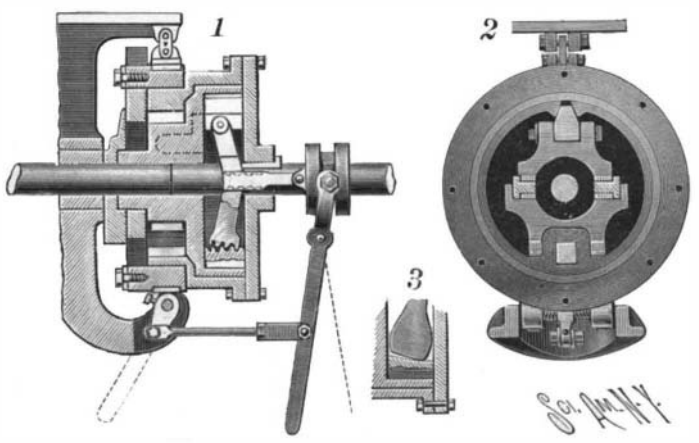
A VARIABLE SPEED POWER CLUTCH.

The clutch shown in the illustration is very similar to one described by its inventor in a paper contributed to Section G of the British Association for the Advancement of Science in 1893, and noticed at the time in SCIENTIFIC AMERICAN SUPPLEMENT, No. 932. It forms the subject of a patent recently issued to W. Worby Beaumont, 100 Palace Road, Tulse Hill, S. W., London, England. The improvement is designed to facilitate the starting of driven shafting or adjacent parts of machinery by overcoming the inertia of rest at a slow speed by positive mechanism, the full speed of the driver being afterward obtained, there being two positive gear speeds with optional intermediate speeds. There are two successively actuated clutches, one containing an epicycloidal gear by which it transmits power through the medium of part of the second clutch, the friction grip surface of which is in part provided with an extension into it of part of or an attachment to the eccentric or shaft in the first clutch. Fig. 1 is a sectional side elevation, and Fig. 2 an end elevation, part in section and the cover of the container removed, of the clutch as arranged for line shafting, Fig. 3 showing a modified form of friction clutch. A fixed eccentric on the driving shaft carries an externally geared ring on which are lugs sliding in slots in a disk, and when the latter does not rotate but slides on lugs on another ring, the first ring, under the action of the eccentric, receives a gyratory motion corresponding to twice the eccentricity of the eccentric. To prevent the rotation of the second ring, a band clutch is closed upon it, when another ring connected with a disk or cover keyed to the driven shaft is caused to rotate, communicating motion to the latter at a speed of perhaps one-fourth that of the driving shaft. The band clutch ring is then released and a second clutch formed by other parts is brought into action, increasing the speed of the driven shaft. By means of a lever the epicycloidal gear part of the combination may be brought into action to start the driven shaft at the speed proper to the ratio of the epicycloidal gear, and a friction full speed clutch may also be put into gear. The invention provides for several modifications of the parts and varying arrangement of the clutches, one of the modifications contemplating the operating of the friction surfaces of one of the clutches by an electromagnet.



BEAUMONT'S VARIABLE SPEED POWER CLUTCH.

RESTORATION OF THE OLYMPIAN STADIUM.

