TOTAL ECLIPSES OF THE SUN.

WITH SOME REFERENCE TO THE NEXT ECLIPSE VISIBLE IN THE SOUTHERN STATES, MAY 28, 1900.

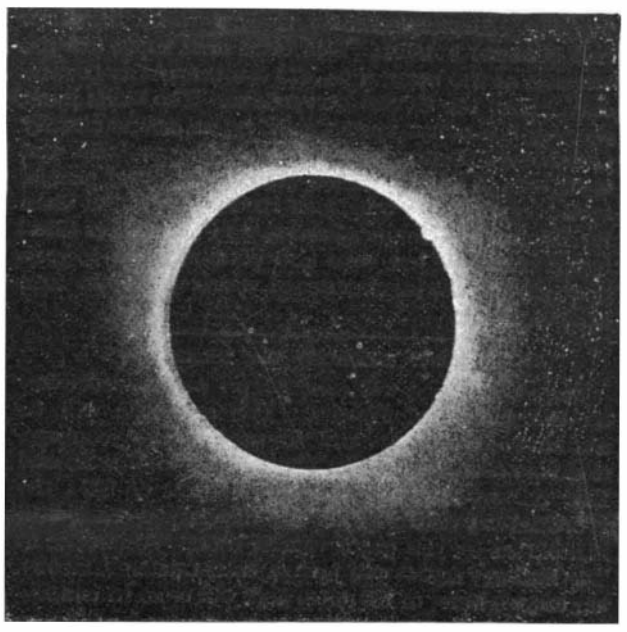
BY G. E. LUMSDEN, F.R.A.S.

Were it possible for us to see shadows against the sky, and to take up out in space a suitable position for the purpose, we should perceive that both the earth and the moon ever cast behind them vast black cones pointed away from the sun, the common source of illumination. Could we measure these cones, we should find that the shadow of the earth is 850,000 miles, and that the shadow of the moon is 238,000 miles in average length. The moon's path is far from being exactly circular. It is elliptical, or egg-shaped, so that while the distance which separates the earth and moon from each other averages 240,000 miles, there are days when she is only 222,000 miles away, and other days when she is as far off as 252,000 miles, a difference of 30,000 miles. And this is the reason that, to the naked eye, our satellite at times appears to be larger, or smaller, than at other times. Any one who follows her through a sufficient number of lunations will detect not only these but other interesting differences, and will notice that she never "fulls" twice in precisely the same part of the sky, because she is constantly changing her position by rising or falling from night to night, thus passing, as it were, every month, through many degrees of north and south declination. And it will be further observed that, in obedience to some law, the moon in our summers becomes full at or near her lowest point as she hangs over the southern horizon, and in our winters at her highest point over our heads, thus providentially affording light to that pole, for the time being, most in need of it. An eclipse of the sun visible to us can occur only when the moon is new, that is when she passes exactly between us and the sun, just as one might pass his clenched hand from right to left between his face and a lighted lamp. Now, if an eclipse happen when she is at her least distance, 222,000 miles, from us, and, therefore apparently greatest in diameter, the apex or point of her shadow-cone will come into contact with the surface of the earth and be broken off to the extent of some thousands of miles. If, however, one happen when the moon is at her greatest distance, 252,000 miles, from us, and, therefore, apparently least in diameter, the apex of the shadow will pass over our heads at a distance of many thousands of miles, and somewhat after the fashion of a balloon floating by at a considerable height. In the first instance, the eclipse will be total along the path more or less curved, over which the broken shadow travels, because the moon will be large enough to hide the sun. In the second, the eclipse will be annular, because the moon will have been, by her distance, apparently diminished to that degree that at no instant while she is crossing the solar disk can she completely obscure it, for around her coal-black body will blaze a ring of the white-hot sun.

Of the stupendous scale of total solar eclipses, mooncast shadow-apparitions are impressive and awful to the last degree; they are phenomena never forgotten by those who see them. Than Prof. Langley there is no better authority, he having observed three. No wonder he declares that repetition does not dull the interest, and that a total eclipse of the sun is worth a journey round the world to behold.

