ing power of gases, have led to the following results: The heat conduction of air being considered = 1, that of cotton is (on an average) = 37, sheep's wool = 12, and silk = 11; the cotton and the wool were unwrought. The latter was washed merino wool; the silk was in the state of cocoon fibers.

THE TOTAL ECLIPSE OF THE SUN.

Extensive preparations are being made by the officers in charge of the National Observatory to observe the next total eclipse of the sun, which will take place on the 29th of this month. Congress having voted $8,000 to pay the expenses, the work will not be crippled for lack of funds, and five expeditions have been organized by Admiral Rodgers. The following gives the members of the different parties and their proximate points of observation:

Professor S. Newcomb, Commander W. T. Sampson, Lieut. C. G. Bowman, and John Meier will locate at Creston, Wyoming. This party will photograph with one of the photo-heliographs used in photographing the transit of Venus in December, 1874. They will also observe contacts and look for intra-mercurial planets.

The following party will be stationed at Pueblo, Colorado: Professor A. Hall, Professor J. A. Rogers, Professor A. W. Wright, Mr. H. F. Gardner, and Mr. A. B. Wheeler. They will take photographs of the eclipse, corona, and all around it that can be gotten on a plate; make polariscopic observations of the light of the corona; observe time of contacts, and make a search for intra-mercurial planets.

The next party locates at Creston, Wyoming, and is made up as follows: Professor Wm. Harkness, Lieut. E. W. Sturdy, Assistant Astronomer A. M. Skinner, Messrs. L. E. Walker, A. G. Clark, and Professor O. H. Robinson. This party has the same instructions as Professor Hall's, except that instead of polariscopic observations they will take spectroscopic and thermo-electric observations.

At Pueblo, Colorado, there will also be stationed Professor J. R. Eastman, Professor Lewis Boss, Assistant Astronomer H. M. Paul, and Mr. H. S. Pritchett. This party will take polariscopic observations, observe contacts, search for planets, and make drawings of the corona.

The following party will be at Central City, Colorado: Professor E. S. Holden, Lieut. T. W. Very, and Dr. C. S. Hastings. They will go into the mountains southwest of Denver, search for planets, and investigate structure of corona.

In addition to these main expeditions, Mr. L. Trouvelot, of Cambridge, Mass., a most skillful artist, accompanied by his son, will go to Rawlings, Wyoming, to make a drawing of the corona.

Mr. G. W. Hill, of the Nautical Almanac Office, will be stationed on one of the mountains in Colorado to make drawings of the corona.

Prof. Ormond Stone, of Cincinnati, and Mr. Winslow Upton, of Cambridge, will observe the eclipse from the lofty peaks of Colorado.

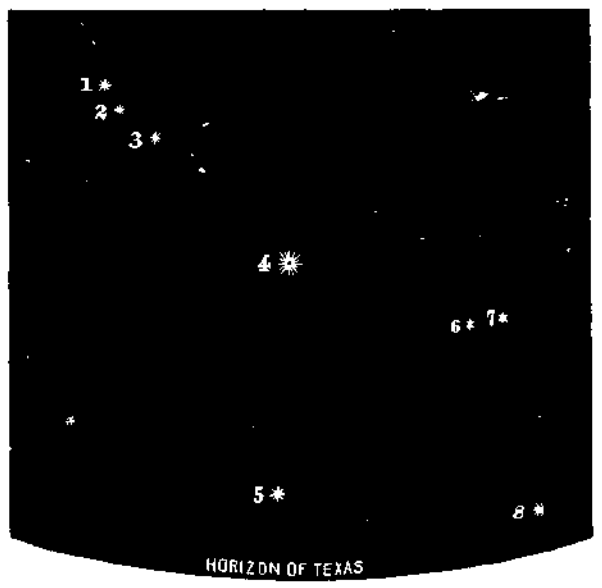
General Myers and Professor Able, of the Signal Office, and Professor Langley, of Pittsburg, will go to Pike's Peak. They will be obliged to take their instruments apart and carry them by hand to an elevation exceeding 14,000 feet.

