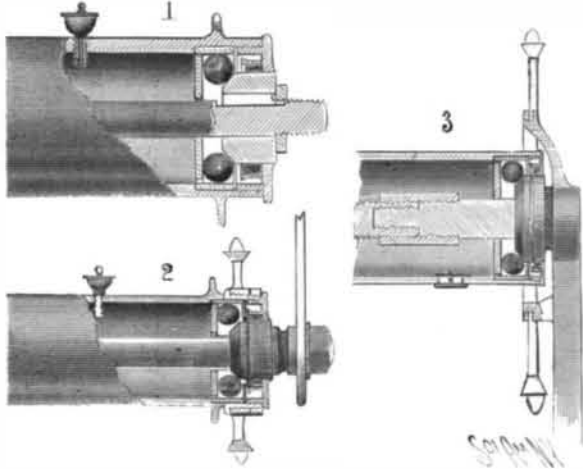


**AN IMPROVED BALL-BEARING.**

The ball-bearing illustrated in the accompanying engraving is designed always to run true and to permit ready access to the various parts. Means are provided for lubricating the bearing and for excluding dust.

Of our illustrations, Fig. 1 is a partial section through the hub of a bicycle-wheel showing the parts of the



**HITCHCOCK'S BALL-BEARING.**

bearing. Fig. 2 shows the bearing applied to the rear hub of a bicycle-wheel. Fig. 3 is a sectional view of the bearing applied to the crank-hanger of a bicycle. In all these applications the essential principle of the bearing has been retained with but few modifications.

The bearing is surrounded by a casing, in each end of which a back-plate is secured. Each back-plate has a marginal flange extending outward. To the end of the shaft passing through the casing, cones are secured, coating with the back-plates to form raceways for the balls. Each cone is formed with a peripheral flange. Retaining-rings are provided, which bear against the flanges of the back-plates. Dust-caps are secured in the ends of the casing and are provided with flanges coating with the cone-flanges, with the retaining-rings, and with washers on the cones, to exclude all dust. The cones are secured to the shaft, not by the ordinary method, but by means of a shouldered key placed in a groove on the shaft and threaded as far as the shoulder; when the cone and locking-nut are assembled on the axle, the nut will engage the threaded end of the key, holding it firmly in place as well as the cone itself. By providing the back-plates and retaining-rings with small apertures, the lubricating material coming from the oil-cup is permitted ready access to all the moving parts.

The bearing has been patented by the inventor, Mr. A. G. Hitchcock, of 409 Fort Street, Honolulu, Hawaiian Islands.

**Luxurious Travel in Siberia.**

The new Siberian train which was recently sent to St. Petersburg for the approval of M. Khilkov, Minister of Ways and Communications, returned August 3, after being personally inspected by the Czar. It left with over forty passengers, including several Englishmen, Americans, and Frenchmen. This is the second train specially built for the quick service on the great Siberian railway. It is an improvement upon the first specially built train, which was already a marvel to Russians.

The new train consists of five coaches, two for second-class and one for first-class passengers, the others being a dining and a baggage car. The construction is of the newest design, and the train runs with great smoothness. Besides the comforts of a bathroom with gymnastic apparatus, a library in several languages, a piano and selection of music, maps, guide-books, albums of views, an ice-cellar, and an arrangement for boiling water in three minutes by means of steam, which were found in the first train, the new one is fitted with plates which indicate the next stopping station, and, if the stoppage be over five minutes, also how long the train stops.

All the windows are protected from dust and wind by external plate-glass guards; the last coach is arranged to serve as an "observation-car," showing

three views of the country traversed. A stationary bicycle, with arrangements for measuring in minutes and kilometers the amount of work done, a barber, who is also qualified to give medical assistance, and a superintendent, who speaks Russian, French, German, and English, are among the other conveniences to comfort of traveling now provided. The train will be lighted inside and out by electricity, and electric cigar-lighters find a place in the dining-car. A lavatory has been fitted in the second-class car, so as to be available for the enthusiastic photographer to change plates and develop in during the journey. Electric bells and portable electric reading-lamps are in each compartment. The kitchen is intended to furnish a hot dinner for a maximum of sixty people. Paper and envelopes are to be supplied gratis at the buffet, where hot and cold drinks of all kinds are to be had; there is no charge for the barber, but two rubles is the price of a bath, for which three hours' notice beforehand must be given.

