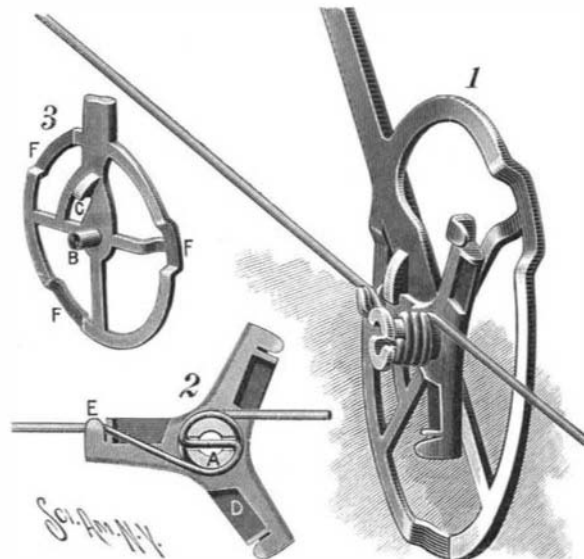


**AN IMPROVED WIRE-STRETCHER.**

A new wire-stretcher has been patented by William E. Kimmel, Bermudian, Penn., which is designed to take up the slack in wires stretched between fence posts. Fig. 1 is a perspective view of the complete device. Fig. 2 shows a capstan employed. Fig. 3 is a perspective view of an operating-lever. The stretcher comprises essentially two pieces, the capstan and the operating-lever. The capstan is formed with a tubular portion, A, provided with diametrically opposite slots to receive the wire and flanged to prevent the wire's slipping. Arms extend radially from the tubular portion, A. Each arm has a recess, D, at one side and a hook, E, on its outer end to retain the wire. The operating-lever consists of a handle and a ring-shaped head having a hub, B, at its center designed to engage the tubular portion, A, of the capstan. The ring is formed with depressed portions, F, not in the same plane as the arms of the capstan, so that the wire will be clear of the head portion after the stretching is effected. The lever-head carries a lug, C, designed to engage the capstan arms when the lever is turned. The lug is curved to permit its gliding beneath an arm upon a backward motion of the lever. The wire to be stretched is placed in the slots of the tubular portion, A; and the hub, B, of the lever head is fitted in the tubular portion of the capstan. The entire device is then turned as the lug, C, engages one of the recesses, D, of the capstan arms. The lever is moved as far as possible and is then brought back to engage the lug with the next arm, whereupon the capstan is again turned. When the slack has been taken up, the lever is slipped off, leaving the capstan permanently in position to retain the wire as shown in Fig. 2.



TIGHTENING A SLACK WIRE.

**THE SNOWFALL AND WATER SUPPLY OF THE ROCKY MOUNTAINS.**

BY H. A. CRAFTS.

While the mountain gorges of the higher altitudes of the Rocky Mountains contain large bodies of perennial snow, there is supposed to be but one real glacier in Colorado. This is Hallett's Glacier, which is situated upon Hague's Peak in the northern part of the State, between Estes Park and Middle Park. It was discovered only a few years ago by a Denver man, after whom it was named. It is of comparatively small extent, but it has been examined sufficiently to convince scientific men that it has existed for many generations. The innumerable bodies of snow which last from year to year, upon being thoroughly explored prove to be snow only, though their lower strata have become considerably compacted, with an admixture now and then of ice. But they are far from having arrived at the glacial state. The fresh layers of snow that are deposited from winter to winter upon their surfaces melt almost entirely away each summer, under the combined influence of sun and wind. The almost entire absence of glaciers however is accounted for, by those who have studied the subject, by the extreme aridity of the climate. If heavy and continued rains prevailed during the warm season of the year, these great beds of snow would be converted into water, and the water into ice, which would be found gathered in great masses in the mountain gorges. There are marked evidences, however, among the Rocky Mountains of Colorado that at some remote period real glaciers did exist. In the opinion of Prof. L. G. Carpenter, of the department of irrigation engineering of the Colorado State Agricultural College, an immense glacier once existed on the eastern slope of Mt. Cameron of the Medicine Bow Range in Northern Colorado. There is strong evidence that Chambers Lake, which lies just under the southern slope of Mt. Cameron, at some former age emptied into the Big Laramie River instead of the Cache la Poudre as it does now; for the great

have been warmer and characterized by heavy rain-falls, otherwise the heavy ice masses could not have been formed. Now, nearly all of the precipitation in these high altitudes is in the shape of light snow. In fact, snow falls in every month of the year. The rain which falls during the summer months usually comes in heavy showers or "cloud bursts" as they are called in Colorado, causing sudden floods in the mountain streams. The snows that fall during the winter are rapidly melted by the bright sunshine and warm winds of springtime, and also cause very high water in the streams. To show the great fluctuation in the flow of some of these streams, it may be stated that at the height of the flood season of 1884, which followed a period of copious snowfalls in the mountains, the Cache la Poudre River carried as high as 7,000 cubic feet of water per second, while in 1898 at low water and after a period of light snowfalls it ran down to only about 80 cubic feet per second. This shows how much the mountain streams of Colorado are dependent

