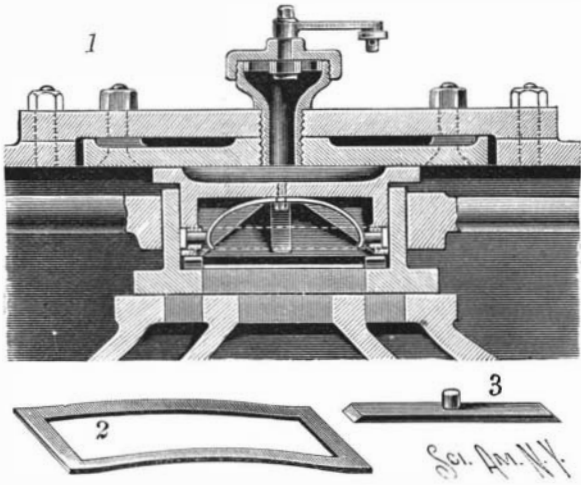


**AN IMPROVED BALANCED SLIDE VALVE.**

A slide valve of simple and durable construction is shown herewith, the illustration being made from a drawing of a valve fitted on a locomotive running on the imperial government railways of Japan, a six-wheeled coupled tender engine, wheels 4 feet diameter, cylinders 16 by 22 inches, and boiler pressure 160 pounds per square inch. The improvement has been patented by Mr. John McDonald, of the Railway Shenbasi, Tokio, Japan. The valve is formed with an open top, in which slides vertically a crown plate or cover adapted to be pressed by back pressure of the cylinder in contact with the face plate held on the

**MCDONALD'S BALANCED SLIDE VALVE.**

steam chest cover. In the middle of the cover is a valve which opens into the steam chest over the space covered by the crown plate, the valve opening to the atmosphere when the live steam is shut off from the steam chest, whereby all vacuum in the cylinder is destroyed. In starting, there is ordinarily a momentary puff of steam, until the crown plate rises, and the operator can observe whether the valve is working balanced or unbalanced, according to the escape or non-escape of steam, a lever or link enabling the operator to close the openings of the valve as desired, when the improvement works like an ordinary slide valve. Fig. 3 represents the packing strip held by a curved spring in the end and side walls of the crown plate, and Fig. 2 is a spring preferably used, but not considered essential, to keep the crown plate against the upper face plate. It is said that one locomotive in Japan, provided with one of these valves, has run over 33,000 miles, showing no wear whatever, the trials thus far being so successful that other locomotives are being fitted with the improvement. An especially valuable feature of the device is that it automatically opens the cylinders to the atmosphere when the engine is running without steam, so that there is no vacuum created and no tendency to suck smoke and ashes into the cylinders.

**A New Use for Bamboo.**

A new application of the stems of the larger growing species of bamboo has recently been adopted in China for the manufacture of small trays and ornamental articles for export to Europe. It is known in China as bamboo sheeting, and it is said to be carried on at present only to a limited extent at Wenchow, where, notwithstanding that it is quite a new trade, about ten firms are now engaged in it. The process adopted is as follows: A length of bamboo is cut off, and then pared with an ax till it is of the thickness required. It is next planed with a spokeshave, and the thin cylinder so obtained is slit up, so that, on being opened out, it forms a sheet. A number of these cylinders, placed one inside the other, are immersed in boiling water for a few minutes, to render them flexible, and they are then unrolled and flattened out, by being subjected to pressure under heavy stones. These sheets are sometimes used for making fretwork and carved screens, fans, etc.; and the small, pale, straw-colored pin trays, for toilet tables, which appeared in the London shops last season, are apparently made from this specially prepared bamboo. It seems to adapt itself extremely well for moulding into many forms, and might be made available in this country for various

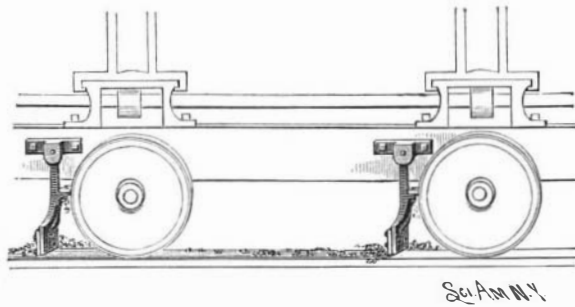
kinds of veneering. The bamboo now appears to be the *Dendrocalamus latiflorus*.