Mr. D. P. Todd will go to Texas and make arrangements for observing duration of totality near the limits of total eclipse.

Many distinguished English astronomers, and M. Jansen, the famous astronomer from Paris, are coming over to observe the eclipse.

Much interest is attached to the eclipse by our scientists, who look upon it as the means of determining many vexed questions. First, and perhaps the most important, as it is of practical value to all navigators, is the corrections that will be obtained to the present solar and lunar tables. Notwithstanding the remarkable accuracy already obtained, it is to be observed that the location of the central line of the eclipse as calculated by the American Nautical Almanac differs by about four miles from that derived from the English Nautical Almanac.

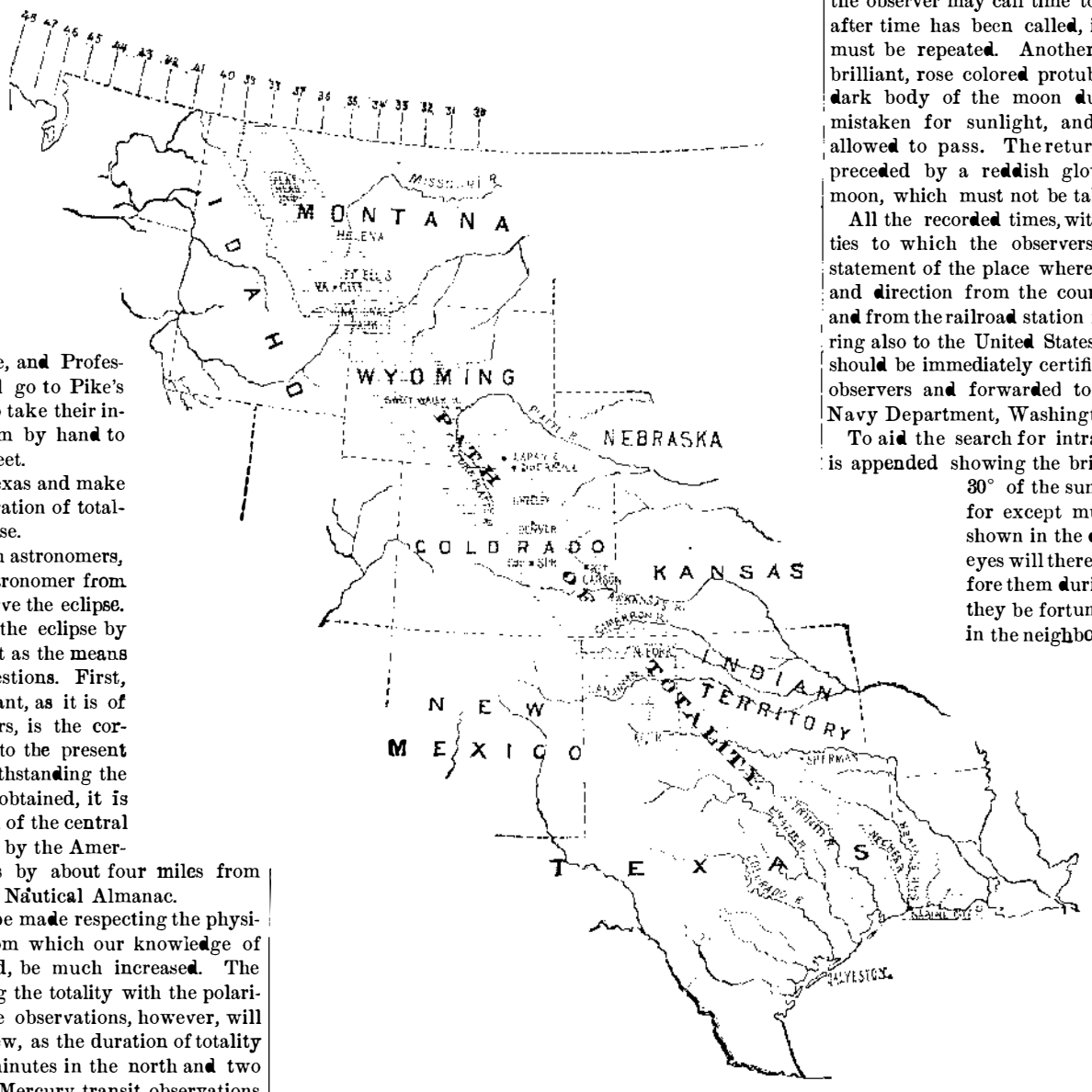
Important observations will be made respecting the physical constitution of the sun, from which our knowledge of that luminary will, it is hoped, be much increased. The corona is to be examined during the totality with the polariscope and spectroscope. These observations, however, will necessarily be comparatively few, as the duration of totality will not be more than three minutes in the north and two and a half in the south. The Mercury transit observations of last May, as far as they have been worked up, appear to demonstrate the fact that the tables of that planet were incorrect, as Le Verrier had said, and as it is thought possible that he might be correct in his supposition of an intra-mercurial planet, advantage of the sun's observation will be taken to examine the heavens in the neighborhood of the sun, for one or more small bodies supposed to belong to our system of planets. In addition to the telescopic scrutiny, large photographs of the heavens will be taken, in order to allow the small planets, if any there be, to print themselves upon the photographic plate and thus announce to the world the fact of their existence and their influence upon the motions of Mercury. Should any of our astronomers be so fortunate as to discover any such body, his name will be heralded throughout the scientific world as ranking with Le Verrier, the discoverer of Neptune, and Hall, the discoverer of the satellites of Mars.



