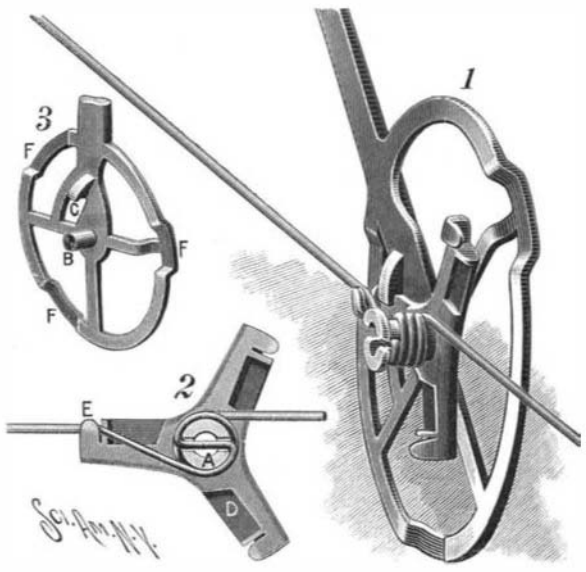
AN IMPROVED WIRE-STRETCHER.

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.

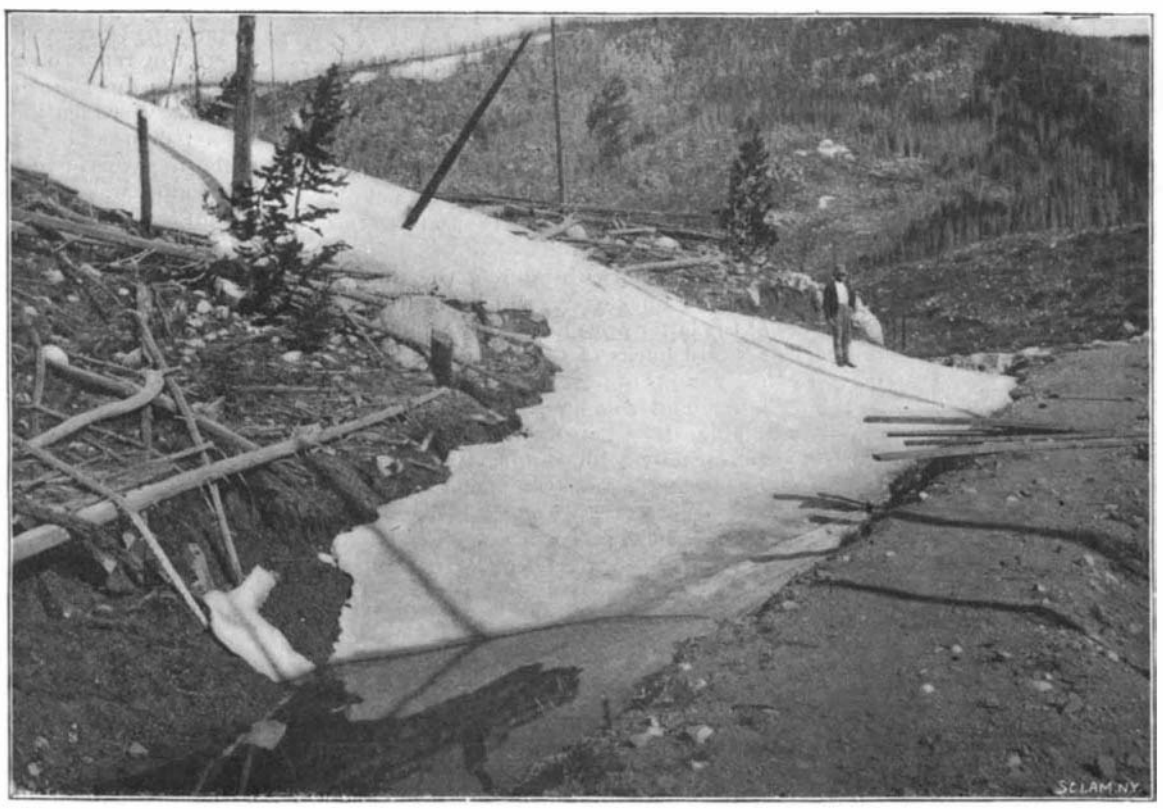
BY H. A. CRAFTS.