**Calomel in Hemorrhoids.**

For a number of years Dr. J. B. James, of London, has treated hemorrhoids by the simple process of applying calomel to them with the finger, and claims to have done so with marked success in every case, particularly when the hemorrhoidal mass was inflamed, which is characterized by mucous discharge and hemorrhage, accompanied with a painful sensation of weight in the region of the rectum. All these symptoms, it is alleged, were speedily relieved by the simple application of the calomel, which had the still more important subsequent advantage of restoring the patient to perfect ease, enabling him to pursue his usual occupations in happy immunity from all distressing or annoying symptoms.

**A SCRAPER FOR SAWMILL CARRIAGES.**

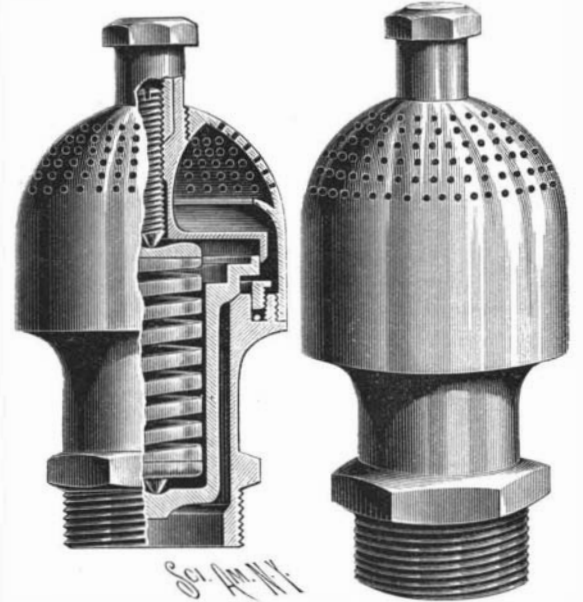
A cheap and simple device to be attached to the carriage of any kind of a sawmill, to scrape the track and the wheels, so that both will be kept clean and the carriage will run smoothly, is shown in the accompanying illustration. The improvement has been patented by Mr. Charles M. Cronkhite, of Kimball, Wis. Near each wheel and to one side of the carriage is secured a hanger from which the body of the scraper is suspended, upon a pin extending through a vertical slot in the upper end of the body, allowing for the vertical movement of the scraper. On the front face of the lower end of the body is a steel wear plate having a beveled lower edge, adapted to run upon the track and scrape off sawdust, pitch, etc., the plate being adjustably fastened in position by screws, so

**CRONKHITE'S SCRAPER FOR SAWMILLS.**

that its position may be changed as it becomes worn. On a projecting ledge of the body is also secured a similar wear plate adapted to bear against the face of one of the wheels. When the carriage is moved forward the scrapers bear upon the track and wheels, and when it is moved in the opposite direction the scrapers swing freely on their pivots.

**AN IMPROVED SAFETY VALVE AND MUFFLER.**

The illustration represents a simple and durable valve designed to permit the ready escape of the steam, while the steam will be so expanded and the currents so broken up before reaching the atmosphere that the improvement forms an efficient muffler. The invention has been patented by Mr. Erastus B. Kunkle, of Fort Wayne, Ind. In the valve body is a spring pressed cup valve, held in lowermost position by heli-

