

point of view. The present pneumatic tire was clumsy when it first appeared; now the absence of it would be clumsy. Ball bearings to be generally successful must be practical, and to be practical all sentimental regard for appearances must be cast to the winds and such a bearing devised as will best fulfill all the demands that may be placed upon it.

TYPICAL PERPETUAL MOTION FRAUD.

By the courtesy of a correspondent in Bradford, Pennsylvania, we are enabled to present illustrations of one of the neatest perpetual motion frauds that ever drew money from a credulous public or gained for its author a well earned seclusion within the walls of a State prison. Some two years ago, one J. M. Aldrich exhibited to certain citizens of Bradford "a machine which he called a motor," and on the strength of its unique performances secured several not inconsiderable sums of money from the favored few who were permitted as "parties of the second part" to secure an interest in the invention. Subsequent irregularities in the conduct of the "party of the first part" in these transactions, and a too liberal discrepancy between the promise and performance of the "motor," led to the arrest of Mr. Aldrich and his detention for three or four months in the county jail. Unfortunately for the general public, the Bradford victims feared that they did not have sufficient evidence to secure a conviction, and he was released. "Motor" promotion must have proved a lucrative calling, for, notwithstanding his peep through the open doors of the penitentiary, Aldrich cast his net for fresh victims, and for two years continued, no doubt, to prosper after the manner of his kind. Last March, however, one of his many "half interest" holders secured the model and sent it to the Patent Office, where the perpetual motion was traced to its time-honored source—a concealed spring.

We can conceive it is quite possible that the builder of this "perpetual motion machine" did not set out with any deliberate intention to deceive the public. Like many another, before and since, he was doubtless attracted by this will o' the wisp of the inventor, and started with the honest intention and expectation of building a machine which would run without the assistance of any external agency. The type of motor aimed at was one in which the force of gravity should supply the motive power, and it took the form of a rotating shaft, two transverse arms placed at right angles to each other, and jointed levers which should always present an excess of turning moment on one side of the shaft. As will be seen from our engravings of the machine, disk-shaped weights are carried at the outer ends of two transverse arms which are themselves carried at opposite ends of the main shaft. The weights are adjusted at the ends of swinging arms which are capable of motion through an arc of 90°. The direction of rotation (see smaller engraving) is the same as that of the hands of a clock, and the weighted levers are so attached to the transverse arms that in the downward half of each revolution they fall outward and forward, thus lengthening the radius on which they travel relatively to the center of the main shaft. On the upward half of the revolution, the weighted levers close up and the weights themselves describe an arc of rotation with a smaller radius relative to the shaft. To assist in giving a preponderance of turning moment on the downward half of the revolution, the transverse arms are split in the center and are capable of sliding bodily across the main shaft, as will be clearly seen from the cut. As each transverse arm with its jointed lever and weight rises a little past the horizontal it slides forward and downward, thus throwing the weight on the opposite end of the arm still further from the center and increasing the turning moment on that side, at the same time decreasing the moment on the upward half of the revolution. The transverse arms are kept in place by means of small rocking levers which extend from steadying arms attached to the shaft.

To provide against too rapid motion of the machine and a too prodigal display of its powers, a centrifugal governor is provided near one of the vertical posts which carry the main shaft, and its superabundant energy may also be controlled by a small brake which acts on a flywheel attached to the center of the shaft and is held against the wheel by means of a rubber band.

Now we have no doubt whatever that Mr. Aldrich believed that his extensible arms with the weights flung far out on one side of the shaft and drawn snugly in on the other side, would not only insure perpetual rotation, but in a machine of sufficient size would exert a not inconsiderable number of horse power. As a matter of fact, even in a frictionless machine, there would be no turning moment whatever, and as it was, Mr. Aldrich found that on starting his machine it was very quickly brought to rest by the energy consumed in overcoming the internal friction.

If he had been content, as many another unfortunate had been before him, to consign his machine to the scrap heap, it would have been better for him and for his victims; but being of an ingenious and resourceful mind, and doubtless "tempted of the devil," he conceived the idea of overcoming the troublesome friction

by means of concealed clockwork, and acting upon the thought he carefully carved and whittled out the wooden bed plate of the machine and placed therein the springs and the train of gears shown in the illustrations.