For the purpose of observing these phenomena, scientific men and women do not hesitate, literally, to go to the ends of the earth. Especially promising eclipses have found enthusiastic observers on the steppes of Russia, the wastes of Asia, the inhospitable shores of Africa, the peaks of the Andes, and lonely rocks in mid-Pacific. The total phase is the only portion of a solar eclipse of the slightest value to astronomers or solar physicists, or, indeed, of real interest to the mere sight-seer, and this phase, under the best possible conditions, cannot at any one place last so long as eight minutes; commonly, the duration does not exceed three minutes. Notwithstanding this, and the chance of complete failure, owing to the presence of clouds, costly expeditions are from year to year fitted out by governments, observatories, societies, and private munificence, and the arduous duties devolving upon them are ungrudgingly assumed by men eager to glean from the sky every vestige of information obtainable by telescope, spectroscope, and camera during the few precious moments that the obscuration of the sun is sufficiently complete to allow critical examination to be made of the solar appendages, visible to man only when daylight has been thus temporarily turned into night. Readers of the SCIENTIFIC AMERICAN will, therefore, readily appreciate the keen interest with which scientific men and women on this continent are looking forward to the next total eclipse, which, most fortunately for them, will, on the 28th of May, 1900, be visible in Mississippi, Alabama, Georgia, South Carolina, North Carolina, and Virginia, or, in other words, throughout a broad belt, extending from New Orleans to Cape Henry.

The shadow-path of the approaching solar eclipse will cross the American continent, and, within the United States, will cover a belt fifteen hundred miles long by about forty miles wide at New Orleans, and sixty miles wide at Cape Henry. Observers should, if possible, take up positions on the central line of the path, as the shadow will there be densest, and the phenomena best seen. Along this central line, and within the north and south limits of the path, there will be thousands of excellent stations. From every city, town, village, hamlet, and farm throughout the belt observations may be made to great advantage. The best positions will be found in the moon's path



THE SUN'S CORONA, TOTAL ECLIPSE, JANUARY 22, 1898.

from the Appalachian highlands on to the Atlantic coast. Some of these have already been selected by professional astronomers, who have chosen localities likely to be most free from cloud. These ladies and gentlemen will take care to be on the ground several days in advance, so as to arrange their instruments and drill their staffs to the last degree of thoroughness and precision. No doubt the unprofessional men and women who will be present on eclipse day will number many thousands. Well equipped parties will go south and east from all parts of the continent, not excepting Canada. At least one official party will come out from England, while other parties from that and other countries will go to places in Europe and Africa. The eclipse will be total along a path extending from a point near the southern end of Lower California, across Mexico, the United States, the Atlantic, twice cutting the path of ocean travel, Portugal, Spain, Algiers, and Egypt. Outside of this path the eclipse will, some time

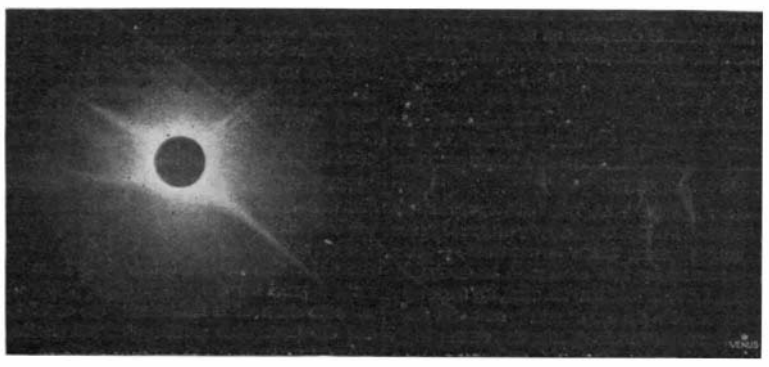
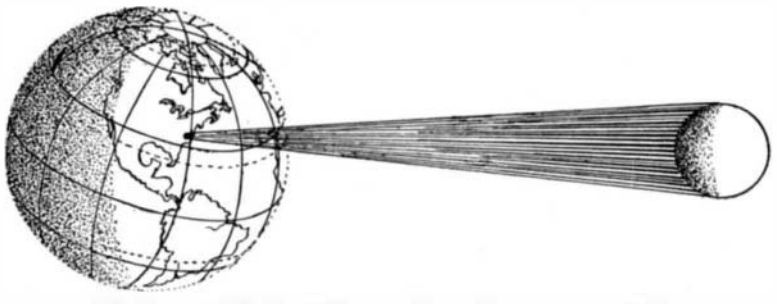


PHOTO OF SOLAR CORONA,

Taken with a small camera by Mrs. E. W. Maunder, January 22, 1898. Venus in the lower right hand corner.



