blank having one or more projecting tongues, and having elongated portions extending on either side of said tongue or tongues, said elongated portions being suitably shaped, so that when folded there will be a sufficient opening or openings between them for clearance of the spring-tongues, as by indentations formed in such elongated portions in proximity to the tongue or tongues, and then submitting the blank to one or more stamping operations, whereby the elongated portions are folded up into tubular form with the tongue or tongues in the wall thereof. In the construction hereinafter particularly described, two of said elongated portions are formed in line with each other, and two of said tongues are formed, one on each side of the blank, and the complete socket has a tubular portion composed of two substantially semitubular

parts joined at their upper ends, with the retaining-springs in the openings between said semitubular parts; but other constructions may be devised within the purview of my invention, in which the tubular portion is longitudinally divided into more than two parts, and in which but one retaining-spring or a greater number of retaining-springs are employed, or in which the retaining-springs are omitted.

The accompanying drawings illustrate embodiments of my invention.

Figure 1 is a face view of a blank for a caster-socket having a flange or supporting-plate thereon and adapted for use in an article having a wooden base or legs. Fig. 2 is a vertical central section showing the partially-formed socket made from the blank shown in Fig. 1 at the termination of the first stamping operation. Fig. 3 is a side elevation showing the completed socket made from the blank shown in Fig. 1. Fig. 4 is an underneath plan view of the same. Fig. 5 is a vertical central section of a complete caster and a socket such as is illustrated in Figs. 3 and 4 and a portion of a leg or base of a wooden article of furniture in which said socket is secured and said caster held. Fig. 6 is a face view of a blank for a caster-socket not provided with a flange or supporting-plate and adapted for use in an article having a metal base or legs. Fig. 7 is a side elevation of the completed socket stamped from the blank shown in Fig. 6. Fig. 8 is a vertical central section of a complete socket such as is illustrated in Fig. 7 and a portion of a metal leg or base of an article of furniture, and shows in full elevation a caster held therein.

In making my improved caster-sockets the first operation is that of forming the blank, and this may be effected by a single cutting operation, although it is, of course, evident that the blank may be formed by any desired means. When the socket is to be used in metal articles and it is not desired to form a flange or supporting-plate thereon, the blank is made up of elongated portions of generally rectangular form, and in the construction shown, wherein the completed tubular part is made up of two semi-tubes, two elongated portions a a are provided, and laterally-projecting tongues a' a' are formed thereon between said elongated portions, and the width of the elongated portions a in proximity to the tongue is such as to provide an opening with proper clearance for said tongues from the wall of the completed tubular portion of the socket, this being provided for by forming indentations a^2 at the edges of the blank on either side of and in proximity to these tongues, and the parts of the longitudinal portions beyond the length of said tongues are of full width, so as to produce two substantially complete semi-tubes. This blank for the socket unprovided with a flange or supporting-plate is shown in Fig. 6.

When the socket is to be used in wooden articles and it is desired to form a flange or supporting-plate thereon, the blank, as shown in Fig. 1, has the same elongated and generally rectangular portions a and the same spring-tongues a' and indentations a^2, but is also provided with fan-shaped extensions a^3, as will be hereinafter more fully described. The projecting tongues a' form the detaining-springs of the completed socket, and it is, of course, evident that where the number of parts to the tubular portion is increased a greater number of springs may be employed, and that if only one detaining-spring is desired one of the tongues may be omitted, and that where other means than these detaining-springs are provided for holding the caster within the socket, or where it is not desired to yieldingly hold the caster within the socket, these spring-tongues may be omitted altogether. If one or both of said spring-tongues were omitted, the indentations a^2 a^2 would not usually be as deep as shown, but would exist to some extent to facilitate the formation of the socket during the stamping operation.

The blank shown in Fig. 6 may be formed up into the socket shown in Fig. 7 by a single stamping operation, during which operation the elongated portions a on either side of the spring-tongue are folded up into substantially semitubular parts, joined at their upper ends to form a continuance-ring, and the spring-tongues a' are drawn into the walls of the tubular part composed of said semitubular parts, and said spring-tongues extend downward into the openings between said semitubular parts and with suitable clearance of the walls of said semitubular parts, so that there will be no interference with the free action of these spring-tongues as detaining-springs. I prefer to bend in these spring-tongues a' to their final positions, in which they are shown in Fig. 8, by a separate operation, which may take place while the socket is held in the stamping-die or after it has been removed therefrom.

In sockets for metal articles I prefer to have the upper end of the socket completely closed, as shown, but said closed end does not act as a bearing to sustain the vertical pressures from the caster, as the cavity or hole in the leg of the metal article is usually sufficiently deep to leave considerable clearance between the top of the socket and the end of the cavity, and as there is no sustaining-flange on the socket the pintle will push the socket up into the cavity as far as the pintle is allowed to move by other bearing-surfaces which sustain the vertical pressure, and which will be hereinafter described.