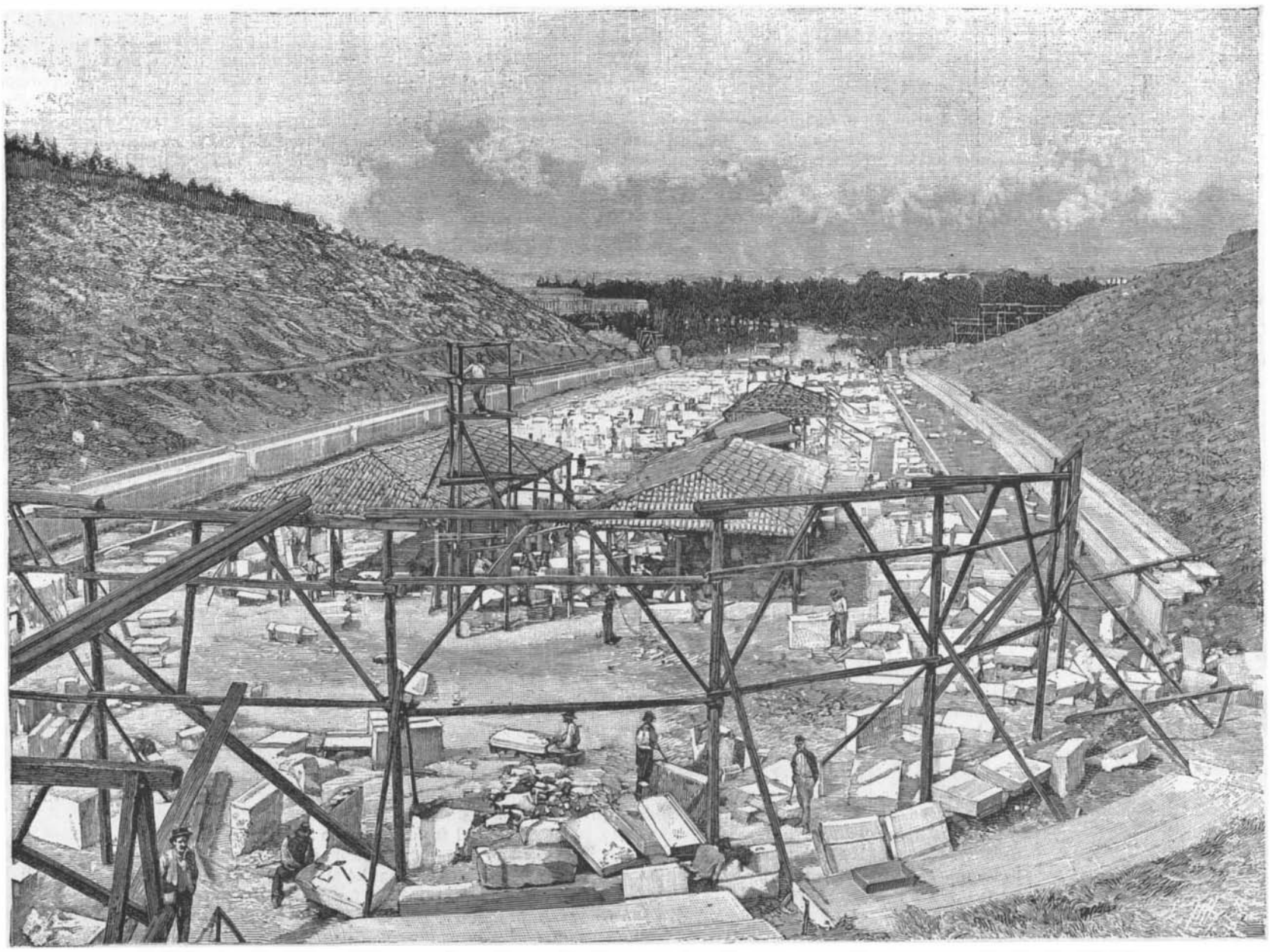
Greece, after exhuming marvels of art from her soil, is now preparing for a grand revival of the celebrated Olympian games. Thanks to the munificence of a rich citizen of Greece, M. G. Avéroff, the work of restoration of the Olympian Stadium or circus at Athens is now being carried on. Our engraving shows the actual state of progress of the restoration. The arena is situated between two hills. It is 656 feet long and 160 feet wide. The entrance is at the northern end. The southern end from which the photograph was taken ends in a hemicycle. Twenty-five ranges of seats rise on three sides of the arena. The seats, steps, parapet, etc., are built of stone from the Piraeus and of Pentelic marble. The steps are ten feet wide. Under the hill at the east has been dug a vaulted passage which gives the athletes direct access to the arena. Great care has been taken to reproduce the ancient stadium, the ruins of which have been diligently studied. Fifty thousand spectators can find a place around the arena. From the top of the hemicycle the view is grand, embracing the amphitheater, the palace of the king and the palace of industry. For our engraving we are indebted to L'Illustration.

The Alps of Japan.

At a recent meeting of the Royal Geographical Society a paper on "Exploration in the Japanese Alps, 1891–1894," was read by the Rev. Walter Weston, M A. The range might be briefly described as a backbone or axis of granitic rocks, through or over which vast quantities of igneous and volcanic rocks had been poured from time to time. The most beautiful mountains in form were Hodakayama, whose granite towers gave it the name of the "mountain of the standing ears of corn," and its northern neighbor Yarigatake, "the Spear Peak," the Matterhorn of Japan, which consisted of an intensely hard, weather-resisting porphyry breccia. The inaccessible character of the range cut off nearly all intercourse between the people on either side. Near the hot springs of Tateyama striking evidences were seen of the terrific power of seismic phenomena. All around the spot was a wilderness of large bowlders, sand, and stones. Although thunderstorms were usually neither frequent nor violent in most parts of Japan, they were by no means uncommon in the central parts of this range. Some of the sulphur springs were very remarkable, especially those on Tateyama toward the north of the range. They were called O jigoku ("great hell"). Jets of steam and sulphureted hydrogen burst forth sometimes with a deafening roar, and with force enough to project lumps of sulphur deposit to a distance of 15 or 20 feet. In the mountains, wherever hot mineral springs were found, the peasantry resorted to them, some for the sake of the healing virtues of the waters and others to kill time pleasantly. The yuba, i. e., "hot water houses," as these bathing establishments were called, usually nestled at the bottom of some deep ravine, or occasionally were found perched high up on the slope of one or other of the great volcanoes. The temperature of the water varied from 100° to 130° Fah.