The gears were connected with the main shaft by means of a small rod extending through the right hand post, a couple of bevel wheels at the top of the post serving to transmit the motion to the revolving shaft and weights. The model, as it stands on our office table, is certainly a masterpiece of deception, and eminently calculated to deceive the unwary. The problem of concealing the joint, after the "works" had been inserted in the hollowed out base of the machine, was solved by forming a bevel joint and making it coincident with the bottom edge of the base, as shown in our drawing. This has been done so skillfully as positively to defy detection, and the illusion is further assisted by the extreme roughness with which the other joints on the machine have been finished. By pushing the little block, which carries a brake, to one side, it may be lifted away, exposing two openings in the base for winding the springs. Considering the artistic clumsiness with which the whole affair is put together, the worm holes neatly drilled, but drilled with that careless abandon which marks the ravages of the native worm, the coarse, rough jointing of the posts standing in close proximity to the exquisitely finished bevel joints of the base, one cannot but regret that the unquestioned dexterity of the inventor was not directed to a better end.

With perpetual motion so palpably accomplished, however, Mr. Aldrich saw in his creation a means of immediate if unlawful gain. Hence, three things followed: Many simple people were relieved of their money; Aldrich was given space for repentance within Auburn prison; and the SCIENTIFIC AMERICAN is enabled to "point a moral and adorn a tale," for the benefit of the all too easily snared investor.

The Feather-Work of Hawaii.

It is seldom that the native products of the savage or semi-savage races are at all remarkable for artistic beauty, no matter how curious or interesting they may be. Among such products the magnificent feather-work formerly produced by the natives of the Hawaiian Islands may be assigned a very high place. This work consisted of feather plumes, feather-covered helmets and dance masks, of wreaths and tippets, above all, of gorgeous cloaks, covered with feathers of brightly-colored native birds. All the earlier visitors of the Hawaiian Islands mention the feather-work. Mr. Miller Christy, F.L.S., has recently written an interesting article entitled "The Rare Feather-Work of Hawaii," in the English Windsor Magazine, and we obtain our facts from this source.

Although once fairly abundant in Hawaii, specimens of this splendid feather-work are now very scarce and more highly prized than ever, for not only has the art of making it been lost, but the bird whose feathers were most highly prized in the manufacture has become extinct. The making of cloaks and other feather-covered articles of dress or ornament dates doubtless from a very remote period in the history of the islands. In bygone days it was the principal occupation of the wives and daughters of Hawaiian nobles, and the ancient kings had a regular corps of skilled feather hunters who were very expert in their business. In catching the birds, a net or snare was sometimes used, but more often a kind of birdlime made from the sticky juice of the bread-fruit tree was used. This was smeared on the higher branches of the trees frequented by the birds or on long poles set up for the purpose of catching them. Often a live specimen of a brilliant scarlet bird known as the "iiwi" was fastened in the vicinity to act as a snare. It is said that the hunters sometimes transplanted trees to the heart of the forest in order to excite the birds' curiosity. The old bird-catchers were doubtless important men in the community, for feathers were considered to exceed in value any other kind of personal property. The difficulty of obtaining sufficient feathers for the manufacture of a cloak must have been enormous, so that it is little wonder that the cloaks are of such value. The groundwork of all the feather articles is coarse netting made of string manufactured from the fiber of a native grass. The outer side is alone covered with feathers, the shafts of which are so dexterously and closely woven into or sewn onto the fabric of the net that the feathers which overlap one another present a surface as smooth and glossy as the back of a live bird. Among the birds which provided the feathers were the mammo-bird and the oo-bird, also the iiwi-bird and the ou-bird. The cloaks already mentioned were by far the most striking products of the Hawaiian feather-workers. They have been spoken of as "royal cloaks," but only those made solely from the brilliant orange-hued feathers of the now extinct mammo-bird can be properly so described.