In Fig. 8 b represents a portion of the leg of a metal article—such, for instance, as an iron or brass bedstead—and b' is the cavity or hole formed therein to receive and hold the socket.

As before stated, the blank for a flanged socket is shown in Fig. 1. The flanges of this socket are provided for by the fan-shaped en-

largements or enlarged ends a^3 a^3, and several points or teeth a^4 are formed along the outer edges of these ends. In shaping or forming this blank into a complete socket I prefer to employ two stamping operations, although the complete shaping of the socket may be effected in a single operation, and Fig. 2 shows the partially-formed blank at the completion of the first one of said two stamping operations.

The formation of the tubular portion of the socket and of the detaining-springs is substantially the same as already described in relation to the socket unprovided with a flange or supporting-plate; but it is desirable, in sockets to be employed on wooden articles to have the upper end of the socket completely open, for the reason that the socket is rigidly held by its flange from exceeding a certain degree of penetration into the article, and therefore any chips or shavings which were wedged into the socket would, if the socket had its upper end closed, act to clog and choke the socket, so as to prevent the insertion of the caster-pintle. I therefore cut away the upper end of the socket during the first stamping operation, so that the tubular portion is open at both ends at the completion of this operation. The annular flange at the mouth of the socket is only partially formed during this first operation, a concave recessed annular portion being formed therein, but with the portion of the flange outside of said recess in flattened condition. In the second stamping operation the shaping of the flange is completed by forming an annular bead thereon and turning up the outer edge so that the points a^4 project upwardly. I prefer to bend the detaining-springs a' inward into their desired working positions during this second stamping operation. Thus a complete flanged socket having a rounded supporting-plate thereon and having detaining-springs in the walls thereof held in operative position with clearance of said walls, and having an open upper end is formed by three operations, one cutting operation and two stamping operations.

It will be observed that in the tubular portion of the socket the upper end of the socket is a complete tube or continuous ring not seamed or divided, and that the spring-tongues extend downward from this complete tubular portion or ring, and that the tubular portion below this complete tubular part is seamed or divided longitudinally into two substantially-semitubular parts, and that the spring-tongues a' are located within the openings between these semitubular parts, and that the flange is medially divided or seamed and is made up of two semiannular parts, each continuous with one of said semitubular parts, and that the flange has a concave annular recess surrounded by an annular bead and has points extending upward around the edges of said bead, said points being adapted to penetrate the article of furniture. It is of course evident that these points may be slightly inclined inward so as to tend to force the two semi-parts toward each other when the socket is driven in place.

It will be noted that the socket is largely reinforced and held against any lateral pressure or strain both by the walls of the cavity or hole c' in the leg or base c of the the article of furniture wherein said socket is held and by the penetration of the points a^4 into the lower surface of said leg or base c, and thus any tendency to spreading of the socket is effectually resisted.

It is desirable that the lower surface of the socket-flange shall be without projecting points or edges, so as to slide smoothly over the floor or ground, and I therefore slightly round the lower edges of the flange along the radial dividing-lines of the flange, as shown in the drawings. This may be readily effected as a part of the stamping operation by suitably forming the dies, as will be well understood.

The caster shown in the drawings is provided with a wheel d fitted to rotate on a pin d' passing through the arms of a horn-frame e. The pintle f is rigidly secured to the horn-frame, the lower end of the pintle f having a somewhat conical shoulder or enlargement fitting against a depressed portion of the horn-frame e around a central perforation, and the extreme lower end of the pintle f being tightly rivoted over against the lower face of the horn-frame e. This manner of uniting the horn-frame and pintle is simple and effective; but the parts may be otherwise united or made in one piece. The pintle f has a knob or enlargement at its upper end, which in co-operation with the detaining-springs a' yieldingly holds the caster in the socket.

A ball-bearing case g is provided, fitted upon the pintle so as to rotate freely thereon, and is longitudinally held thereto, but with sufficient freedom to transmit all vertical strains to the caster through the balls h, arranged within said ball-bearing case. These balls intervene between the ball-bearing case g and the caster-pintle and frame, and, as shown, bear vertically downward against the horn-frame and laterally inward against the pintle. To restrain the ball-bearing case from moving upwardly to such an extent as to release the balls or become detached from the caster, I form burrs f', raised from the material of the pintle f and projecting outward just above the upper surface of the ball-bearing case g, and this construction is exceedingly simple and inexpensive and effectively holds the ball-bearing case and bearing-balls to the other parts of the caster, so as to prevent any separation of said parts.

