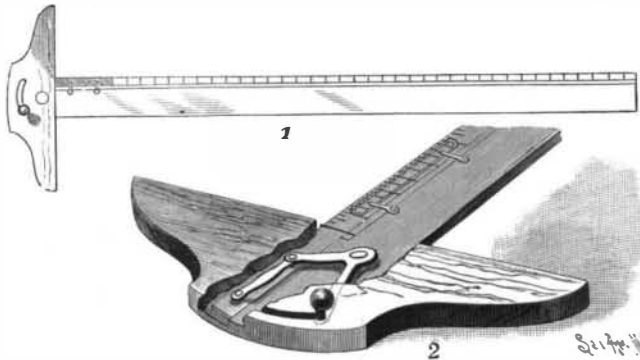


## AN IMPROVED T-SQUARE.

The illustration represents a tool designed to be more satisfactory than the one ordinarily employed in locating points and taking distances, dispensing with the ordinary ruling and measuring separately with a T-square and scale, the latter being adjustably placed in the arm of the square, so that any given distance can be laid off, beginning at any point on the paper. The improvement has been patented by Morgan J. Hammers and Charles R. Clark, of Champaign, Ill.



HAMMERS &amp; CLARK'S T-SQUARE.

At the working side of the blade of the square is an edge of transparent material, under which, in a longitudinal channel, is movable a strip of steel marked off in inches for the greater portion of its length, the inner end portion only being marked for the fractions of an inch, and this portion coming under an elongated opening in the transparent edge. At each side of the center of the elongated opening is a pointer, and the scale is movable endwise in its transparent sheath by an angled lever fulcrumed in a chamber of the head, a short arm of the lever being pivotally connected with the scale, while its longer arm has a knob extending through a curved slot in the upper face of the head. The square is placed on the paper to mark off the required number of inches, and the knob is moved to carry the scale outward for any required fraction of an inch, as indicated by one of the pointers.

## THE BALDWIN ADJUSTABLE CYCLE CHAIN.

The modern bicycle is the product of two main factors, the chain gearing and the pneumatic tire. Any defect or trouble in these parts tells heavily against it. Above all, the chain is the source of trouble, on account of wearing at the joints, technically though incorrectly called "stretching." As the rivets wear, the chain becomes too long and out of pitch with the sprocket wheels. Profuse lubrication may keep it going, but it never works properly after this wear has declared itself. It would seem easy to prevent, in great measure, the trouble, by hardening the links and rivets. But if the rivets are made of hard steel, they cannot be headed, and if of soft steel, they wear. To illustrate the effects of "stretching," Figs. 1 and 2 of the cut may be referred to, the first showing a chain in pitch, the second one which has stretched out of pitch.

These figures have another interest of their own. They were drawn from a Baldwin chain which had been used on a bicycle for 6,000 miles, and the stretch shown in Fig. 2 was removed by the simplest possible manipulation, and the chain was brought into the condition shown in Fig. 1 in a few minutes by the rider himself.

The peculiarities of the chain we describe affect its construction and adjustability. It contains no more than the normal number of parts, and in the omission of the usual bolt and nut for connecting the ends, the parts have even been reduced in number.

The pins are secured in place without riveting. Each pin is turned and worked into its completed shape by machinery, and is hardened. No further operation is required, as its shape is such that, once in place, it stays there and is prevented absolutely from rotating in the side plates. Figs. 7 and 8 show the pin. It is originally cylindrical, but is slotted out a short distance from each end, so as to form a neck. This neck is cut in from three sides of a square only, as shown in Fig. 8, one side being left intact; the side, A, of the neck opposite the untouched part, B, being rounded. The pin is next hardened and is ready for the chain.

The side plates are shaped as shown in Fig. 6. The central enlargement of the slot is large enough to let the pin pass through. Owing to the diminished area of the pin at the neck, this portion can slide into the long slots of the side plate.