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 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.

Over in Estes Park, some twenty-five miles south of Mt. Cameron, are found not a few well-defined moraines, a further proof that these mountains once contained genuine glacial formations of no mean magnitude, for the moraines indicate violent convulsions of nature. It may also be stated that the flat grounds in the valley of the Joe Wright Creek, near Cameron Pass, some six miles south of Chambers Lake, have a peculiarly billowy formation, as if the ridges and knolls had been formed from the residuum of glacial decay. These evidences of glacial formations, however, imply the existence of very different climatic conditions from those now prevailing. The climate must have been warmer and characterized by heavy rainfalls, 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 30 cubic feet per second. This shows how much the mountain streams of Colorado are dependent 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 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 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.



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

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.

The Durability and Preservation of Paintings.

A picture is one of the most precious of human documents, and at the present time artists are producing paintings which are changing—changing so rapidly in some cases that the beauty fades even before they leave the studio, and in a few years there will be hardly a trace of their original beauty. The treatment of pictures after they have passed from the artist's care is frequently one that tends to their destruction. The durability of a picture should be a point of honor with an artist. The permanency of ancient works of art is well illustrated by the fact that some madders are still quite vivid, and the same may be said of vermilion, while the high reds have changed only slightly. The red draperies of the Italian pictures as early as Fra Angelico, painted with rose madder, are perfect at the present time, and the Dutch and Flemish schools exhibit many very excellent examples of the most durable work. At the same time we find many failures—for example, patches of black occur in drawings by old artists where high lights were, and they had no permanent true yellow or orange pigment, the yellow used by older artists being fugitive. The yellows of arsenic have not only gone themselves, but have also injured the colors they came in contact with, while the orange hues produced from the same substance have turned dark brown, and in some cases black. In more recent times, in some of the works of Cox and Turner, there is noticeable a faded and changed condition.

In the past the young artist was apprenticed to an older artist, preparing all the materials and grinding the pigments to be used in the production of the picture, consequently the artist knew exactly the quality of the colors he was using and was not at the mercy of the color manufacturers. At Antwerp, there is a trunk which belonged to Rubens, in which he had placed pigments collected during his travels, showing what care he took in selecting his colors. The atmosphere of our city since the introduction of coal as a fuel is most detrimental to painting, fresco being well nigh impossible with the air full of smoke particles and sulphur compounds from the combustion of coal. If modern chemistry has produced many fugitive colors, it has also added very largely to the list of permanent ones. The English Architectural Review, from which we obtain our information, gives most interesting facts relating to the "Durability and Preservation of Paintings," written by James Leicester, F.I.C., F.C.S. The whole of a man's life work, the visible and surviving records of our great painters, are dependent upon a few tubes of colors; and when we consider the vast sums of money given for great works at the present time, it is only honest that they should be produced of good and durable materials, and artists should look to the future stability of their work as do architects. The preparation of colors too quickly and without sufficient washing, and in some cases the mixture of cheap and bright pigments with dull ones, should be condemned. There are many easy tests by which artists can detect impurities in their pigments, but they are not apt to go to this trouble, nor have they the requisite experience to test them, and they are too apt to be governed by the colormaker's word. The artist should demand, says Mr. Leicester, the chemical formula for each tube sold, or in other words, the true name of the ingredients.

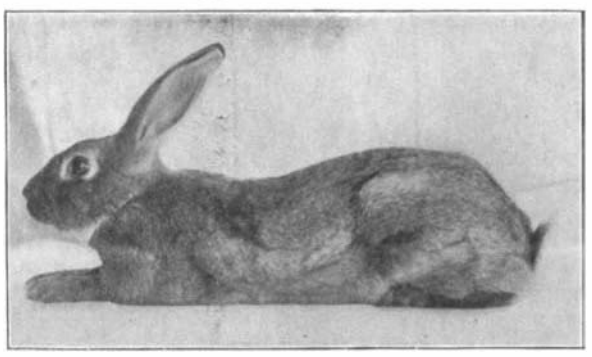
The scheme of M. Vibert, that painter of splendid genre, is well worthy of consideration. He proposed that a permanent commission on the material processes of art be appointed, the members of the committee to be chosen from all branches of art having problems to solve and advantages to obtain from the work of the commission, also chemists and manufacturers; and the work of the commission being to investigate the inventions and processes, ancient and modern, and to indicate in special reports those which might seem preferable, and to conduct correspondence relating to the objects of the commission, also to establish a laboratory where analyses could be carried on on behalf of the artists, dealers or manufacturers. No commercial considerations were to be entertained, and the mark of the society was to be placed on all products recognized as good, the dealer or manufacturer depositing a sample of the product and binding himself to produce a product identical with the sample. All artists would thus be assured of a pure material in no way injurious to the preservation of their works. It would be very gratifying if a scheme of this nature could be adopted, and in the end it would add to the business of the manufacturers.