This taste for bathing was indulged to an incredible extent. In one place he knew of, where the water was just about blood heat, a man would stay in practically for a month on end, taking care, however, to place a heavy stone on his knees to keep him from floating or turning over in his sleep. The caretaker of this particular establishment, a cheery old man of some 70 summers, himself stayed in the bath the whole winter through.

Chief among the animals found in this alpine region was the kuma, or black bear. It sometimes attained a length of over six feet, and its flesh was smoked and eaten. In the north end of the range the badger was very common and was much valued, both for its flesh and its fur. In the forests high up the mountain sides boars were found. Deer were also hunted in the winter. Of birds, the beautiful golden eagle led the way. Besides the kite, which was common, was a curious black and white speckled crow (regarded in Japan as the bird of love), and extremely tame ptarmigan abounded near the upper snowfields. The most remarkable animal of all, however, was now fast dying out. This was the giant salamander (Cryptobronchus japonicus), found chiefly in the southwest spurs of the range.



REVIVAL OF THE OLYMPIAN GAMES IN GREECE—RESTORATION OF THE ANCIENT STADIUM.

Animals' Change of Color in Cold Countries.

As winter approaches and the green of summer is replaced by snow and ice, a peculiar change occurs among certain animals. At the first hint of cold they begin to assume a different color; tints of gray and lighter hues appear in the somber black or dark coat of summer, and soon the animal is mottled with dark and white patches, finally becoming a pure white that is at once a protection, rendering it almost invisible on the snow. Before the change was understood it was supposed that the animals were distinct forms; one white and the other dark. But it is now well known that a number of animals change their color with the regularity of the seasons, says the Philadelphia Times.

One of the most interesting examples is the hare, several of which are known to assume a winter pelage, the most familiar being the varying hare and the Arctic hare. The latter, in summer, when it would in a winter coat present a marked and striking contrast to its surroundings, is on its upper side black and a light brownish yellow, mixed; the upper portions of the tail and the tips of the ears black. This color is retained all through the summer, but at the approach of the cold season the pelage begins to fade and gradually becomes white, with the exception of the tips of the ears, which remain black.

This wonderful changeable hare is found in the Alps, Ireland, and Scotland, and in the Arctic regions of Asia. In many of the Arctic explorations it has been of the greatest service to the men from its habit of frequenting camps. The voyagers of the Vega often relied upon the little animals in time of need and when food was scarce.

In America, in the far north, we have the same hare, but a larger and finer animal, known as the polar or glacier hare. The American form ranges from the north to the middle portions of the country, and in regions away from the extreme north changes only slightly or imperfectly. As the cold comes on, its dark coat fades to a lighter hue, becoming pronounced in summer again.

The protection afforded these animals in the far north is almost perfect, as it is almost impossible to distinguish them from the snow. When they run they seem to be swallowed up in the field of white.

The principal four-footed enemy of the white hare is the Arctic fox, that is endowed with a similar protection. It is one of the smallest foxes known, and certainly one of the most beautiful. In summer, when the ground is bare or covered with verdure, the little animal has a silky fur, bluish or brownish gray. This lasts until the snow comes, when the coat gradually changes. The hair becomes longer and thicker, especially on the tail and feet, which are densely furred, and by midwinter, or before, it is pure white, without a suspicion of its summer hue.

If the winter and summer pelage be contrasted, it will hardly seem possible that they represent the same animal. The fox is a very cunning and intelligent creature, as all Arctic travelers have discovered. It is an inveterate thief, stealing for the pleasure of stealing, taking from the Vega explorers not only food, but knives, forks, ammunition, sacks, shoes, and stockings. When the men slept they would crawl under the robes and nose them, and if those awake held their breath, pretending to be dead, the foxes would begin to nibble them, and when frightened off would carry away a hat, mittens, or anything that came in the way. If followed, one of the foxes would go on guard while the others buried the stolen goods.