Situation of the Brighter Stars and Planets which may be seen during the Total Eclipse of July 29, 1878.—1. Mercury. 2. Regulus. 3. Mars. 4. The eclipsed sun. 5. Procyon (probably invisible in Texas). 6. Pollux. 7. Castor. 8. Venus (probably invisible in Texas). The sun, and the stars on the left hand side of the map, will be about an hour higher above the horizon in Wyoming than in Texas.

As such a favorable chance for the observation of the various phenomena attending upon a total eclipse can seldom be obtained, Admiral Rodgers and the authorities of the National Observatory wish to make the most of it, and have therefore issued a pamphlet requesting amateur astronomers and others that may be conveniently located to take such observations as may be in their power and forward the results obtained to the Observatory. From this we have condensed the following:

This eclipse may be regarded as a return of that of July 18, 1860. The dark shadow of the moon will first strike the earth in Siberia, and crossing Behring Strait will strike the United States at the line separating Idaho from Montana Territory, will sweep over the western end of the latter, the Yellowstone National Park, diagonally through the center of Wyoming and Colorado, through the Indian Territory, and Northern and Eastern Texas, leaving the United States where Louisiana and Texas join, as illustrated in the accompanying map—the two lines there shown indicating the extreme limits of totality, which will be about 116 miles wide. After leaving the United States the eclipse will pass over most of Cuba and Southern San Domingo. The eclipse will be visible, as a partial one, all over North America.



THE TOTAL ECLIPSE OF THE SUN, JULY 29, 1878.

As previously stated, there is about four miles' difference in the path of the shadow as computed by the American and British Almanacs respectively. Inhabitants of towns near the edge of the shadow may furnish observations by which these limits may be accurately determined by simply noting how many seconds the sun is wholly obscured by the moon. These observations may be most conveniently made by a party of three persons, one being furnished with a watch having a second hand, another with a common spyglass and a piece of smoked glass, and a third with a pencil and note book, to record the time. A station should be selected where the party will be free from all interruption, either in the open air or at an open window. The spyglass should be lashed fast to some fixed object in such a position as to give an easy view of the sun, and some portion of the smoked glass should be very lightly discolored. The watch should have its minute hand carefully set to be on the minute mark when the second hand is on the 60s. It may also be advisable to cover the object glass of the spyglass with a cap having a hole three fourths of an inch in diameter cut in its center to lessen the brilliancy of the sun.