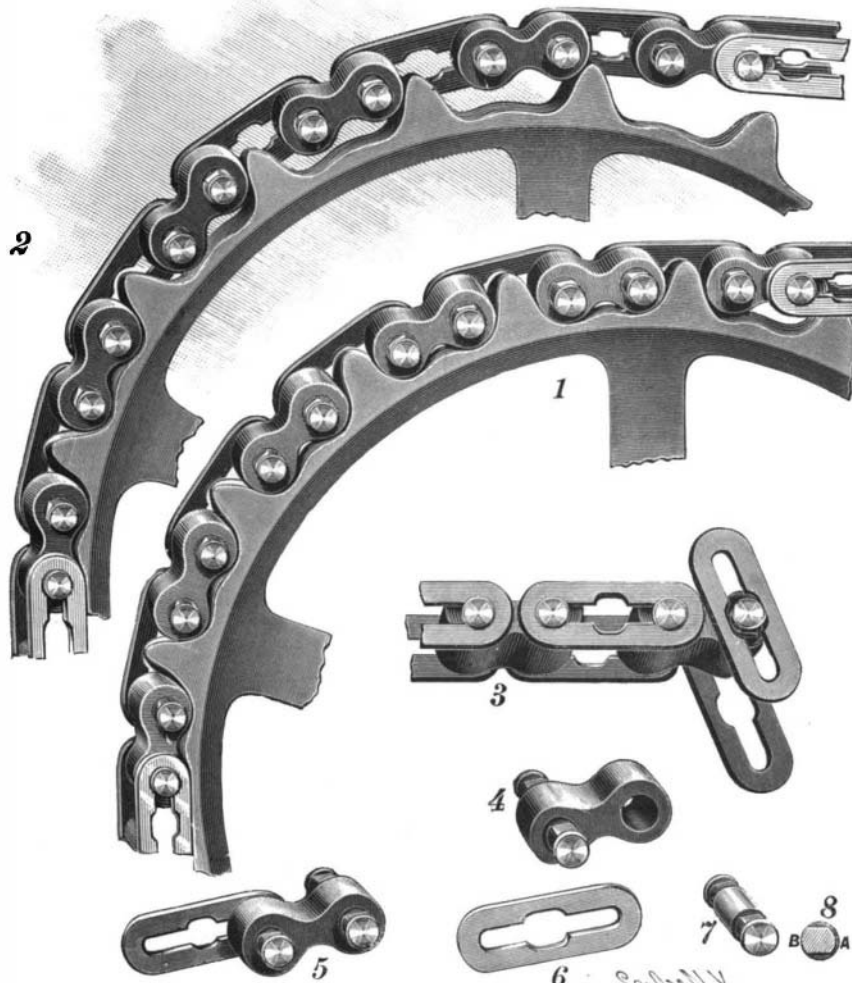
The block of the chain shown in Fig. 4, with one pin inserted, needs no explanation, as it is of the usual type. Fig. 5 shows one block and one side plate with the pin in the slot of a side plate, and Fig. 3 shows the chain still further assembled. The system is obvious. The pin is thrust through the central portions of the slots in the side plates and through one of the apertures in the block. It is turned so as to bring the side, A, Fig. 8, toward the ends of the side plates, and is then slid into the slot. The heads or flanges of the pins hold them securely in place, and the parallel sides of the neck prevent any rotation in the side plates.

If it went no further than this, the chain would be an improvement of no low order, because, the parts being interchangeable, if the chain breaks on the road, the rider is able with the simplest tools to replace the broken link with parts from an extra link carried in the saddle bag. But its adjusting quality is still more striking. By sliding one of the pins back to the center of the side plate and rotating it through half a circle, the portion, B, is brought to the front in place of A, and the link is shortened by the depth of the slot at A. It is clear that, as the pins are drawn, this would be an excessive amount for almost any case, and that it would be very troublesome to so treat every pin. To prevent this trouble the slot is made of the depth shown, the pins being cut out  $\frac{1}{4}$  inch deep at A, so that turning all the pins in a 52 inch chain would reduce its length a little over three inches. To adjust it after stretching, a few pins only are turned at regular intervals. Thus to take up  $\frac{1}{2}$  inch of stretch, every sixth pin is turned, a total of 17 pins giving an adjustment of  $\frac{1}{2}$  inch. This overcorrects every third link, and the overcorrection is distributed between three links, so as to be practically imperceptible.

Owing to the practicability of hardening the pins, this chain will outwear two ordinary ones. With adjustment, it should, on this basis, outwear twelve or more. This chain is being manufactured by the Baldwin Adjustable Cycle Chain Company, No. 4 Walnut Street, Worcester, Mass.