The ermine, whose fur has become fashionable again, is a familiar example of this remarkable change in color. It is common in all the northern countries and in our own country down to the Southern States, a most destructive little creature, killing chickens, birds, and various animals, often simply for amusement. An ermine has been observed watching a bird, placing itself beneath an inviting roost; when the bird alighted it sprang at it, clinging to it, although carried a long distance into the air.

Some curious experiments have been tried with this little animal. Four or five were caught one summer in the north, and found to have rich coats of a mahogany brown color. Two were sent to some one in the Southern States, while the remainder were kept where the cold winter prevailed. Those in the north began to change as the leaves disappeared, the strange painting of nature gradually going on until the animals, with the exception of the tip of the tail, were pure white. Correspondence had been kept up with those having the other ermines in charge, but in vain they looked for the winter change. The animals retained their mahogany colored coat during the warm winter, showing conclusively that the change is produced by the cold, and is a wise provision of nature, rendering the animals almost invisible to their enemies.

There is another reason given for the change—a wise provision of nature to protect the ermine from the cold. Animals with black or dark colored fur radiate internal heat more effectually than those of lighter colors; so the ermine in its white coat absorbs the rays of the sun, radiating but little; thus the change becomes an important factor in the preservation of the heat supply. In their movements these animals and their allies resemble serpents, and the actions of an ermine stealing along with sinuous motion over the snow is very suggestive.

ADJUSTING THE BEAT OF CLOCK PENDULUMS.

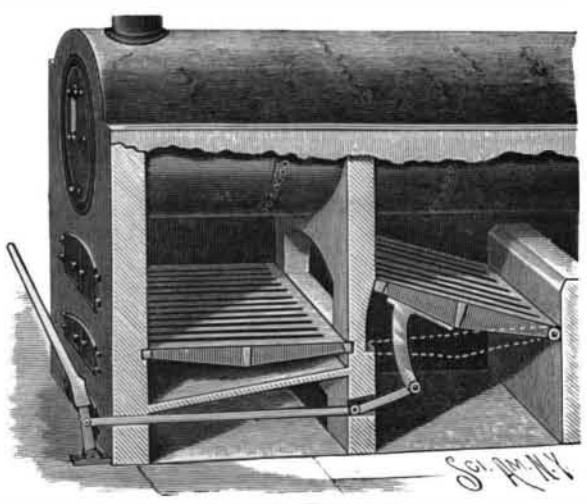
The illustration represents a leveling device adapted for attachment to a clock mechanism to control the pendulum and verge, whereby they will be kept plumb, irrespective of the frame carrying the clock mechanism proper. It is a patented improvement of Fred F. Richey and William Bittmann, of Wamego, Kansas. The clock mechanism may be of any desired construction, and the verge wheel shaft is jour-

BITTMANN & RICHEY'S CLOCK PENDULUM.

naled in the frame at the back and in a bracket projected at the front, each bearing being formed with a boss having an integral stud, and on the studs being pivoted the upper members of a U-shaped frame from which depends a weight. The front member of the U-shaped frame is at all times in front of the verge rod, while the rear member is straight. On the inner face of the front member is pivoted a block in which is journaled one end of the verge spindle, its opposite end being held in the usual spring. The verge is thus carried by the weighted swinging frame, and the pendulum rod at its upper end, after passing through the verge, is secured in the usual manner to a post, which is also secured to the back of the forward member of the weighted frame, whereby both the pendulum and the verge are kept perfectly plumb. The device is very simple and inexpensive.

AN IMPROVED FURNACE.

The furnace shown in the accompanying illustration is designed to insure a more complete and efficient combustion of the fuel than is possible with furnaces of the ordinary construction, by the employment of an auxiliary grate in the rear of the front grate, the rear



THORN'S FURNACE.

grate receiving the burning or coked fuel from the front grate, and the smoke and gases from the burning fuel on the front grate passing through the fuel burning on the rear grate.