The ball-bearing case g is shaped so as to fit within the concave annular recess of the socket when the socket is provided with a flange, as shown in Fig. 5, or to fit within a concave depression formed in the bottom of

the metal leg or base of the article when the socket is not provided with a flange, as shown in Fig. 8. Thus the ball-bearings do not add to the height of the caster, and all lateral, as well as vertical, strains at the mouth of the socket are taken up by the ball-bearings.

The construction shown with two diametrically-opposite retaining-springs a' holds the upper end of the pintle f centrally within the socket. It also produces a symmetrical blank which very readily and uniformly assumes under the stamping-dies the desired form of the completed socket. The depressions or indentations a^2 in the edges of the elongated portions of the blank insure proper clearance about the retaining-springs and a complete tubular form with the opposed longitudinal edges substantially in contact below the retaining-springs. In the socket for a metal article I prefer to leave the longitudinal seams slightly open, as shown in Fig. 7, so as to have a slight spring action against the hard and unyielding surface of the article when the socket is within the cavity in the article, whereby the socket is held within the cavity; but this is not usually desirable in the flanged socket, as the points a' hold the socket and the socket may be quite tightly fitted in the comparatively soft and yielding material—usually wood—of the article to be supported by the caster.

The construction of the flange at the mouth of the caster with an annular bead and a concave recess therein provides an efficient supporting-plate or track-plate for supporting and protecting the leg or base of the article when the caster is not in place in the socket, and also provides a very compact construction when the caster is in place, and, in combination with the ball-bearing case and other parts of the caster, insures the transmission of all strains and movements at the mouth of the caster through the ball-bearing, and thus all sliding friction at the mouth of the socket is done away with.

In the caster-socket, and parts of a caster above described embodying my invention, every piece except the bearing-balls may be made of stamped metal, and all stampings from the same dies will be exactly the same, so that no special fitting of the parts is required, and the only mechanical or manual operation after the parts have been stamped, other than assembling the parts, is that of forming the burrs upon the pintle to prevent separation therefrom of the ball-bearing case and balls, and this operation is simple and may be readily and quickly performed. Thus no expensive operations—such as turning, planing, or drilling, or fitting the parts together—are required in the manufacture of articles embodying my invention, and the cost of production is at the minimum.

It is, of course, evident that various modifications may be made in the shapes of the parts and otherwise within the purview of my invention, and that parts of the structure above described, or of other structures embodying my invention, may be used separately or in combination with other parts of different constructions.

I do not, therefore, limit my invention to the particular construction above described and shown in the drawings; but

What I claim, and desire to secure by Letters Patent, is—

1. A blank for a caster socket comprising oppositely disposed elongated portions of generally rectangular form, and a laterally projecting tongue between said elongated portions, the edge of the blank on either side of and in proximity to said tongue having indentations, whereby as said blank is bent to form a tubular socket, said tongue shall stand in an opening between adjacent portions of the tube.

2. A caster socket having a tubular portion and also having an annular flange at one end of said tubular portion, said flange having an annular bead and a concave annular recess therein, in combination with a caster having a pintle held in said tubular portion of the socket, a ball bearing case free to rotate on said pintle and fitting into the annular recess of the socket flange, and bearing balls within said case and intervening between said case and the caster pintle and frame, substantially as set forth.

3. A caster socket having a tubular portion comprising longitudinally divided parts joined at their upper ends to form a continuous ring and having one or more detaining springs extended downward from said ring and located in an opening or openings between said parts formed by indentations in the edge thereof, said tubular portion and detaining spring or springs being in one piece, substantially as set forth.

4. A caster socket in one piece having a tubular portion and having an annular flange at the lower end of said tubular portion, said annular flange comprising an annular bead and a concave annular recess, and having points adapted to enter the article to which the caster is attached, said flange being made up of radially divided parts and said tubular portion being made up of parts longitudinally divided but joined at their upper ends, each of said annular parts being continuous with one of said tubular parts, in combination with a caster having a pintle held in said tubular portion of the socket, a ball bearing case free to rotate on said pintle and fitting into the annular recess of the socket flange and bearing balls within said case and intervening between said case and the caster pintle and frame, substantially as set forth.

5. A caster socket in one piece having a tubular portion comprising longitudinally divided parts joined at their upper ends to form a continuous ring and having one or more detaining springs located in an opening or openings between said parts, said socket also having an annular flange comprising an annular

bead and a concave annular recess and being made up of radially divided parts each continuous with one of the tubular parts, in combination with a caster having a pintle held in said tubular portion of the socket, a ball bearing case free to rotate on said pintle and fitting into the annular recess of the socket flange, and bearing balls within said case and intervening between said case and the caster pintle and frame, substantially as set forth.

This specification signed and witnessed this 13th day of February, A. D. 1895.

ERNEST GUSTAV HOFFMANN.

In presence of—

HENRY D. WILLIAMS,

GEO. H. SONNEBORN.