ECLIPSE SHADOW, MAY 28, 1900, OVER CAPE HENRY.

during the day, be more or less partial to observers from the North Pole to the river Amazon and from the central Pacific Ocean to the Red Sea.

On the 28th of May next, sometime after local sunrise, the round black shadow of the moon, like a great arm, will sweep in out of space, coming into contact with the earth near the Revilla Gigedo Islands in the Pacific Ocean, about five hundred miles south and west of California. With the tremendous initial velocity of about one hundred miles a minute, the shadow-cone will rush toward the mainland and enter Mexico near Cape Corrientes. In eight minutes it shall have crossed the Rocky Mountains, where, flying from peak to peak and from valley to valley, the spectacle must be sublime, though lasting but thirty seconds. By 7:30 Central Standard time (or 8:30 Eastern Standard time) it shall have crossed the Gulf near the mouth of the Rio Grande and plunged New Orleans into sepulchral gloom.

For the purposes of anticipation and study, let us imagine ourselves to be members of a group of enthusiastic men, women, and youths, not necessarily scientific or practiced observers, only anxious to see everything possible. We should be posted upon the highest possible eminence, so as not to miss the tremendous impressions due to the sudden rushing upon us of the stupendous shadow. We ought to be in the center of the ground over which the shadow will pass. If this position be near New Orleans, we shall have totality for seventy-seven seconds. If we are at Union Point, Greene County, Georgia, the center of the path in the United States, we shall have darkness for ninety-two seconds. If we are near the Atlantic coast, not far south of the city of Norfolk, we shall have one hundred and five seconds for observation. Let us assume that we have brought with us opera and field glasses, telescopes, spectroscopes, barometers, thermometers, and well regulated timepieces set to Washington, Greenwich, and local times. Of course, we have notebooks, pads of drawing paper, cardboard, white and blackened, upon which have been laid down black disks, around which our artistic members, by rapid sketching with colored chalks, may draw the phenomena we shall see. We have candles and lanterns, the latter for use if wind arise. Of course, we have cameras and plates of various speeds and densities of coating. We have seen the beautiful photographs taken on the 22d of January, 1898, in India, by Mrs. E. W. Maunder, with a small camera having a one and a half inch lens, nine inches in focus, photographs due entirely to her own conception of what might be accomplished with such a camera, and which have proved to be of scientific value. The images were small, but from them excellent drawings have been made. We have everything in readiness. Instruments are mounted or suspended. Cameras have been focused, the most distant objects being used for the purpose. Thermometers have been placed so that we shall be able to take the temperature of the air and soil; we have been told off by our director, who has given each of us some special duty to perform, and who ought to have knowledge sufficient to tell us what to look for and to explain the various phenomena as they come under our notice. Timepieces and thermometers must be read; information as to exposing plates must be given; the moments of contact announced, and the seconds during totality called off in a loud voice. And though we are all assisting, we shall be able to see everything. Professional astronomers will not be so fortunate. They must be in constant attendance upon their instruments, and will probably work behind screens shutting them off from the world, so that their attention shall not be distracted.

From our calculations, we know when the various contacts will occur. The sun is about three hours high, and the sky clear. We are told that the edge of the lunar disk is all but touching the edge of the sun, but we cannot detect the presence of our satellite. It has been explained to us that the moon is really moving toward the east and at the rate of about half a mile per second, that the surface of the earth is carrying us toward the east at the speed of about twelve miles a minute, and that the shadow is approaching us from the west at the velocity of nearly one mile a second. During the hour and twelve minutes which must elapse between the first detected cutting by the moon into the sun's limb and totality, we shall have ample opportunity to observe and draw sun-spots and faculæ, if any, to note down our impressions, to estimate the effect the gradual extinction of the direct solar rays is having upon objects around us, and the falling of the mercury in the thermometers. As totality approaches, we should be on the alert for the shadow bands which are usually present in bewildering variety a few moments before the fact of the sun is hidden, pulsating, it is said, in a manner to suggest the throes of nature in dissolution, and as if conscious of impending disaster. Nor should we forget to notice the effects of increasing twilight upon animals, birds, insects, and flowers. On such occasions, domestic fowls go to roost, birds return to their nests, butterflies act "as if drunk," deer run about in alarm, and flowers, such as crocus, tulips, anemones, gentians, hepatica, pimpernels, wood sorrel, and wild geranium close, and a peculiar hush falls upon everything. At this moment attention must be given to the sun, or what is left of it, for we must see the splendid phenomena known as Baily's Beads, visible for an instant or two as the moon's advancing edge closes in upon the eastern edge of the sun, but visible

again when the western edge of the moon moves forward just enough to allow the solar rays to glint round at us through the valleys among the lunar mountains.