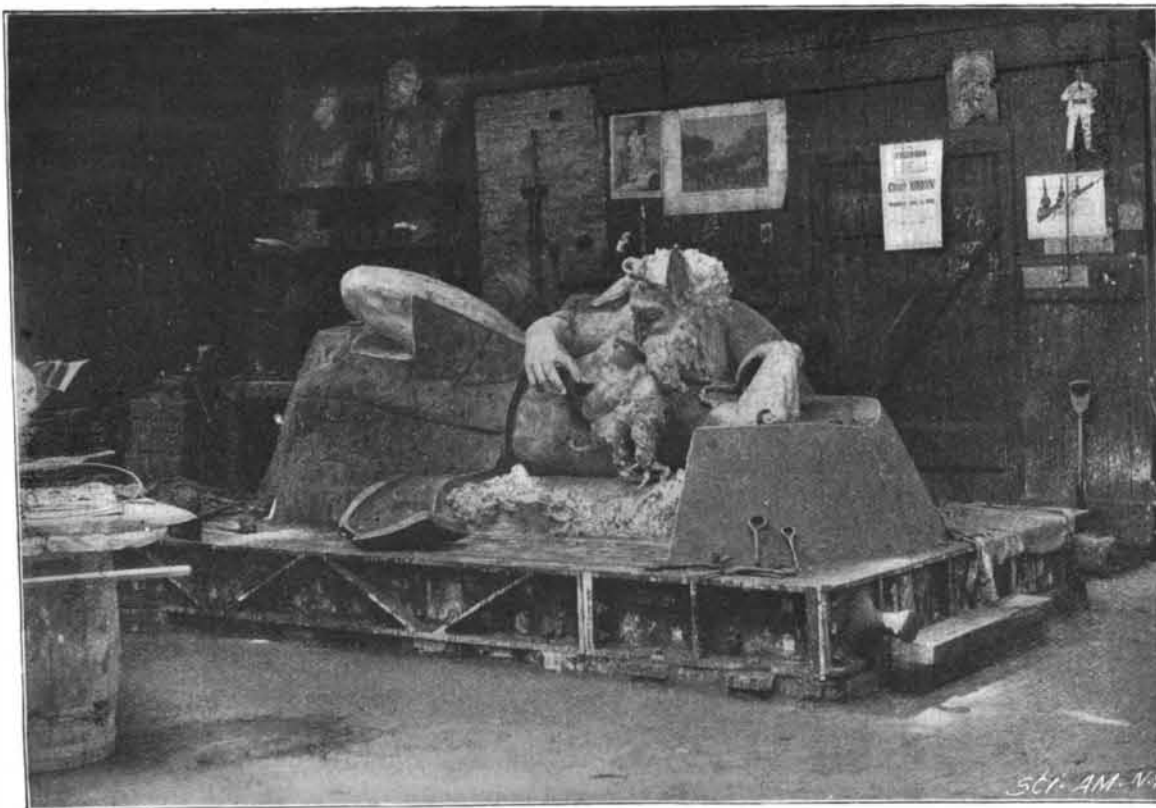
From Moscow one may now get to within a few hundred miles of Irkutsk on the sixth day, and the charges for this journey under such luxurious circumstances are very moderate. The Englishman who cares to undertake the journey has only to see that his passport has been properly viséd in London before leaving; and even if he be entirely ignorant of any language but his own, he will find no difficulty in reaching the heart of Siberia by rail. In all the chief towns, as far as Irkutsk, one or two resident English or Americans are to be found, and they gladly welcome a fellow-countryman who brings the latest gossip from town. The French are already showing their appreciation of the opportunities offered for investigating the resources of Siberia. A special train from Paris is to leave Moscow for this trip in August, the whole time to be occupied being about one month.

