out of the vehicle. The check strap is extended beneath a gripping cam on the saddle and is made to act on a rearwardly projecting arm to release the cam by being lifted or moved upwardly. To check up the horse again it is only necessary to pull back on the strap.

KNEE PROTECTOR.—Thomas B. Walker, Honolulu, Hawaii. For the use of cavalrymen and others to protect the rider against rain, snow, etc., this inventor has devised a new article of manufacture to be made of leather, rubber or waterproof cloth. It comprises both a knee and thigh protector, arranged for ready connection with each other and with the trousers legs or boots or leggins. The knee protector is of somewhat triangular shape, with side flaps at the lower corners and rounded at the top to conform to and bend over the knee.

STRING FASTENER.—Charles C. Pine, New York City. For fastening shoes, corsets and other articles to be laced, this inventor provides a device for holding the string end without tying the string or using springs, jaws, etc., the fastener being more especially designed for use with flat strings. A body piece adapted to be fastened to the shoe or corset has a narrow slit for the passage of the string, the slot being arranged in alignment with the back pull of the string, and the latter passes over the body piece and twists on entering the slot. Only the string end has to be passed through the slot to fasten the string in place.

PAPER DOLL. — Edward T. Gibson, Minneapolis, Minn. This invention relates to dolls in which changes of costume can be made by the adjustment of paper garments, the doll being destitute of arms and shoulders, and preferably destitute of head and neck. By means of a locking key the assembled parts of the doll are so firmly held together that the doll may be tossed about without disarranging the parts, and an extension of the key serves to support the doll in nearly upright position.

GAME APPARATUS. — Joseph Jessup, Woodbury, N. J. A game to be played in simulation of the game of football is provided by this patent, a foldable board being used, marked off as a football field, while a movable block has the position of the opposing teams indicated thereon, a series of dies indicating the different players, character of play and distances on the field. It is designed that those who have played this game will better appreciate all the points of a good game on the field.

DESIGN FOR WRENCH HEAD.—Walter T. Johnston, Macon, Ga. This head has a rounding and transversely serrated top surface, one projecting end presenting a bifurcation and the opposite projecting end being concaved at the under side.

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References to former articles or answers should give date of paper and page or number of question.

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(6598) T. D. B. asks: 1. Will you please tell me the name of inclosed leaves and greatly oblige several parties? A. Charles W. Dabney, Jr., of the Department of Agriculture, informs us that the leaf which you inclose is that of the common poison ivy, Rhus radicans. 2. Please give formula and an example of increase of candle power due to increase of amperes in an incandescent lamp. A. An increase in the amperes will increase the light of an incandescent lamp because both heat and light are determined by the power used by the lamp. Electrical power is measured in watts, which are calculated by multiplying the amperes by the volts. W=CE. (1) A 16 candle power lamp should use about 60 watts, when the pressure is 115 volts. From formula (1) we obtain (2) $C=\frac{W}{E}$ hence $C=\frac{60}{115}=0.52$ ampere. If in formula (1) C is made larger, the product CE becomes larger; that is, more power in watts is used and more light is given. This answers the question as asked, but the result cannot be gained in this way. With a given lamp and generator capable of lighting it, no variation in the amperes can be made. Ohm's law is $C=\frac{E}{R}$ amperes $=\frac{\text{volts}}{\text{ohms}}$. Dynamos for incandescent lighting usually have a constant voltage, and the resistance of the lamp may be said to be constant. The voltage of the dynamo only varies as its speed may change, and the resistance of the lamp only changes by decreasing as the filament grows hotter, or increasing as the lamp wears out; so that there is ordinarily a uniform amperage passing in a lamp. To increase the light given by an incandescent lamp, the voltage of the current must be increased. This should not be done, because it will wear the lamp out too fast. A comparatively small increase of pressure will reduce the life of the lamp by a half. The only other way to increase the light is to make a lamp with a lower resistance, that is, with a shorter or larger filament. This is the method actually employed.