But when warned by our director, every eye must be turned to the west, for whatever else we succeed in doing, we must not fail to see the lunar shadow as it approaches. We may not live long enough to witness another eclipse under such auspices. Let us make the most of this. Forbes, who observed at Turin, the total eclipse of 1842, said that he was so confounded by the awful velocity of the shadow, which swept toward him from the Alps, that he felt as if the great building on which he was standing swayed beneath him and began to fall over in the direction of the coming gloom. The rapidity of its motion and its black intensity produced the sensation that something material was flying over the earth at a speed "perfectly frightful," and he involuntarily listened for the rushing noise of a mighty wind. Airy describes as "very awful" a shadow retreating away among the hills of Northern Spain. Other writers are no less dramatic in their accounts of these phenomena, and the tremendous impression they create. But when the shadow has come, and after we have recovered to some degree from the effects of shock, and of the sudden darkness into which we have been plunged, we must rivet our attention upon the sun, or rather upon the moon, around whose black disk by this time will have appeared the splendid phenomena associated with a total solar eclipse, seen in all its majesty. Striking indeed is the almost instantaneous substitution, as in a dissolving lantern, of one picture for another, the one showing the sky with the blackened sun like a blot upon it, the other showing the sky suddenly draped in the mantel of night, upon whose sable bosom glow planet, star, and coronal halo, and also roseate jets of incandescent gaseous matter leaping upward from and falling back upon the sun.

Now we photograph, sketch and color most assiduously, not losing a single second. We lay down the positions of planets, comets, if any, and of bright stars. The eclipse is taking place in the constellation of Taurus, between the fine red star Aldebaran and the Pleiades. We look to see whether Aldebaran is able to make its presence known by shining through the gauzy structure of the corona, and how many of the bright stars in Orion and other constellations can be detected. We glance about the horizon and note the rich color-tones, ranging from black, in the zenith, through browns, purples, crimsons, and reds, to yellow lying along the rough sky-line thirty miles away, where the sun is still shining, though with a partially hidden disk. We notice the ashy tints around us, reflected in our own faces. But a sudden glow along the western edge of the moon warns us that totality has gone like a flash, and that we have time only for a quickly exposed photographic plate or two, and for watching another lovely dissolving view, the fading out of night before the returning glow of all-conquering day. Almost instantly the landscape brightens and becomes familiar. Not until now, as we feel the warmth of the solar rays, did we suspect a passing chill. New life throbs everywhere. The black lunar shadow has swept majestically by us and is already out on the Atlantic, rushing toward Europe. Its vast track behind us is sprinkled with thousands of people, spell-bound by the wondrous vision vouchsafed them by Nature, who, for a moment, as it were, has lifted but a corner of her robe and allowed them to gaze upon glories, the impressions of which will never fade from memory.

A New Railway for Hawaii.

The construction will soon begun on a new railway on the Island of Hawaii. The contracts will be awarded in a few days and the road will be in operation very soon. It will be known as the Kohala and Hilo railway and will connect the port of Hilo, the principal city on the Island and the eastern coast, with Mahukona on the northwestern coast. According to The Railway Age it will have a total trackage, including branch lines, of 130 miles and will open to cultivation a large fertile territory originally inaccessible on account of lack of transportation facilities. The road will be operated by electricity, which will be generated by water power. Three power plants will be built each of sufficient size to furnish sufficient power to run the entire road should necessity call for it. One will be located near Hilo, another at Hakalau, which is near the center of the road and a third at Kuhuihaele, which is at the northern end of the Island. The track will be off standard gage with 60 pound rails. The company will start with one hundred 20-ton cars and 6 electrical locomotives, 2 for passenger service and 4 for freight. Three hundred employes will operate the road and the cost of construction will be about $2,500,000. It is believed that the wood will be of incalculable advantage to the planters of the Island. With the new road the time from Honolulu to Hilo will be only 13, instead of 36 to 39 hours.

The Current Supplement.