**What is Thought of it in California.**

The Signs of the Times, published at Oakland, California, is an admirer of the SCIENTIFIC AMERICAN, and as it comes to us each week, says the editor, it is filled with most useful and practical matter. It keeps close watch of every field of science and industry and is a faithful recorder of the progress that is being made. It employs none but the most thoroughly competent writers, and consequently its information is always reliable.

It is a paper for men, and at the same time it is pre-eminently the paper for boys. Its matter has the advantage of being solid and substantial, while it is also most interesting as well. Boys will pore over its pages by the hour. And when they turn away from its study, their minds are filled with useful facts about farming, fruit-raising, carpentering, machinery, etc. For there is no field of the useful vocations of life from which this valuable paper does not bring you interesting sheaves of desirable knowledge.

If parents will furnish themselves and their children with such papers as the SCIENTIFIC AMERICAN, instead of those that are more or less filled with stories of highway robberies, conflicts with policemen, hair-breadth escapes from bears and the like, they will see



**THE MOULDING OF "PAN"—TAKING OFF PIECES FOR MAKING PIECE MOULDS ON LARGE PIECE.**

their sons grow into useful men rather than "border ruffians."

TASMANIA has one of the most wonderful tin mines in the world, called the Mount Bischoff Mine.

**A FOLDING CRADLE.**

An invention has recently been patented by Ralph Bird, of 307 Webster Avenue, Jersey City, N. J., which provides a novel cradle so constructed that it may be readily folded into compact form when not in use, thus permitting it to be stored and transported with great facility. The cradle, as seen from the engraving, has head and foot arches standing upon base-rails. On each base-rail a bar is hinged. Rods are connected with the bars and are provided with retractile springs by means of which proper tension is maintained. To each bar two braces are attached having slotted ends in which pins on the head and foot arches slide. Dogs are mounted in the slots and are capable of engaging the pins to hold the arches in vertical position. Each arch carries an extension-standard in which is mounted a bolt engaged by a keeper attached to the standard. By means of this arrangement the standards are held in raised position above the arches. The cradle itself is suspended by means of slings attached to the arches.

When it is desired to fold the cradle, the bolts in the standards are lifted out of engagement with their



**BIRD'S FOLDING CRADLE.**

keepers and the standards are moved inwardly and downwardly. The dogs in the slots of the braces are then disengaged from the pins working in the slots; the arches are then folded down over the body of the cradle. The cradle itself, being made of fabric, readily collapses on the rods, and the whole device then appears as shown in the lower portion of our engraving.

**A PHENOMENAL PIECE OF BRONZE CASTING.**

No substance is so well fitted for monumental use as bronze. There is a sense of dignity, weight, and value about it when used in large masses which is possessed by no other material. It successfully defies the ravages

of time, and its intrinsic value has not been found great enough to make it very often the prey of the vandal; so that, if it is surpassed in some of its properties by gold, silver, and platinum, the value of these precious metals has in itself invited the destruction of beautiful works of art. We have, however, a large number of bronze statues which have descended to us from antiquity which are to-day a striking example of the difficulties with which the early sculptors had to contend and the triumphs which the bronze caster achieved. By the nature of the material, everything which is possible to the sculptor's art is possible to bronze. It can be fused and cast into moulds of the most intricate shape, and it is interesting to note that the history of this alloy has no beginning, and we only know, on the authority of Sir John Evans, that our bronze age ceased in the fourth or

fifth century B. C. We also know it immeasurably antedates alike history and tradition. Bronze working as a fine art is equally lost in the remoteness of antiquity, and from that time to the present day the art of the bronze founder has never been extinct.