In making the observation, the holder of the watch should, as soon as the visible part of the sun is reduced to its narrowest crescent, begin counting the seconds aloud; the holder of the smoked glass (with or without the spyglass) will watch for the last ray of true sunlight, being careful to look through the brightest part of the glass that the eye will bear without inconvenience; and the third observer will look for the disappearance of the sunlight with the naked eye, and stand ready with pencil and paper to record the time. When the last ray of the sun has disappeared the observer with the glass will call time, and the exact minute and second must then be immediately recorded. The observers will then wait the return of sunlight, which will seem to burst out suddenly, and the minute and second of its appearance must be noted down with the same care as the time of disappearance. The difference of the two times gives the duration of totality.

In judging the beginning of totality there is danger of error if the smoked glass is very dark, because the sun's crescent may become so narrow as to be invisible through the glass several seconds before it is really all covered, and thus the observer may call time too soon. If darkness increases after time has been called, it was called too soon, and it must be repeated. Another danger is that the light of the brilliant, rose colored protuberances which surround the dark body of the moon during the total eclipse may be mistaken for sunlight, and thus the critical moment be allowed to pass. The return of the sunlight will also be preceded by a reddish glow on the border of the dark moon, which must not be taken for the sun.

All the recorded times, with an estimate of the uncertainties to which the observers think they were liable, and a statement of the place where made, giving distance in miles and direction from the courthouse if it be a county town, and from the railroad station if a railroad pass through, referring also to the United States land surveys if there are any, should be immediately certified by the signatures of all three observers and forwarded to the Nautical Almanac Office, Navy Department, Washington, D. C.

To aid the search for intra-mercurial planets, a diagram is appended showing the brightest planets and stars within 30° of the sun. No objects need be looked for except much nearer the sun than those shown in the diagram. Observers with keen eyes will therefore do well to have this map before them during the total eclipse, and should they be fortunate enough to see any objects in the neighborhood of the sun, indicate it by pricking with a pin or pencil the exact spot where such objects appear relatively to those shown on the map. As there may be some difficulty in identifyiug the various objects, the map should be studied with the aid of the following items: Venus will be in the west about an hour and a half high in Colorado and Wyoming, and only about half an hour in Texas. Procyon will be a little lower than Venus, and further south may not be seen at all. Mercury, Mars, and Regulus will be from an hour and a half to two hours west of the meridian in Colorado and Wyoming, and two hours and a half west in Texas. In the former region they will be southwest from the zenith, and in the latter nearly west, being about one fourth or one third of the way from the zenith to the horizon in each place. Of the three, Mercury will be much the brightest, and may possibly be the only one visible.

Should a spectator observe any object nearer the sun than

these. he should, before making it on the map, make a careful estimate of its direction and distance relative to them, the distance being estimated as a fraction of that to Pollux or to Mercury, or to the zenith or horizon. All maps thus marked should be sent to the National Observatory at Washington.

Drawings of the corona surrounding the moon during the total eclipse made by such as are expert in sketching will be useful, if made as exact as possible. In doing this it will be necessary to distinguish between the real object and the rays surrounding it, which are the result of an optical illusion. It may be well to have a smoked or colored glass through which to study the object but it should not be too dark, or the details may be hidden.

NEW IRON FENCE.

Our engraving represents a new form of iron fence invented by Freeman R. Martin, of Brooklyn, Greene Co., Wis

The inventor states that the fence is not liable to injury by wind or frost, or by expansion or contraction by changes of temperature.