The current SUPPLEMENT, No. 1242, has a number of important papers. "The Evolution of Technical Education in Economics, Politics and Statecraft" is an address by Dr. R. H. Thurston delivered on the occasion of the anniversary meeting of the Franklin Institute at the National Export Exposition. "The Uganda Railway" is accompanied by a map. "Boats and Sails," by Walter Burnham, is one of the most interesting articles which we have ever published relating to shipping. It is an amplification of the article which is published in this issue of the SCIENTIFC AMERICAN, and is accompanied by eleven illustrations. "Electric Auxiliary Machinery in the United States Navy" is by Alton D. Adams. "The Observatory at Pulkowa" is an interesting illustrated article. "Proper Forms for Cross Sections of Moving Bodies" is an article by M. F. Mithoff. "The Progress of Science and Its Results" is the Presidential address of the British Association.

Contents.

(Illustrated articles are marked with an asterisk.)

RECENTLY PATENTED INVENTIONS.

Agricultural Implements.

SHEEP-HOOK.—PHILIP I. MOULE, Bercail, Mont. The hook is so constructed that the leg of a sheep may be readily caught thereby and held as long as desirable, it being practically impossible for the animal to free itself. The leg of the sheep is automatically locked without injury by a peculiar form of spring loop, so that the operator can release the animal when necessary.

VINE-CUTTING ATTACHMENT FOR PLOWS.—GEORGE H. NUNGEZER, Pooler, Ga. The purpose of this invention is to provide an attachment for plows especially adapted for cutting sweet-potato vines in advance of the plow in order that the vines may be readily cut and plowed under, and that the beds may be simultaneously sided or hilled and made ready for digging or plowing out. The attachment consists of a support, by the ends of which knives are carried, the support being adapted for attachment to a plow-beam.

Engineering Improvements.

METHOD OF AND APPARATUS FOR GENERATING POWER.—GUSTAF M. WESTMAN, 1144 Broadway, Manhattan, New York city. The operation of the motor involves the free expansion of the motive fluid. Free expansion is the condition of the fluid in which it can expand to the surrounding pressure without doing any work or putting other bodies in motion. In such condition the velocity of the fluid is increased; but when putting other bodies in motion, the fluid necessarily loses velocity proportionate to that acquired by the body set in motion; consequently, the fluid loses power or ability to expand; and its temperature can not sink as low as it would have done if no body had been put in motion. This may be regarded as the application of a new physical principle to engineering.

AUTOMATIC WATER-FEEDER FOR STEAM-BOILERS.—CLAUDE B. HANTHORN and ALVADORE WELCH, Astoria, Ore. This invention relates to a type of water-feeding devices employed to supply water to steam-boilers, while they are in service and also capable of use in connection with oil, gas, or fluid boilers. An efficient device of this character is provided, which is readily connected with any steam-generator and which automatically feeds water from a source of supply into the boiler by force of gravity, the apparatus being adapted for adjustment to maintain the water in the boiler at a desired height.

BOILER-FURNACE.—SAMUEL W. BUTTERFIELD, Three Rivers, Canada. The furnace is designed to burn mill refuse and coal and is arranged to insure a complete combustion of the fuel and quick generation of steam in the boiler. The boiler is provided with a fire-box under its front end and with a second fire-box located in front of the first box and having communication with the inner box over a bridge-wall. The grate of the inner box is above that of the outer box. By having two fire-boxes located one in front of the other, a complete combustion is obtained, so that the heat-units are all utilized in the generation of steam.

Mechanical Devices.

COMBINED DOOR LATCH AND LOCK.—EDWARD E. NELSON, Fillmore, Ill. The latch and lock are devoid of springs and provide means for the locking of both the latch-bolt and lock-bolt at the same time, thus affording double security. The working parts comprise a slide-bolt, a slidable locking-bolt, and a shackle-bar having two lateral projections and slidably disposed between and parallel with the bolts. The shackle-bar is adapted by adjustment to engage the lateral projections with the latch-bolt and locking-bolt, thereby securing them against retraction.

WRAPPING-MACHINE.—GEORGE L. GAY, Spokane, Wash. This invention provides a wrapping-machine for newspapers, pamphlets, circulars or the like, which is arranged to deliver the material for forming the wrappers from an endless roll, then to place the wrapper securely and firmly around the newspaper, circular or other paper to be wrapped, and at the same time to fold both the wrapper and paper, finally to cut the wrapper from the endless roll and to seal the end and deliver the paper completely wrapped ready for mailing.

