angles to each other. By means of these rolls the material is squeezed, where not required, inside and between the future links, into a thin web, and what, for convenience, may be called the chain bar, is formed, having the shape illustrated at b, Fig. 1, in which a shows the original cross bar.

The arrangement of the rolls will be best understood by reference to Fig 2, in which a bar is shown during its passage through the rolls with the top roll removed. The conversion of the cross bar into the chain bar is carried out in one heat. After leaving the rolls, the chain bar is passed through a punching machine, with automatic feed, by means of which the webs are removed. This is done while the material is still slightly warm. As rolled, the width of the chain links is somewhat greater, and the length consequently somewhat less, than is required in their finished state. In order, therefore, to give them their final shape, the chain bar, of which the links are still connected by a slight web where inaccessible to the punches, is reheated to a red heat and passed under a press, by which the links are reduced to the specified width. The same end can also be attained by the use of finishing rolls, which stretch the links to the necessary extent. In either case the links are finally separated during the operation. The velocity with which the chain bars are rolled depends, of course, upon the dimensions, and ranges from 10 feet to 20 feet per second.

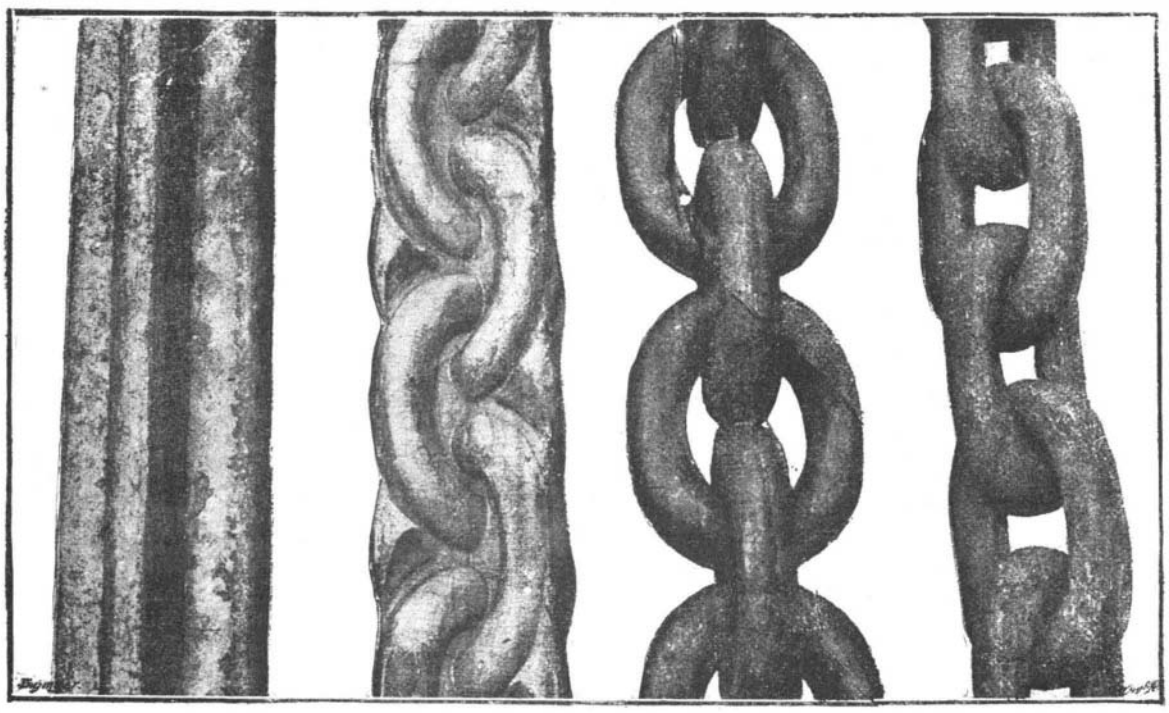


Fig. 1.—DEVELOPMENT OF THE CHAIN FROM THE BAR.