Mr. Leicester then describes the various media used during the Middle Ages and in the Renaissance, and gives some of the ancient directions for preparing colors. He recommends that as far as possible, pictures should be painted on panels in preference to canvas and carefully protected on the back to guard the painting from the action of the damp. Many scientists and artists are of the opinion that pigments should be tested by exposure to diffused daylight alone, for sunshine exposures are hardly the condition under which to test the durability of a pigment from an artist's point of view. Pigments are influenced according to the pureness of the atmosphere and the dryness of the climate. It is possible to use pigments in the pure air of the country which would be greatly destroyed by the impure air of cities. In a fine, dry climate like Egypt a picture could be produced which it would be difficult to paint in England, and still remain as permanent. The artist, now as of old, is safest when he considers what pigments he should exclude rather than what new colors he can add to the palette, and the durability of the pigments should not be considered apart from the question of the medium, as many of the most fugitive of pigments having, owing to the medium they were used with, preserved their freshness for hundreds of years, and the use of copal and amber varnish with linseed oil for oil pictures is most advisable for the production of lasting work. At the present time it would be well if the scientist and the artist drew more together, in order that the emotions which the pictures are capable of conveying to the spirit which has been given to the painter shall not either be left unrecorded or allowed to fade from the book of record.

BELGIAN HARE RAISING IN SOUTHERN CALIFORNIA.

The growing of Belgian hares has recently become an extensive industry in Southern California, having its center in Los Angeles. Here, within the past two years, hundreds of firms have turned their attention to the timid little red brown hare, and thousands of hutches, or rabbit warrens, are housing the breeding or growing animals. Many of the concerns have extensive equipments costing as much as thirty and forty thousand dollars, while hundreds of others are mere boxes in back yards screened with wire netting, the proprietor of the place being some boy or woman of the establishment.

The economic value of the Belgian abides in its flesh for food purposes. This has no relation to the ordinary hare or rabbit. It is white, close-grained and tender, resembling very much the legs of frogs, being



A HIGH-BRED BELGIAN HARE

withal of delicate and most savory flavor. It is decidedly an epicurean dish, being superior to fowl of any kind; no roast could be more palatable than a good fat hare stuffed with oysters.

The animal commends itself to raising in small ways from the fact that it is very clean and will be healthy in the most limited and confined spaces. In this respect it is greatly superior to poultry; requiring neither the care nor the space of chickens. These considerations have made it distinctly the back yard pet of Los Angeles in which enclosures many thousands are now being raised. The prices of hares of good breeding points are now high notwithstanding the number in existence. A good buck or doe will bring from $50 to $250, sales at the latter price being very common. The ordinary does and bucks of the age of three months, not bred from parents of prize records, bring from $20 to $25. The sex most commonly sold is the females; a few unsalable does get upon the meat market where they are readily gobbled up at twenty-five cents per pound live weight, a price which makes the animal worth from $2 to $2.50. They are killed and dressed at the stalls while the purchaser waits. The animals can be grown to maturity for from thirty-five to forty cents, and they could be sold at seventy-five cents and great profit realized; the present prices, therefore, are very remarkable, yet they have kept steadily up since the inception of the industry and give no indication of waning.

The hares of Los Angeles come directly from England and Belgium; several of the firms make a speciality of importing. It is said that a hare having the points of the Belgian, but of smaller size, runs wild in the country to the west of Antwerp; and by the importers it is said that it was from this hare crossed with English breeds, the crossing being with regard to a table animal, that the now popular Belgian was procured. Los Angeles appears to have gotten the start upon the rest of the country as shipments are being made daily from this place to all parts of the United States, Florida being one of the largest takers. A southern climate, however, is not necessary for successful culture of the animals. It will thrive equally well in Michigan or Wisconsin and would do as well in Massachusetts as in Mississippi.