Railway-Appliances.

CAR-COUPLING.—ALFRED R. HEATH, Covington, Ind. The coupling is of the hook-and-catch type, and comprises a body having a hook-member at one end and a slotted draw-bar at the opposite end. At the forward end of the slot a rock-shaft is supported, the rear side of which is engaged by a fulcrum-box. A buffer-spring in the slot has its ends respectively pressing upon the draw-bar and fulcrum-box. The great range of rocking adjustment enables two cars of different heights to be coupled together so that there will be no cramping strain on either car-coupling.

SEAT.—JOHN JAMES, Polo, Ill. This inventor has devised a simple seat which is especially adapted for the use of locomotive-firemen, which is removably applied to the locomotive-tender, and which can be compactly folded. When the seat is not to be used, its back may be thrown down over the seat, and the seat and back and connected parts so folded together that there will be but little space occupied.

MAIL-CRANE.—FRANCIS M. EDWARDS, Greigsville, N. Y. Most mail-cranes in use must be mounted at or beyond a switch or upon the outer sides of double tracks. This necessity often involves the location of the mail-crane at a considerable distance from the station. The present device can be placed upon either side of a track, between double tracks and near a station, so that it may be watched. The crane has a receiving-arm pivoted upon a horizontal pivot and provided with a locking extension at its inner end and with a bag catching and holding device at its outer end. A spring-held catch engages the locking extension of the arm, and a pivoted bag-delivering arm is adapted to be engaged by the delivering-arm in its drop. Connections to the catch are provided for releasing the receiving-arm.

CAR-REPLACER.—ISAAC H. WISE, Huntsville, Ala. The car-replacer is a device for replacing cars and wheeled vehicles upon a track. The car-replacer has a toothed rib or track and a toothed segment-disk has flanges at each side of the teeth, engaging the rack. A notch at one edge of the segment-disk is adapted to receive the car-axle. A similarly-curved segment-disk secured to the toothed segment is adapted to bear upon the base. The car-axle will be lifted as the segments roll upon the base. The angular position of the device will determine the amount of side movement given to the car. Hence the car can be raised and transferred sidewise as many times as necessary.

Miscellaneous Inventions.

FASTENER FOR BUTTONS.—ARTHUR H. LOHSE, Manhattan, New York city. Connected with a button having eyes is a plate through which and through the eyes a rivet passes. A pin extends through another eye of the button and through the plate. The pin and rivet serve to hold the button and plate together. A tongue on the plate is adapted to be turned against the pin. A button once fastened cannot very readily be loosened or torn off.

SURVEYOR'S COMPASS.—RUDOLPH J. GOEPPINGER, St. Francis, Ark. The compass comprises a casing having a graduation over which a needle plays. A retaining device or stop projects into the path of the needle and is movably mounted on the casing, so that it may be brought into registry with different points of the graduation. The vibrations and oscillations of the needle are hence confined, and the needle comes to rest in a comparatively short time, thereby enabling the surveyor to run lines quickly.

IRONING-BOARD.—WILLIAM HARGROVE and JAMES J. WYLDE, Montreal, Canada. This invention provides a simple and ingenious ironing-board which can be readily attached to a table and which can be folded into a small space when not in use. The board is provided with a head, which is placed on top of the table, and with bearings in which a leg is fulcrumed, resting with its free end upon the floor. A clamping extension on the leg engages the under side of the table-top to hold the board. The board is held in extended position by a brace on the leg, which brace engages one of a number of teeth on the under surface of the board.

BUTTONHOLE-MOISTENER.—DANIEL F. BAGLEY, Brooklyn, New York city. This device for moistening the buttonholes of collars, cuffs, shirts, and the like, consists of pivotally connected handles, to one end of each of which a jaw is pivoted. The jaws contain absorbent pads for the water. By applying the jaws to opposite sides of a buttonhole, the starch is extracted and the buttonhole portion rendered pliable, while the adjacent portions still retain their stiffness.

PROCESS OF MAKING SOLUBLE ALKALINE SILICATES.—FRITZ HENKEL, Düsseldorf, Germany. The inventor has discovered that, by intimately mixing solid silicic alkalies or alkaline silicates with a little water, in the proportion of six to one, and strongly heating the mixture, or by mixing the solid silicic alkali or alkaline silicate with a hot, concentrated solution of the silicate, a substance is obtained which cakes to form a solid mass which can be pulverized and is easily soluble in cold water.