The improvement has been patented by A. L. Thorn, of Lump City, Montana. In a rear combustion chamber, pivoted to the rear bridge wall, is an auxiliary grate, the front of which is adapted to rest, as shown in the dotted lines, on an intermediate grate wall, in the center of which is an opening immediately at the rear of the front grate, so that the fuel from the latter may be conveniently pushed upon the rear grate. Under the front grate is an ash pit with inclined bottom, and the ash pit under the rear grate has an extension under the front ash pit and a separate door. An arm extending downwardly from the rear grate is connected with an exterior lever, by which the grate may be moved up and down, the illustration representing the furnace with the grate in normal position, so that the smoke and gases from the burning fuel on the front grate bars will pass through the fuel on the auxiliary grate, the latter being lowered occasionally to permit the burning fuel on the front grate to be pushed back on the rear grate, the latter being then again raised. The lower ash pit door is normally closed, to prevent the passage of outside air to the rear ash pit, and it is designed to use a water grate in the second combustion chamber, the water thus heated being used as a boiler feed.

The Hardening of Extra Soft Steel.

The subject of the hardening of extra soft steel was dealt with at a recent meeting of the Académie des Sciences, in Paris, by Mr. Osmond. Taking for example a test bar of steel carbonized by cementation in which the proportion of carbon varies in a continuous fashion (from 1·70 to 0·35 per cent) from one extremity to the other, if the bar be well hardened, and an attempt be made to scratch it by means of a sewing needle, the latter will scratch the softer parts—say, up to the part containing about 0·70 per cent carbon. The mark or scratch then disappears, but, contrary to all expectation and to all ideas on the subject, it reappears in the part of the bar containing a proportion of carbon of about 1·30 per cent.

In examining the scratch or mark by means of a microscope in the most carbonized part, it is found not to be continuous, but that it appears to be a series of broken or interrupted lines. The part in question is therefore not homogeneous and contains at least two constituents, which may be here named A and B respectively. A, not scratched by the needle, scratches glass and feldspar. B is scratched by apatite, and probably of fluorspar. By giving them a good polishing, a slight difference in color will be found between the two constituents: B is of a silver-white color, while A has a slightly grayish tint. Polishing in bass-relief on damp parchment, impregnated with a little brown-red, does not sensibly affect B, thus assigning to this constituent a resistance to inordinate wearing, having regard to its relative mineralogical hardness. By attacking it with tincture of iodine or by dilute nitric acid the mass is divided into only slightly coherent polyhedrons, separated or not by traces of definite carbon, to which is attributed the formula Fe_3C. At the same time A and B assume different colors, but are ordinarily homogeneous for the same constituent within the limits of the same polyhedron. The structure thus becomes very clearly defined. In most cases, A becomes distributed in barbed flakes parallel to two directions, which remain constant for each polyhedron; B forms the base. If the attack be prolonged, all the section becomes black, both constituents being carbonized. The hard constituent, A, is the same which forms almost exclusively hardened steel containing 1 per cent carbon. The proportion of the constituent B increases with the content of carbon up to about 1·60 per cent. To continue the experiments, by taking a steel not more complex but of a composition which has been found most convenient (for example, a steel containing 1·57 per cent carbon), and submitting it to a varying hardening process, it will be seen that to obtain the maximum of B, the steel must be heated up to at least 1,000° Cent. (but not exceeding 1,100° Cent.), and cooling it as rapidly as possible in iced water or in very cold mercury, otherwise the carbon, Fe_3C, becomes isolated again and diminishes to that extent the actual content of carbon in the remainder of the mass. Under the most favorable conditions, it is possible to obtain a mixture of equal parts (in round figures) of A and B. Such a mixture is, relatively, only slightly magnetic. A bar of it, with one far end placed against one pole of a powerful horizontal magnet, is supported vertically with difficulty, while a similar bar, hardened by heating up to 800° Cent. and cooling at 15° Cent., is held horizontally.

The same mixture, with the parts A and B practically equal, cannot be filed, and breaks before it bends, owing both to the presence of the hard and fragile constituent, A, and to the absence of cohesion between the polyhedrons. So far as it has been able to ascertain them from a mixture, the properties of B tend to make it similar to steel, having 25 per cent nickel and from 12 to 13 per cent manganese.—The Colliery Guardian.

Sir Edward Harland.

Sir Edward Harland, head of the famous shipbuilding firm of Harland & Wolff, died December 24. He was a member of Parliament for North Belfast in the Conservative interest, was sixty-four years old, and was twice mayor of Belfast. His partner, G. W. Wolff, is member of Parliament for East Belfast in the Conservative interest, and, Mr. Wolff being of German extraction, they were known in the House of Commons as the Majestic and Germanic. Sir Edward Harland was for many years chairman of the Harbor Commissioners of Belfast, and was a bulwark of Conservatism in Ulster. He was one of the foremost organizers of the Ulster convention. His baronetcy was the gift of Lord Salisbury and dates from 1885.