The high profit in growing the hare abides in their wonderful fecundity and in their eating cheap provender. The doe brings forth every sixty days, having from six to eleven and as high as fourteen in a litter. As the doe can only suckle eight, a white rabbit, usually an Angora, is kept in breeding to serve as nurse for the surplusage. The youngsters grow fat a rate of about one pound per month for eight months when they are matured at eight pounds. They are bred at seven months. They eat about the same food as a sheep, their preference being for alfalfa or clover hay. When the doe comes to yield her litter she prepares for them a nest of hair which she pulls out of her own body. If not prevented by spreading boards or wire netting over the surface of the ground the doe will burrow and produce her young in a chamber about five feet under the ground. In this the animal follows a trait of the rabbit and not of the hare; another rabbit quality is that the young do not open their eyes until about ten days after birth, while hares are born with their eyes open. But with all these qualities of unconformitity there is no doubt that the animal is a hare. It has the small fore limbs and the large strong kangaroo-like hind legs of the hare and it moves by leaps and bounds.

In color the Belgian is a yellowish red when mature with white upon the belly, and with long erect ears.

They are nearly black when born, turn almost gray when a week old, but darken and redden as they approach maturity.

A Belgian Hare Association has been formed in Los Angeles which has an extensive membership and all the indications are that another enduring and extensive industry has been added to the live stock interests of the country, with incident benefit to the pelt industry, for the skins make excellent furs for hatters' uses, and for the lighter winter apparel for women, while they are beginning to enter the trade as trimmings.

O. P. Walcott.

Los Angeles, Cal.

Mines of Mount Sinai.

The Egyptains had mined the rugged sides of Mount Sinai for copper and torquoises thousands of years before Moses climbed the mountain to receive the Tables of the Law, and the Egyptains waged wars for the possession of these mines. M. de Morgan with a party of French engineers recently visited these abandoned workings which is situated convenient to the Gulf of Suez, and explored two of the ancient deposits. He found the mineral deposits in the sandstone region and not in the porphyries which constitute the great mass of the mountain. These deposits consists of copper and iron-bearing minerals, especially hematite and some gypsum. Among the cupriferous minerals the most valuable were the torquoise, many valuable specimens of which which have been discovered from time to time in the tomb and treasures of the Egyptains, says The National Druggist, from which we derive our information. M. de Morgan brought back to France quite a collection of minerals most of which were turned over to M. Berthelot who made a most interesting report on the minerals, in which he stated that the copper-bearing specimens were poor in metal and not very plentiful. Mining such ores must have been tedious and severe labor. The Egyptians were still using arms of wood and chipped or ground stones and copper was a rare and precious metal, the possession of which was thought to repay the most severe labor. Later on, wood and stone implements gave place to bronze which was made possible by the importation of tin from remote regions. The extraction of the metal was effected by methods similar to those followed in the metallurgy of copper in its production of similar ores from the remotest antiquity down to recent times—the use of wood as a reducing material along with silicious, ferruginous and calcareous fluxes.

The mines have been abandoned for at least 3,000 years, probably on account of a constantly growing scarcity of the material and the poverty of the residue in metal. The mines were probably worked from 3,500 to 4,000 years. It is thought that the working of the mines began nearly 7,000 years ago.

There is a close connection and to a certain extent inter-dependence between the relations of forest fires to insect ravages, and insects to forest fires, diseases of trees to insects and insects to fungous diseases, which are not obvious at first sight. Dr. A. D. Hopkins in a report on the insects enemies of the forest in the Northwest treats quite fully of this subject. Trees dying from injury by fires or weakened in vitality offer favorable conditions for the multiplication of vast numbers of destructive insects. Moreover, the trees which have been killed by insects furnish, in their fallen branches and partially decayed trunks and dry bark, a most favorable propagating ground for the starting, spread and perpetuation of forest fires. It is, of course, well known that forest trees weakened by disease contribute to the multiplication of insect enemies to forests, therefore, the study of insects associated with unhealthy forest trees should lead to results of economic importance.