PROCESS OF DECOLORIZING VEGETABLE JUICES.—JOHANNES C. BOOT, Klatten, Java. The object of the invention is to render the iron salts of decolorized sirups and juices innocuous, so that a permanent decolorization is obtained. To this end the inventor heats the juices (concentrated below 50° Brix) to about 50° C.; and, under constant stirring, sulphurous acid alone or zinc and sulphurous acid are added. So far the process is that usually employed. The liquid is then heated to 80° C. and a soluble ferrocyanid is added until the iron (or iron and zinc) is precipitated. The liquor is then filtered or decanted.

HOSE-CLAMPING DEVICE.—ALBERT M. BURGHER, Clay City, Ky. This device for attaching clamps to hose consists of opposing jaws arranged to receive the clamp and provided with handles. A device is provided for adjusting the jaws; and a fulcrum is furnished for the handles. A bearing-block is carried by the movable fulcrum and is arranged for engagement with the clamp to be secured. The device is adjustable to hose-clamps of different diameters.

PNEUMATICAL APPARATUS FOR APPLYING TOOLS TO SURFACES OF ANY SOLID BODIES.—LOUIS J. MOISSENET, Cherbourg, France. The apparatus applies or affixes tools to the surface of any solid body and employs a vacuum created by one or more suckers of proper size placed on the surface and in the interior of which a more or less complete vacuum is produced, so as to establish on the surface of the body fastening-points which permit any machine-tool to be fixed in place, such as a drill, mortising machine, and the like. The suckers serve firmly to fix a brush or stay on the surface to be operated upon; and the tool is fitted to the bench, which serves as its fixed point of support during the work.

PRESS.—GEORGE F. CROSS, San Antonio, Tex. This improved press for holding down sauerkraut, pickles, and the like, in barrels or tubs, comprises a presser or follower-plate on which a guideway is vertically mounted. A presser-foot slides in the guideway; and on the presser-foot arms are mounted on horizontal axes. The arms extend over and engage the follower or presser plate to rock thereon, and serve to hold the follower or presser plate in position.

CALCINING-FURNACE.—CHARLES M. ALLEN, Basin, Mont. The furnace has a number of hearths located one above the other, the uppermost hearth being shorter than the hearth beneath it, leaving one end of the roof of the lower hearth exposed to form a drying-floor leading to the entrance of the upper hearth. The drying-floor is capable of freely taking up the high heat the lower hearth and of imparting that heat to the material discharged upon the drying-floor to expel the moisture from the material during its travel over the floor and before its entrance into the upper hearth. Inlets are provided for the products of combustion to the hearths at the extreme ends; and an outlet for the products of combustion at the discharge end of the lowermost hearth. Very little sulfuric acid being generated, it follows that the life of the hearth is greatly lengthened.

SACK-HOLDER.—FRANK H. GILBERT, Ridgefield, Wash. The sack-holder comprises a hopper with straps secured to the outer sides of its rear wall and terminating in hooks at the upper end. A bracket is attached to the rear wall, and a locking and releasing bar is mounted to rock in a channel formed in the rear wall and is held in place by the straps. Holding-bars are mounted to rock on the opposite side walls of the hopper. Lugs extend inward from the holding-bars and are adapted to be engaged by the locking and releasing bar. A spring moves the locking and releasing bar to its normal position. The sack-holder can be easily attached to a bin or other support.

METHOD OF PRESERVING AND TAWING SKINS.—URY DE GÜNZBURG, Boulevard Lamouroux 52, Vitry-sur-Seine, (Seine), France. In the method to which the present invention relates, the cohesion of the fibers of the hide or skin is destroyed, and putrefaction is prevented without the help or the formation during the operation of any crystallizable salt, which would have the effect of diminishing the strength of the skin. Consequently, skins thus treated contain no crystallizable salts, remain perfectly flexible, and lose none of the strength they possessed before being treated. Water, be it cold or hot, has no effect whatever on a skin thus prepared.

PIPE-COUPLING.—WILLIAM J. HENNING, Key West, Fla. The coupling comprises two sleeves respectively adapted to embrace pipe-sections. The first of these sleeves has interior threads to engage one of the pipe-sections. A collar embraces both sleeves and serves to draw them together. A gland-like collar threaded on the second sleeve is adapted to carry a packing whereby the second sleeve is hermetically connected with the adjacent pipe-section. The pipes can