The right to wear cloaks made from the feathers of this royal bird was the exclusive prerogative of the king. To all others yellow was in the native language "tabu," whence comes our word "tabooed." One of

the yellow cloaks which was worn with a helmet of the same color must have formed a garb of truly royal magnificence. Only one or two of such cloaks are known to have been made. The great state robe and war cloak of the king Kamehameha I. was made up from the smaller tippets of the inferior chiefs; it is 56½ inches in length down the back and 12 feet 4 inches in circumference around the skirt. It is said to have continued to increase in size through eight preceding reigns as each successive monarch added something to its size. With the exception of a very narrow border of red feathers it is wholly of the brilliant yellow feathers of the now extinct mammo-birds. The "mamos" worn by chiefs were covered with feathers of commoner birds, chiefly red and yellow, but the yellow is that of the oo-bird and not of the mammo-bird. The two colors are usually arranged in a simple curved or angular pattern showing considerable poverty of design. The length of the cloaks worn by the chiefs was an indication of their rank.

It is difficult to gain anything but an approximate idea of the number of birds required to make one of these garments. In the case of the royal cloaks the feathers of ten birds would on an average be required for each square inch. By simple computation it will be seen that 20,000 to 30,000 birds will be required to make a royal cloak, so that it is little wonder that one cost \$100,000.

Next to the cloaks the most remarkable feather-covered objects produced were large helmets that somewhat resembled those of the ancient Greeks. The frame is of wickerwork over which is stretched a feather covered network. Less remarkable, but equally imposing, were the long-handled feather plumes which were borne by the king and his highest chiefs as insignia of rank and banners in war. These plumes also marked the temporary stopping place of the king or leader. Other feather-covered objects manufactured were dance masks, which consisted of huge heads constructed on a wicker-covered frame and having superlatively hideous features; the mouth stretching from ear to ear, armed with several rows of sharks' teeth and great goggling eyes of mother-of-pearl. As late as 1888 two native nobles wore their "mamos" at the opening of the Hawaiian legislature. When the Hawaiians adopted the dress of civilization, the monarchs, however, still continued to wear the royal mammo at their coronations. Naturally the finest series of Hawaiian featherwork are still to be found in Hawaii, principally in the Bishop Museum at Honolulu.

Automobile News.

In addition to international yacht racing for a cup, we shall now have international automobile races for a cup. The Automobile Club de France will have the keeping of the cup, which can be challenged for by any club in any country, in the name of one of its members. The first contest is to be held in France, and if the French vehicles are beaten, in the country of the winning club. The name, date, and distance of the first race will be decided later.

It is announced that there will be another New York-Irvington automobile race in a few weeks, under practically the same auspices as the race held in 1896. The management of the former race was very much criticized, and it is to be hoped that the shortcomings of those who have the matter in charge will be less in evidence.

Boston, Chicago, and New York will each have their automobile clubs. Some of them are in the initial stage of organization, but they all promise to be successful.

A "stable" of gasoline vehicles has been opened in New York, on West Forty-eighth Street.

Mr. Whitney Lyon drove his Riker electric dos-a-dos trap from New York to Coney Island a few days ago. He covered the round trip of thirty-five miles without recharging the batteries. There were four persons in the trap during the trip. The time from the ferry at Broadway, Brooklyn, to the beach was forty-five minutes. Although the trap was not supposed to cover more than twenty-five miles without a renewal of the charge, there was ample power at the end of the trip.

Home-Made Migraine.

In preparing migraine at home, C. Weinedel proposes to make an admixture of 0.5 to 1.0 of burnt magnesia, in melting the ingredients, i. e., antipyrine 85 grammes, caffeine 9 grammes, and citric acid 6 grammes, whereby the preparation is prevented from getting damp, if the melting temperature had been a low one, which always gives a white product. Even by a mere mixing with admixture of magnesia, a rather stable migraine can be produced.—Apotheker Zeitung.

SCORES of prominent people in Washington have taken to cycling this season. Recent converts to the chainless idea include Senators Wolcott and Chandler; Captain Sigsbee, late commander of the ill-fated "Maine"; Assistant Secretary of the Navy Allen, and Rev. Drs. Hamlin and Mackay-Smith.