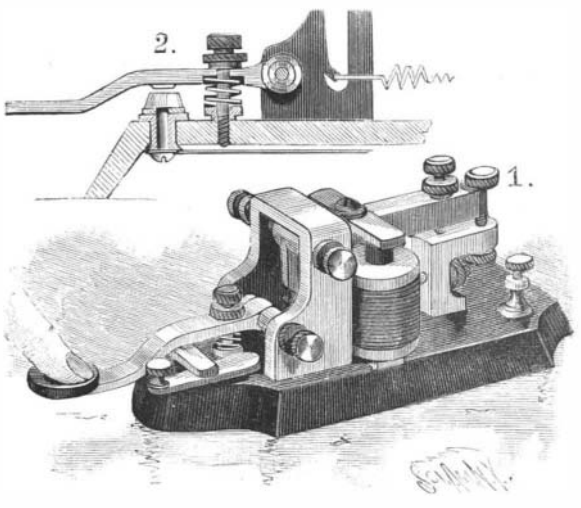
Having given the general outlines of Mr. Klatte's process, we now come to the details, upon which, as in every similar case, the success of the invention depends. The detailed construction of one of the rolls is shown in Figs. 3 to 7. It consists of a central disk—secured, as shown in Figs. 3 and 4, between two bevel wheels—to the circumference of which are dovetailed and keyed a number of sectors constituting the working portion of the roll in which the dies or matrices are formed.

By removing the key piece, c, an opening is uncovered, through which one sector after another can be inserted and pushed into its proper position on the circumference. When all the sectors are in place, the piece, c, is again inserted, and the two keys, d, driven in; the latter secure the sectors against displacement. The sectors are in the first place rolled as bars, with the necessary cavities—or matrices—impressed in them. These bars are afterward cut to the required lengths and fitted, while the finishing of the matrices is effected by cutters, on a machine specially designed for the purpose, of a type similar to those employed in the manufacture of small arms. It has been found that steel with a tensile strength of from 32 to 38 tons per square inch is a suitable material for the sectors. Instead of sectors, a complete ring may be used, but for facilitating the renewal of worn or damaged parts sectors are very convenient. Experience has proved that the rolls do not appreciably suffer by use, as with all the trials which have been carried out with one set of rolls no measurable wear has been observed. This is due to the large diameter of the rolls—from 3 feet 3 inches to nearly 5 feet—and also to their high velocity.

If any supplementary shaping of the matrices is necessary, the rolls are supported on pedestals and the circumference heated to a red heat and annealed. Hitherto, no distortion has been found to result from this treatment. Damaged or defective sectors can easily be replaced. Instead of being fitted together in the manner already described, the sectors may be dovetailed together; there is no difficulty about this. In order to facilitate the adjustment of the four rolls relatively to each other, the device illustrated in Figs. 8 and 9 is adopted. This consists of an eccentric fitting the central disk of each roll, and having its bearings in the wheel plates or webs between which the roll is secured. The eccentric is turned by a spanner, and when adjusted is kept in place by means of a lever and set screw, as clearly shown in the illustration, Figs. 2, 8, and 9. In the construction of the matrices many points have to be considered, not only with regard to the durability and strength of the projecting portions—or teeth, as they may be termed—but also as to the important part which is played by these teeth in displacing the material of the crossbar. The form of the teeth also depends on the shape of the links, whether long or short. As the corresponding matrices for each link on the four rolls come together, the process of rolling is in reality interrupted, and room must therefore be provided for the lateral displacement of the material. This is effected by means of a suitable distribution of space in the cavities of the rolls, and the inventor has, for instance, in the case of one set of rolls, provided for the "spreading" of the material during the process of rolling by giving the links a larger section at the points of contact, where they are subject to the greatest strain and wear.

As regards the general method adopted, the bloom is rolled in the usual manner into a bar of suitable section for the production of cross steel, having a length of about 50 feet. This bar is reheated in a furnace of corresponding length, and then passed automatically through a series of quadruple rolls, arranged in line one behind the other, and calibrated. On leaving these rolls, the length of the bar will have increased to between 98 feet and 130 feet, and it is transferred directly in the same heat to the chain rolls, in which it is finally stretched to from 164 feet to 197 feet. When longer chains are required, special wire chain links are provided for connecting several rolled lengths.

The cost of production by Mr. Klatte's process compares favorably with that of the old method of chain making, and advantages over the latter in other respects are claimed. The results of official tests, carried out at the Royal Experimental Institute at Berlin, with "Klatte" chains of different kinds of steel, and also with an ordinary welded chain, show the great superiority in strength of these machine-made chains over the wrought iron welded chain.



COX'S TELEGRAPH KEY AND SOUNDER.

A TELEGRAPH KEY AND SOUNDER.