**KUNKLE'S SAFETY VALVE AND MUFFLER.**

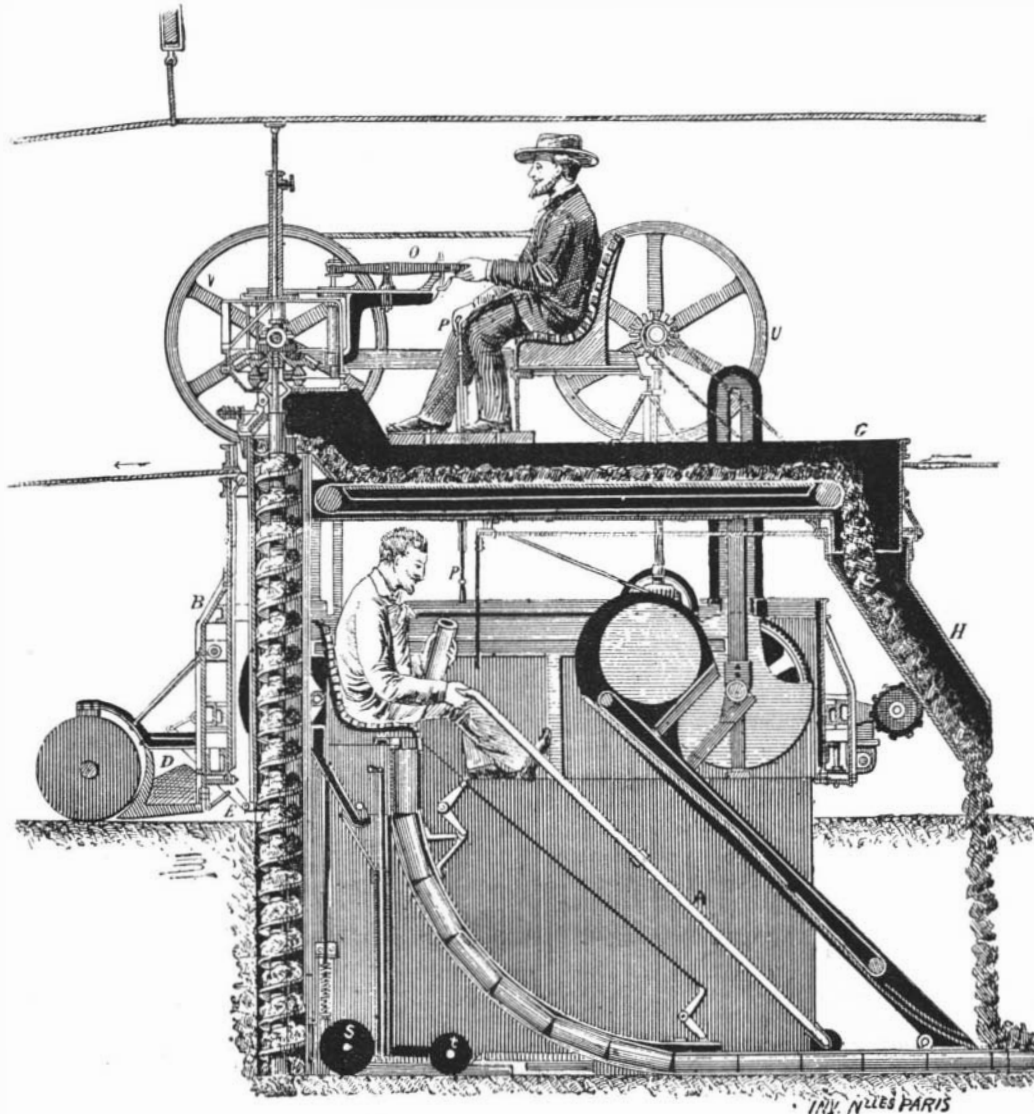
coidal springs, the tension of which is regulated by a screw in a hub of a semi-spherical cap, provided with perforations, and screwing on a flange of the valve body outside of the valve seat. The hub of the cap has at its lower end a disk, there being a passageway for escaping steam between the wall of the cap and the edge of the disk, and a downwardly extending annular flange on the outer edge of the disk fits upon an annular flange of the cup valve. Directly below the latter flange is a ring screwing in an interior thread in the valve body to regulate the size of the steam passage outside the valve seats, and provision is also made for the escape of any steam passing into the cup valve. An annular curved lip, on the inside of the cup, extends upward and inward over the edge of the disk at the lower end of the hub, the lip guiding the escaping steam toward the center of the cap, so that the currents are broken up before the steam passes out to the atmosphere through the perforations of the cap. It is designed that, with this form of valve, the noise will be so reduced as to be hardly perceptible.