## The World's Merchant Navy.

The annual statistics of the Bureau Veritas relating to the mercantile navy of the world give the total number of sailing vessels now afloat measuring over 50 tons as 25,570, with an aggregate tonnage of 9,323,995 tons. Of this number Great Britain comes first with 8,793 ships of 3,383,607 tons. The United States is



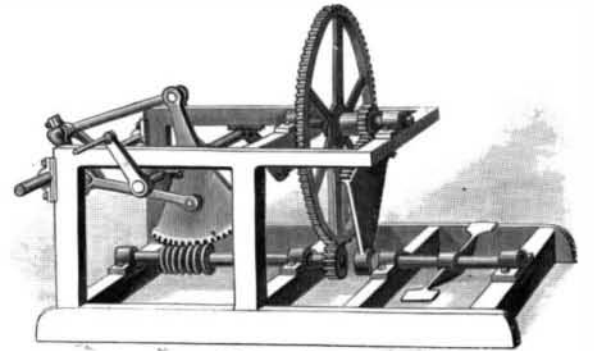
THE BALDWIN ADJUSTABLE CYCLE CHAIN.

second with 3,824 vessels and 1,362,317 tons. Norway is third, with nearly 1,000 less vessels than the United States, but nearly the same amount of tonnage. France occupies only the eighth rank, between Sweden and Greece. In regard to the steamers: England counts 5,771 vessels with nearly 10,000,000 tons. Germany, which comes second, has 826 steamers of 1,306,-

771 tons, France third, with 501 steamers and 864,598 tons, while the United States holds fourth place with 447 steamers and 703,399 tons.

## A NOVEL MECHANICAL MOTOR.

The illustration represents a motor which may be conveniently operated by foot power to convert reciprocating into rotary motion, and to multiply the movement, to drive machinery of various kinds. It has been patented by James M. Dickson, Roseneath, Miss. In a frame of suitable strength and form, two treadle levers are alternately depressed to rock a shaft carrying a segment rack meshing with a pinion on a short shaft which also carries a large gear wheel. The latter meshes at its lower side with a pinion on a shaft carrying a screw or worm meshing with a spirally



DICKSON'S MOTOR.

toothed segment gear journaled on a transverse shaft, and extending from this segment is an arm to which is pivoted a connecting rod whose opposite end is coupled to a crank in the power shaft. A second connecting rod pivoted to the segment is coupled to a second crank in the shaft, set opposite or quartering to the first crank. By operating the treadles a continuous rotary movement is thus given to the power shaft, and the motor is especially well adapted for use in cases where it is essential that the hands be otherwise employed.

## Guarding Against Moths.

Moths deposit their eggs in the spring, and this, therefore, is the proper time to take precautions against their ravages among goods which contain wool. It is not the moth, but the moth maggot, that does the mischief. The moths fly through the house in April and continue sometimes as late as August, seeking places in which to lay eggs. There are from a dozen to about seventy-five of these eggs in each nest, which hatch after a little while into small white worms. These worms devote their lives to eating the material in which they find themselves. As to remedies, almost every one has something to recommend, but all of the remedies are of but little account after the moth egg has been laid. There are things like cedar, camphor, and tobacco, the odor of which is disagreeable to the moth, and when the female is looking for a place to deposit her eggs, she may be deterred from laying them near these substances, but if the eggs are really laid, the grub will pursue its destructive work without paying any attention to the odors, and would do so were the smell many times more pungent. The principal attention should therefore be given to keeping the moths out.

If goods are in stock and likely to remain, some of them, at least, through the summer, better thoroughly beat them with a thin rattan and air them for several days in the sun. Nothing displeases moths so much as sunlight, direct or even indirect. Then wrap them up in newspaper; wrap perfectly tight and paste the ends so that no openings remain for the insects to get through. They cannot eat through paper. Examine at least once a month, to make sure of it, and beat and air. Furriers have no other secret than this for keeping furs. For clothing the garments should be thoroughly beaten in order to be certain that no eggs are in them, and then they should be sealed up in paper boxes or bags. Such boxes may easily be procured in any large town or city, an excellent pattern being the boxes used by tailors for delivering garments. The crevices where the cover fits on should be made tight by the use of strips of gummed paper, also a commercial article, and one may feel assured that no damage will be possible. Paper bags are also sure, but they should be sealed at the top.