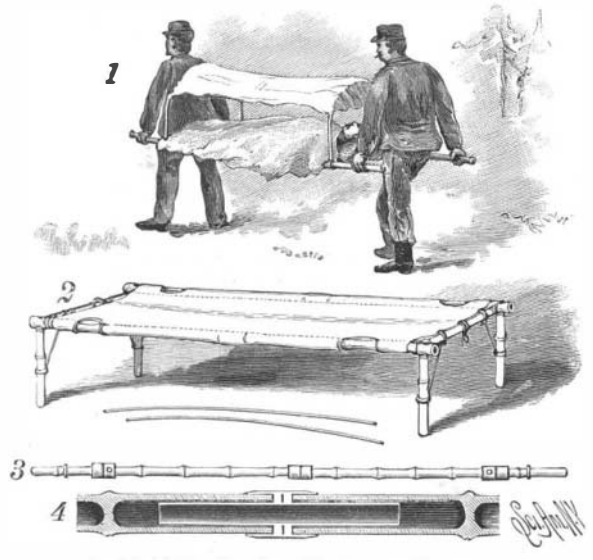
The combination device shown in the illustration has been patented by Mr. Philip D. Cox, of Hawthorn, Florida, and presents some novelties in construction and arrangement of parts. The yoke of the sounder magnet is centrally let into the base, which is preferably made hollow to admit of making the electrical connections of the instrument underneath. The standard is in the form of an arch in the lower part of which are journaled the trunnions of the key, and between its trunnions and the anvil contact, as shown in the sectional view, Fig. 2, the key is apertured to receive a stud screwed into the base. On the threaded lower end of the stud, above the base, is a nut on which rests a spiral spring, whose upper end is received in a cavity in the under side of the key, while on the stud are nuts to adjust the lift of the key, a top jam nut preventing accidental loosening. At the side of the anvil contact is pivoted the circuit-closing lever, and the key and sounder is placed in the circuit by inserting wires in the binding posts at the rear, being operated in the usual way.

The Vanishing Mountains.

In a paper which he recently read before the Scientific Congress at Paris, M. De Lapparent expressed the opinion that all mountains will vanish off the face of the earth in course of time. He declared that, if the actual natural forces at work upon our globe retain their present intensity, in 4,500,000 years all inequalities of surface will be leveled. He instanced as a striking example the reduction of the Ardennes, which were once a chain of the Alps, but which had already shrunk to their present dimensions at the outset of the Tertiary epoch. The Alps, he said, exemplified the youth, the Pyrenees the maturity, and the mountains of Provence the declining years of mountain ranges, while the central plateau of France was typical of their death and dissolution.

AN IMPROVED LITTER.

By means of the simple litter shown in the illustration a patient may be conveniently carried to and transported in an ambulance or train, then successively moved to the hospital, to the operating table, and placed in bed, without being once bodily lifted, thus avoiding unnecessary pain and hemorrhages, or the complication of fractures. The improvement has been patented by Dr. R. Ortega, of Ciudad Porfirio Diaz, Coahuila, Mexico. Fig. 1 represents a litter of this kind as in actual use, Fig. 2 showing it set up as a temporary cot, Fig. 3 representing one of its side bars, and Fig. 4 the side bar joint. On the ends of the side bars are removable handles, connected by hooks with transverse cross bars, and the fabric used is preferably canvas covered by oilcloth. The fabric is made in two pieces, separated longitudinally at the middle of the litter, the two sections being united by a string passed through alternately arranged loops, along the line of separation. When the string is withdrawn from either end, the two sections can be readily moved from under the patient, one to the right and the other to the left. The outer sides of the fabric sections have welts or sheaths through which loosely pass the side bars, portions of the welts being cut out to form hand holes for the carriers. The side bar joints, as shown in Fig. 4, are formed of threaded ferrules, through which extends a short piece of pipe embedded in a suitable substance, the side bars being preferably of bamboo or similar light and suitable material. Each of the handles has a threaded head screwing on the end of a tube in the end of each side bar section, each head also having a transverse threaded aperture by means of which each handle may be arranged as one of the legs when the litter is set up as a cot. The side bar sections and handles may thus be readily taken apart and the entire litter packed in a very small bundle. A light awning for this litter is readily made of bamboo rods covered by a light fabric, the cover being arched by inserting the ends of the rods in apertures in the side bars.



ORTEGA'S LITTER OR STRETCHER.