mountains. Of so much interest is it that information bearing upon the amount of snowfall from month to month during the winter time is sought from many points, and from bulletins in the local newspapers. The relation of forestation to the snowfall and its preservation also engrosses the attention of the agricultural economists. The setting aside of the Medicine Bow forest reservation recently by the general government was due to the efforts of certain farmers of Northern Colorado, the purpose being to preserve the forests as a shelter for the snows falling in the timber belts, and thereby prevent their too sudden melting and a consequent waste of water by excessive floods. This reservation extends northward from the vicinity of Estes Park some hundred and twenty miles, and is about forty miles in width, including the great timber bodies of the Medicine Bow Range, in which head the Little and Big Thompson Creeks, the Cache la Poudre, Big Laramie and North Platte Rivers. But it is not the timber cutter so much as the forest fire that destroys these forests. Every precaution is taken by both county, State, and government authorities to prevent these fires, but the territory is so enormous over which these timber tracts extend that it is well nigh impossible to prevent fires altogether. Each summer the mountains swarm with outing parties, and a lighted match carelessly thrown on the ground, or an unextinguished camp fire, may start a conflagration that may spread over large tracts of fine timber and leave nothing in its track but blackened earth and charred trunks.

One of our illustrations showing a snow drift filling a section of the Big Laramie ditch, recently described in the SCIENTIFIC AMERICAN, not only shows the large bodies of snow remaining in this region as late as June 25 of the year 1899, after our unusually copious snowfall of the winter before, but also gives a fair idea of the denuded state of the mountains in the vicinity, by reason of forest fires. On the slope above the ditch may be seen the dead trunks of trees lying about in wild confusion, while here and there may be seen a sapling pine, bravely struggling to supply a part of a once noble forest. The hillside in the background also gives some idea of the frightful ravages of forest fires in the Rocky Mountains. There is a bare remnant of a once dense growth of tall pines, the main body being supplanted by a meager sprinkling of aspen trees. Very slowly indeed are these ruined forests being replaced by a new growth. And here appears to be another proof of the changed climatic conditions. On northern slopes, where the sun's rays descend with less power, and the snows are not so quickly melted away, the tree growth is more vigorous, but on the southern slopes it seems almost impossible for trees of any kind to make headway against an unfavorable soil and climate. Prof. Carpenter recently made some investigations as to tree growth in Estes Park, at an altitude of about 9,000 feet above sea level. He found in one instance that it had taken



SNOW BANK FILLING BIG LARAMIE DITCH, JUNE 25, 1899—ALTITUDE, 10,000 FEET.

earth dike that now forms the eastern bank of the lake is composed almost entirely of loose earth and broken rock, being entirely different in character from the composition of the surrounding barriers; yet this theory is somewhat weakened by the absence of moraines in the neighborhood. The supposition is, however, that an immense glacier at some former period slid down from the side of Mt. Cameron, dammed up the original outlet of the lake, and turned the overflow of the lake into the channel of the Cache la Poudre.

upon the snows for their water supply, and how quickly and powerfully the snow supply is acted upon by the sun and air of this arid climate. It will be seen that these conditions have an important bearing upon the subject of irrigation, upon which Colorado depends almost exclusively for her agriculture. The rainfall of Colorado is merely supplementary to her supply of water available for irrigation. The question that interests the farmer more than anything else is the amount of snowfall in the

thirty-two years to make a pine tree twenty feet high and four inches through at the butt, and twenty years to make a tree twelve to fifteen feet high and two inches thick at the butt. At an altitude of 11,500 feet he found an aspen twig about as large as a man's thumb and a foot high that showed twelve rings. While this destruction of forests has made no perceptible difference in the amount of precipitation, it has made a marked difference in the flow of water in the mountain streams. Instead of the snow beds being protected from the sun's rays by a dense shield of pine boughs, and thus melting slowly and giving a steady and extended flow of water, they melt with great rapidity upon the arrival of spring and fill the mountain streams with roaring torrents whose volume cannot be properly and economically controlled by the present ditch and reservoir facilities.

Mr. E. H. Harriman, the patron of the Harriman Alaska expedition will publish the results of the explorations in a series of several volumes prepared under the general editorial management of Dr. C. Hart Merriam. The first volume will be a narrative of the expedition by John Burroughs, with chapters on glaciers by John Muir and other chapters by well-known writers.