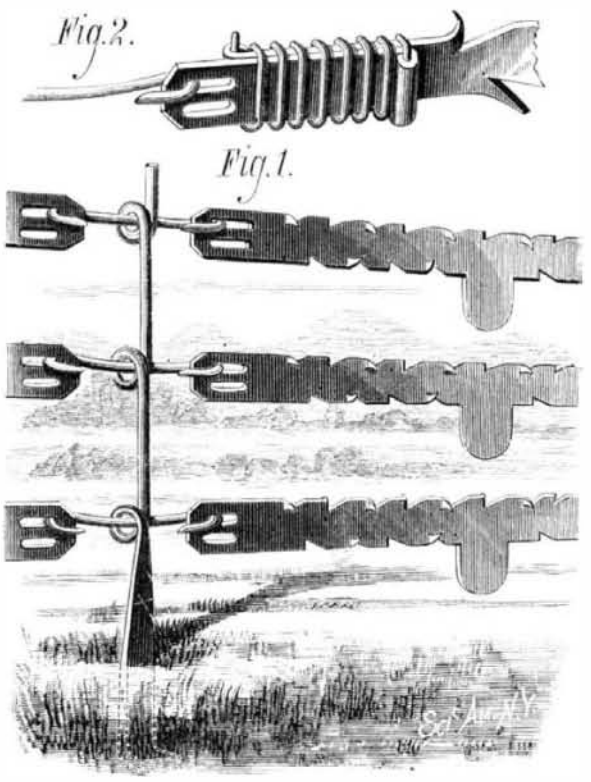
The posts are made from a bar of round iron, in which are formed three eyes for receiving the hooks that connect the barbed strips, and its lower end is flattened and bent at a right angle to give it a good bearing in the ground, and to prevent it from being raised by frost.

The fence strip is made of thin iron having diagonal slits cut in opposite edges, and the points thus made are bent alternately in opposite directions to form barbs. The double hooks which support the strips pass through the eyes in the posts, and are received in slots near the upper edges of the strips.

This arrangement, in connection with the wings that project from the lower edges of the strips, insures the turning of the strips under a heavy wind, so that the edges only are subjected to pressure.

At suitable distances the strips are provided with expansion joints, shown in Fig. 2, in which the spring keeps the strip taut when it is expanded, and permits of contraction without injury.

This invention was patented through the Scientific American Patent Agency, May 28, 1878.



MARTIN'S NEW IRON FENCE.

M. FAYE has lately suggested a new mode of determining a ship's route at sea. namely, by means of the log. With the sextant the angle is taken which the cord of the log makes with the direction of the sun or a star, and thus the ship's direction is determined.

THE ADJUTANT.

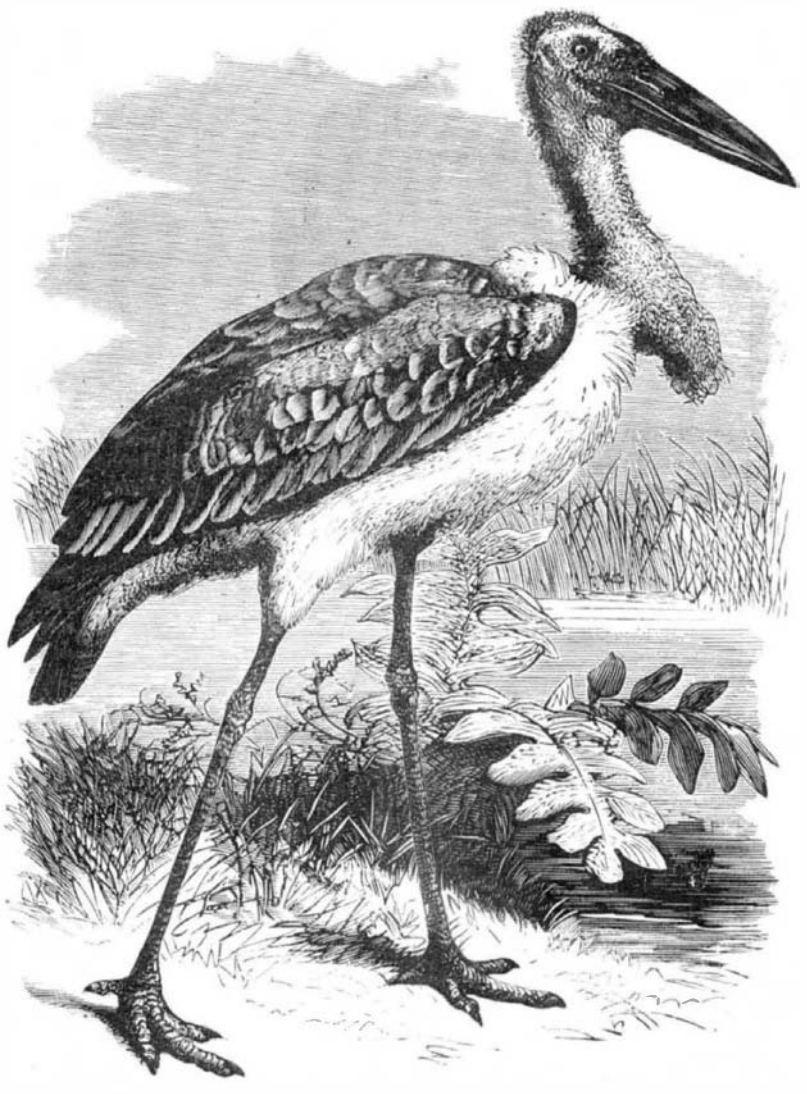
This fine bird is notable for the enormous size of the beak, which is capable of seizing and swallowing objects of considerable size—a full-grown cat, a fowl, or a leg of mutton being ingulfed without any apparent difficulty.

