

like a small screwdriver, it was ascertained that the barrel hook was broken off. Here was a "go." All the tools available within thirty miles were 3 chopping axes, a hammer, a hunting knife, pocket knife, three cornered file and telegraph wire pliers, with a pair of clippers, telegraph vise, spade, coil of telegraph wire and a fragment of copper wire thrown in. However the reputation of the craft in emergencies must be sustained. Punching out the fragment of the hook left in the barrel, by means of a piece of sharpened telegraph wire, I took a small piece of the copper wire, reduced it to the proper size, wore a notch in one end with the jack knife, drove it through the barrel a proper distance, and then using the pliers as an anvil and the back of the hunting knife as a hammer, carefully rivetted the hook in its place. After the watch was carefully put together and a little sweet oil applied, need I say the watch ran like a charm for a week or two. Then that soft copper wire cut through, the monkey wrench refused to hang on the safety valve, the eccentric overbanded on the piston rod and the rag wheel came to a sudden halt. Not having stolen any of the jewels out to compensate me for wear and tear of intellect, I was so discouraged that when my watch stopped shortly after it was hung on a nail and thereafter its owner, when on the march westward over the line to Wabigom, 60 miles distant, when sleeping out at nights noted the snail-like revolution of the "great dipper" around the polar star, when he was wakened every couple of hours by the intense cold and admonished to heap more logs on the fire, then to pray for morning.

Some time ago I received a couple of watches from the West. One had been experimented on by a man in the Rocky Mountains who thought he was pretty handy at anything. The other had been run over by a heavily loaded wagon. A careful examination and comparison showed that in both cases the injuries were about equal. The one had been crushed in and the other had been *crushed out*, so to speak. The mechanic had taken out the barrel and by means of a coarse three cornered file had done some ghastly work on the inner coil of the mainspring and barrel arbor. The various jewels had come in for attention and fragments of them were taken off as mementoes. Neither were the pivots neglected, some of them being beautifully curved.

Perhaps Mr. Editor you would tell us on the quiet what kind of watchmakers you keep in Ontario. Do they use the old brush and chalk method? Do they have trade secrets that they are afraid to impart, or do any of these fancies indicate the reason for their reticence in committing themselves to paper? If some of them do not waken up and contribute to the spicy little TRADER, the humble writer will be compelled in the discharge of a painful duty, to do as the *Manitoba Free Press* was credited with doing in the case of the immortal Nicholas Flood Davin, to take a long pole, reach up to the pinnacle of fame and knock some of them off.

Yours,

H. J. WOODSIDE.

AN OPPORTUNITY FOR INVENTORS.—A German firm, Charles Beck, of Ebingen, Wurtemberg, proposes, in the *L'union Horlogerie*, to order 1,000 tricycles, cash down, from any inventor who will send them a model of a tricycle to be propelled either by spring, electricity, or weight of rider. any one of our readers who wishes to enter into competition and, by applying to *The Jewellers' Circular* office obtain specifications.

A PRACTICAL TREATISE ON

THE BALANCE SPRING.

Including Making, Fitting, Adjusting to Isochronism and Positions, and Rating, also Adjustment for Heat and Cold.

BY EXCELSIOR.

PART III.

THE ADJUSTMENT TO POSITIONS.

(80.) The *adjustment to positions* is another point which must now receive attention. We know that in nearly all watches the balance has a larger motion, or longer vibration, in a horizontal position than when it is in a vertical position, or with its edge up. This is caused by a greater friction on the balance pivots in the latter case. The adjustment to positions is effected by equalizing the frictions, so that the hair spring will be able to move the balance through the same arc in any position in which it may be held. Generally, watches are adjusted for the two horizontal positions, dial upward and balance bridge upwards, and two vertical positions, with the figure XII upwards, and III upwards. But a fine watch should be adjusted for all four vertical positions, XII, VI, III and IX upwards. In all cases the equalizing of the frictions is to be done by *lessening the greater ones*—never increasing frictions unless that is unavoidable.

(81.) The two horizontal frictions are equalized by making the ends of the balance pivots equally flat and well polished. The extent of the vibrations can be readily observed when the dial is upwards, by setting the movement holder upon a piece of looking-glass on the bench. The balance and works can even be examined with the eye glass while in that position, by looking from one side at such an angle that its image will be reflected into the glass. This is much better than holding the movement above one's head in order to see its under side, insures a true and equal horizontal position each time, and obviates the trembling of the hand while holding it, which interferes with the motion of the balance—and is, besides, easier and safer.

(82.) If the vertical vibrations are smaller than the horizontal ones, the other conditions being as described in sections (93, 94,) the only way is to flatten the ends of the pivots, till the balance will keep up about the same motion in all positions. Some workmen not only flatten the ends, but go further and use round grinders or laps to hollow out the pivot end a little, and cause the entire weight to be sustained upon the ring of metal left around the outer edge of the pivot end. This brings the rubbing surface nearly as far from the center of the pivot in the horizontal as in the vertical position, but the practice is objectionable for several reasons, besides being difficult of execution. It is sufficient for all practical purposes to make the end of the pivots perfectly flat, or as nearly so as may be found necessary on trial.

(83.) On the other hand, if the vibrations are greater in the vertical than in the horizontal position, then we slightly round off the end of the pivots to increase the arc in the horizontal position to an equal extent. These changes of the shape of the pivots should be done in a lathe, and very slowly and cautiously, lest we do too much. The best tool is a pivot burnisher, as that both polishes and hardens the surface. If a stone or lap is used, the burnisher should finish the job. In rounding off the end, the departure from a perfect flatness on the end of the pivot should be only sufficient to prevent actual contact with