**MACHINE FOR LAYING DRAINAGE PIPES.**

The laying of drainage pipes is always a costly operation and consumes considerable time. It is generally effected in three operations, the first of which consists in digging the trench, the second in putting the pipes in place by hand, and the third in covering them with earth. The machine represented herewith is designed to perform these various operations at the same time, and with the aid of two men only, thus notably reducing the cost of installation.

It consists of a frame, A, mounted upon wheels, which rest directly upon the ground, or, by preference, upon rails that are taken up and laid again in front in measure as the work progresses. This frame supports another one, B, which carries the tool designed to excavate the trench, and which is nothing else than an endless screw, with cutting edges, arranged vertically. This screw is protected laterally by two plates that support the earth and prevent it from falling into the trench before the pipes have been laid. In the part of the screw that projects above the level of the earth a third plate, placed in front, prevents the earth accumulated upon the spirals from falling upon the ground. This plate is not fixed, but is held against the screw by a lever, E, and a counterpoise, so that if the screw brings up a large stone, the latter can enter the passageway thus formed.

The motion forward, as well as the motion of the screw, is produced by a cable winding over a

**MACHINE FOR LAYING DRAIN PIPES.**

wheel, U, and ending at a stationary engine placed at one end of the field. The starting or stopping is effected through a lever, P, placed within reach of the hand of the two operators. In measure as the machine moves forward, the operator at the lower part puts pipes into the curved cylinder which extends to the bottom of the machine, and the pipes are thus laid upon the ground, one after the other. The earth, on reaching the upper extremity of the screw, is emptied upon an endless cloth in the box, G, whence it falls into the passage, H, which may be inclined to the right or left, so that the earth may be made to drop upon the pipes, or be deposited to the right or left of the trench.

In order to prevent the earth from entering the joints of the pipes, the joints are covered with a band of paper led to them by a guide seen at the back of the machine.

It may happen that the screw, in its operation, may meet with excavations deeper than the trench that it is desired to form, and that consequently the pipes may be insufficiently supported at such points. In order to remedy such a difficulty, there is arranged immediately behind the screw a drum, S, which bears constantly upon the ground, and against which abuts the extremity of the rod of a valve closing a box of sand. When the drum enters an excavation, the valve rod, actuated by a spring, lowers, and the valve leaves its seat and allows of the passage of a certain quantity of sand, which falls into a vertical chute situated behind the drum and fills the excavation. A second roller, t, equalizes this layer of sand, and the bottom of the trench is thus made perfectly level.—*Les Inventions Nouvelles.*

**HOMOGENETIC ENUMERATION.**

It has generally been supposed there are but two systems of numeration, the Arabic and the Roman. Here, however, is a third, which, for want of a better name, we will have to call homogenetic numeration. In this system the limbs of the human body may be made to represent all numbers and their relations that can be expressed in the ordinary manner, and more concisely, for the use of ciphers is dispensed with.

The series consists of nine puppets that represent the

sired by very simple devices, such as standing them upon their heads and making this equivalent to adding a requisite 10,000 to their value, adding hats of different patterns, which will give additional values; or by simply placing above or below the figures a horizontal,