The adjutant is a most useful bird in the countries which it inhabits, and it is protected with the utmost care, as it thoroughly cleans the streets of offal which would be left to putrefy but for the constant services of the adjutant and creatures of similar habits.

The attitudes assumed by the adjutant are varied and grotesque. It has a curious habit of airing itself on a hot day by standing with its huge beak drooping toward the ground and its wings stuck out straight from the body. Sometimes it squats on the ground with its legs tucked under its body, and sits with an air of dignity. Sometimes it stalks menacingly along, with its neck stretched to the utmost, its head thrust forward, and its huge bill open, looking a most formidable creature; but it is a cowardly bird, as it will run away from a child if boldly faced. It will, however, attack snakes, knocking them over before they can strike, and after battering them to death swallows them whole. During inundations the adjutant follows the course of the rising waters, and makes prey of the reptiles that are driven from their holes.

The capacity of the adjutant's stomach is enormous. It has the power of dissolving the soft and digestible parts and ejecting the indigestible, such as shells and bones. It is easily tamed, but is an incorrigible thief.

The exquisitely fine flowing plumes, the "marabou feathers," are obtained from the adjutant and a kindred species, the marabou of Africa. The general color of the adjutant is a delicate ashen gray above, and white beneath. The great head and proportionately large neck are almost bare of covering, having only a scanty supply of down instead of feathers. From the lower part of the neck hangs a kind of dewlap, which can be inflated at the will of the bird, but it generally hangs loose and flabby. We take our illustration from Wood's "Natural History."



THE ADJUTANT.

New Inventions.

J. Henry Potter, of East Bridgewater, Mass., has perfected and patented an improved Tremolo, for pipe or reed organs, which consists in a rotary valve placed in a chest connected with the main wind trunk and driven by a wind wheel placed outside of the chest, and supplied with wind from the trunk. It has a regulating valve for controlling the amount of wind supplied to the wind wheel, and a novel device whereby the effect of the tremolo may be delicately shaded so as to produce, with waves of the same length, a slight waver in tone, or the fullest and strongest effect, according to the requirements of the music to be rendered. Any desired effect may be had, varying from the fullest effect of the tremolo to the faintest perceptible undulation, which finally disappears in the plain tone of the pipe or pipes. The tremolo stop may be drawn without affecting the tone of the organ, or the stop may be left in, when the tremolo pedal may be moved without producing the tremolo effect. By this arrangement the swell and tremolo may be operated by the same pedal, and the swell effect will be produced in the tremolo as well as in the general tone of the organ.