(6599) P. W. says: Please tell me through your paper: 1. What is celluloid composed of? A. Celluloid is a hard elastic compound made by subjecting gun cotton, camphor and other ingredients to hydraulic pressure. See our SUPPLEMENT, No. 227. 2. Some simple way of pressing flowers, especially double flowers, so as to preserve their shape and color. A. A method of preserving the natural colors of flowers, recommended by R. Hegler in the Deutsche Botanische Monatshefte, consists in dusting salicylic acid on the plants as they lie in the press, and removing it again with a brush when the flowers are dry. Red colors in particular are well preserved by this agent. Another method of applying the same preservative is to use a solution of 1 part of salicylic acid in 14 of alcohol by means of blotting paper or cotton wool soaked in it and placed above and below the flowers. Powdered boracic acid yields nearly as good results. Dr. Schonland, in the Gardeners' Chronicle, recommends, as an improvement in the method of using sulphurous acid for preserving the color, that in the case of delicate flowers they might be placed loosely between sheets of vegetable parchment before immersion in the liquid, so as to preserve their natural form.

(6600) J. D. writes: I am figuring on a refrigerating plant, to be operated by the use of compressed air, and would be glad if you will state how many cubic feet of air, atmospheric pressure, at a temperature of 20°, would be required to cool say one gallon of water to a temperature of 34°, the water being in a coil of pipe placed in a receiver into which the compressed air is expanded to ½ pound above atmospheric pressure. Please advise how many units of heat are contained in one gallon of water at 70°, also at 34°; also how many units of heat in one cubic foot atmospheric air at 90° and at 20°. A. The difference of 70°—34°=36°×8⅓ pounds of water per gallon equals 300 heat units. The specific heat of air for equal weights with water is but 0·237, and as 13 cubic feet of air at 60° equals one pound, then 90°—20° $=\frac{70°}{13c'}=5·39\times0·237=1·277$ heat units per cubic foot from 90° to 20°. As the mean difference of the water above the air temperatures at its lowest point is 32°, then $\frac{32°}{13c'}=2·46\times0·237=0·583$ heat unit for each cubic foot of air expended in cooling, and as 300 heat units are required, then $\frac{300}{0·583}=514$ cubic feet of free air at 20° to cool one gallon of water from 70° to 34°. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 999, on "Cooling by Compressed Air."

(6601) P. B. V. says: Please give me through Notes and Queries a formula for a black hair dye. A. 1. Black:

Sulphate of iron	10 grn.
Glycerine	1 oz.
Water	1 pt.

The hair must be thoroughly washed with this, dried and brushed once daily for three days; then the following should be applied on a small tooth comb, but it should not be allowed to touch the skin if the other preparation has done so, as a temporary stain would result. Or 2,

Gallic acid	4 grn.
Tannic acid	4 "
Water	1½ oz.

After the first application of formula 1. the hair should be allowed to dry and then be brushed. Subsequently, both formulæ may be used once daily at an interval of an hour or so, until a black color is produced. All preparations of lead and mercury are injurious if used for any length of time: they may, however, be legitimately used where some small portion of hair has, from personal idiosyncrasy, lost its color, which cannot be restored.

(6602) F. and M. say: Have you receipt for working over and restoring rancid butter to fresh, sweet flavor? A. To Convert Rancid Butter.—1. 100 pounds of butter is mixed with about 30 gallons of hot water, containing ½ pound of bicarbonate of soda and 15 pounds of fine granular animal charcoal free from dust, and the mixture is churned together for half an hour or so. The butter is then separated; after standing, warmed and strained through a linen cloth, then resalted, colored and worked up with one-half its weight of fresh butter. 2. To Sweeten Rancid Butter.—Rancid butter may be restored, or at all events greatly improved, by melting it with some freshly burnt and coarsely powdered animal charcoal (which has been thoroughly freed from dust by sifting) in a water bath, and then straining it through clean flannel. A better and less tronblesome method is to well wash the butter with some good new milk, and next with cold spring water. Butyric acid, on the presence of which rancidity depends, is freely soluble in fresh milk.

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AND EACH BEARING THAT DATE.

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