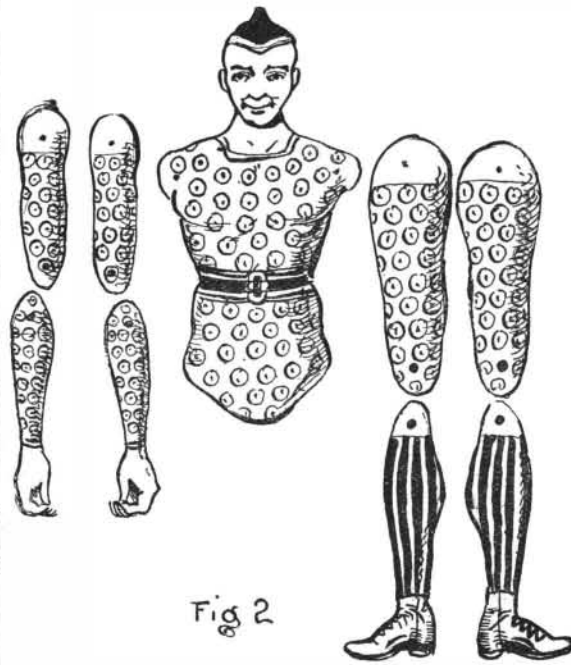


Fig 2  
**HOMOGENETIC ENUMERATION.**

oblique, or vertical stroke; a right, acute, or obtuse angle; or in any way differentiating them from the first series here given. In order to represent any given number by means of these figures, it is first necessary to divide it into units, tens, hundreds, and thousands. Thus 1892 will not be represented as eighteen hundred and ninety-two, but as one thousand, right leg extended at right angles to the body; eight hundred, left leg drawn up to an acute angle with the body and bent to an acute angle at the knee; ninety, right arm from shoulder at an acute angle to the body, right forearm

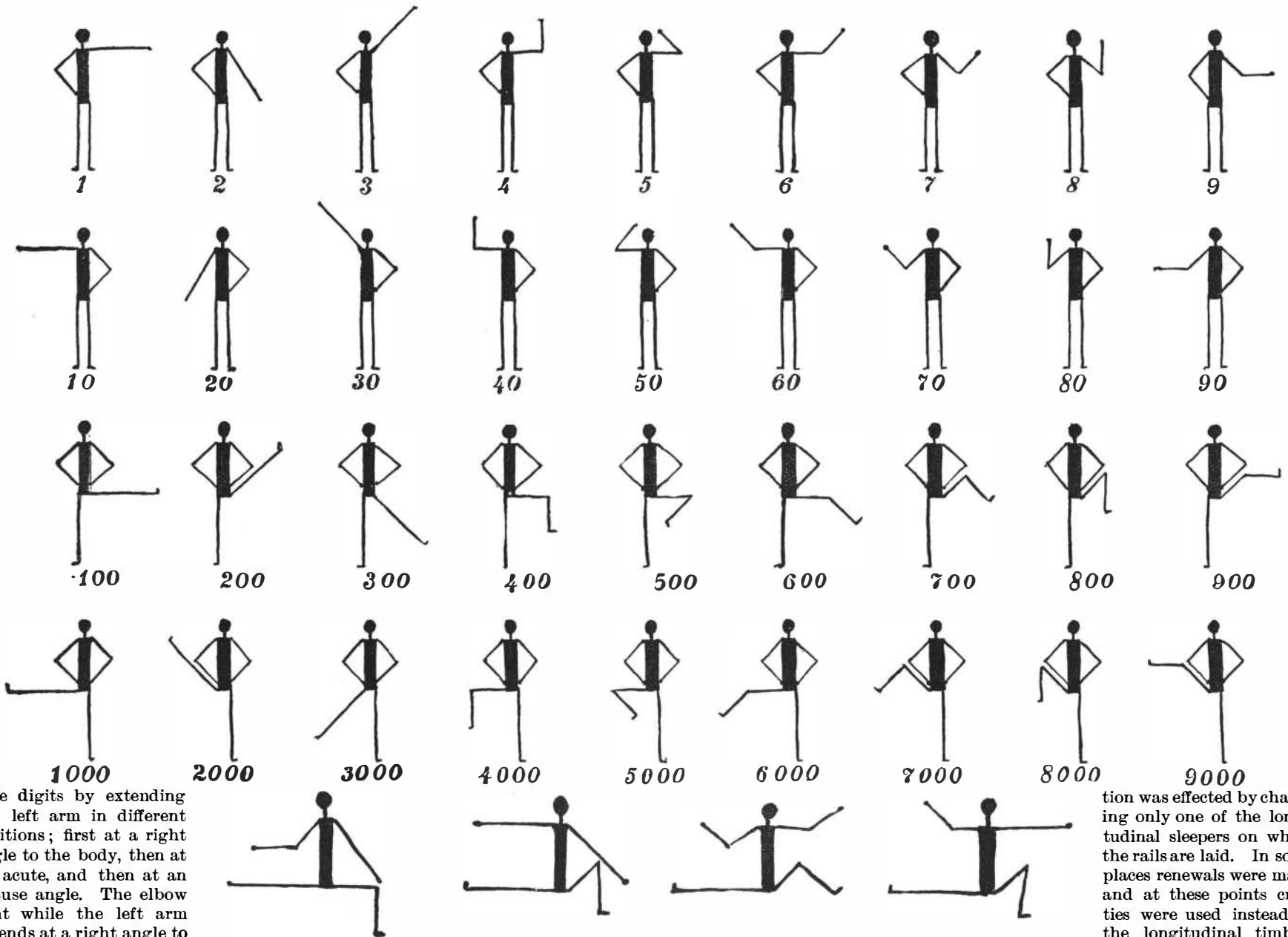
two is shown by puppet with right arm as at twenty and left arm as at two; one hundred and fifty-two with left leg as at one hundred, right arm as at fifty, and left arm as at two, etc.