Daniel James MacLean, of Reading, Pa., has devised an improved Toy Bank, by which coins of any denomination or size may be deposited by means of a swinging figure, to the great amusement of children. A larger interior space is furnished than is generally the case in toy banks with figures.

An improved Metallic Horse Collar has been patented by Jesse C. Smith, of Centerville, Iowa. It is made of sheet zinc, pressed into shape, and strengthened with malleable iron stays, so formed as to also serve as a seat for the hames.

Ira Parke, of Mineral Point, Mo., has patented an improved Hive for Bees, which enables bees to be managed by inexperienced persons, and will enable the bee raiser to have his bees swarm or not. It will lessen the labor of the bees in removing refuse; it will admit of removing the best honey, and will resist wind. rain, and cold.

Edward G. Kearsing and Leonzo Kearsing, of Spring Valley, N. Y., have patented an improvement in Dental Gold Fillings. The gold is so prepared that it may be used in heavier masses than is practicable with gold prepared in the ordinary way, thus saving time and labor to the operator by shortening the tedious operation of filling teeth.

Cyrus M. Townsend, of Standing Rock, Dakota Ter., has recently patented an economical Device for Protecting those Surfaces of Leather Gloves, such as are used in husking corn or in any other kind of work, which are most exposed to wear, thereby rendering such gloves more durable than they would be without such protection.

An improved Condensing Vessel has been patented by Edward D. Bangs, of Galesburg, Ill. This invention relates to an improved condensing vessel or apparatus for extracting the entire strength from tea or coffee, and preserving also the aroma and flavor of the same, and for steeping, boiling, or cooking any substances whatever.

An improved Stove, for camp and other uses, that may be reduced to small and compact size for transportation, and readily put up for use, so as to be especially adapted for exploration parties and camp purposes, has been patented by Louis P. Vollbrecht, of Mason, Texas.

Charles Barlow, of Cookshire, Quebec, Canada, is the inventor of an improved Wash Bench, for supporting a wash tub and wringer. It is so constructed that it may be adjusted at different heights, and may be folded into compact form for convenience in storage and transportation.

An improved Stove Shelf has recently been patented by Geo. W. Robertson, of Peekskill, N. Y. It is designed to improve and render more convenient the ordinary cooking stove, and it consists in a novel device for attaching a shelf to the end of the stove.

Orson Colvin, of Schoolcraft, Mich., has patented an improvement in Beehives, which relates particularly to the form of the brood chamber and the comb guides or peak blocks secured at the top of said chamber. The lower portion of this improved hive contains the brood chamber, which has arc-shaped or concave sides. Having observed that bees tend to build their brood comb in an oval form, the inventor conceived the idea that a hive having concave sides or sides converging gradually toward the top, and having comb guides arranged at the top of the brood chamber, so as to connect the concave sides and span the space between them, would conform more to the instincts or natural tendencies of the bee, and result in an increased production of surplus honey. He states that upon practical test he found the theory correct, and the yield of surplus honey even greater than was anticipated.

Richard W. Riddle, of Minneapolis, Minn., has patented an improved Earth Closet, which consists in an endless apron carried by a movable frame, which is connected with the seat cover, so that it is moved forward when the cover is closed down, and is moved backward when the cover is raised. It has an arrangement of dogs or cams for clamping the apron and causing it to rotate when moved out or in, thus making two deposits of earth in the excrement receptacle as the seat cover is opened and closed.

An improved Bracelet Fastening has been patented by Leon Van Praag, of New York city, which consists of an elliptical band formed of a strip of spring metal, which may be of any desirable shape or configuration. To one of the ends of the strip of which the bracelet is formed, a concave plate is soldered, so that one half of it projects over the end of the strip. In the projecting portion of the concave plate, near its edge, there is a hole for receiving a hook that projects from the bracelet strip near its plain end. The bracelet is fastened by slipping the plain end under the concave plate, and inserting the hook in the hole. The bracelet may be easily fastened and unfastened by one hand.

An improved Grain Drier has been patented by Peter Provost, of Minneapolis, Minn. This invention relates to apparatus for dry-