A pasteboard puppet, as shown in the accompanying Fig. 2, may be made and jointed with thread. It can be worked to solve arithmetical problems, and according to certain fixed successions of movements or postures of the jointed parts may be made to add, subtract, or divide. In fact it may be taught to dance according to arithmetical measure and made to save a vast amount of ciphering, performing in this respect the use of the abacus.

You may also, if you choose to do so, make your puppet spell words. In order to do this you have only to call 1 = A, 2 = B, 3 = C, etc., until you reach the end of the alphabet, and put your figure successively into the attitudes representing the numbers that stand for the different letters forming the word you wish to spell. This whole scheme, although it has here a comical and amusing development, is a very suggestive one, and opens the question lately started in a popular scientific journal as to whether the Arabic numeration, which has for so many centuries been supposed the perfection of number expression, may not be greatly improved upon.

**Alteration of the Great Western Railway.**

For several years back the alteration of the gauge of the track of the Great Western Railway, of England, from 7 feet to 4 feet 8½ inches has been contemplated, and in the construction of new rolling stock that end was had in view. The gauges of several of the branch lines have been altered from time to time, until the remaining portion of the system not changed covered only a distance of about 200 miles. On May 19 the final arrangements were made for completing the change. Five thousand men were distributed at different points along the line before midnight, Friday in readiness for work, May 20, the intention being to have the work on the main line completed by the following Sunday at midnight, and in one day longer the branch lines and sidings completed. Throughout nearly the entire length of the line changed the altera-



nine digits by extending the left arm in different positions; first at a right angle to the body, then at an acute, and then at an obtuse angle. The elbow bent while the left arm extends at a right angle to the body gives a succession of the same angles, and at an acute angle another succession, making nine in all. The right arm extended in the same manner as the left gives a second period, that of tens. The left leg reversing the angles of the left arm represents hundreds, and the right leg reversing those of the right arm, thousands.

This series may be carried as much further as is de-

horizontal; and two, left arm at an acute angle to the body. Eleven would be represented by puppet ten, with the left arm extended as at puppet one.

Twelve would be expressed by puppet ten with the left arm in the position of puppet two; thirteen by puppet ten with left arm as at puppet three; twenty-

tion was effected by changing only one of the longitudinal sleepers on which the rails are laid. In some places renewals were made and at these points cross ties were used instead of the longitudinal timbers which existed in the old track. Between some points where mixed gauges existed the track will not at present be interfered with. By the use of branch lines, other roads and steamships, traffic was but slightly interfered with, and at 9 o'clock Sunday night, May 22, it was expected to run the first train over after the alteration of gauge, after which the traffic will be resumed as usual.