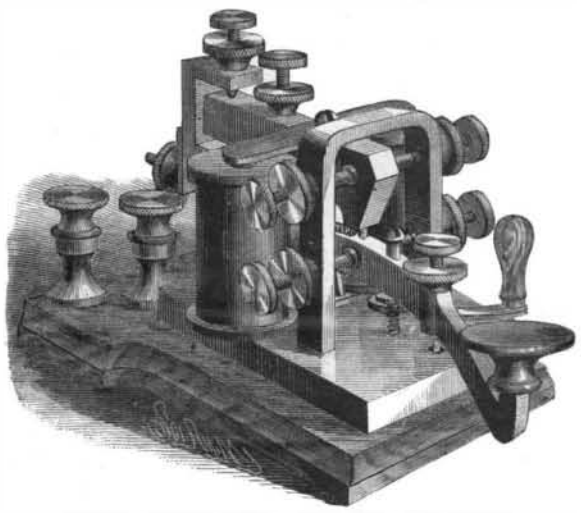
TELEGRAPH KEY AND SOUNDER.

Mounted on the wooden base of the instrument is a metal plate carrying the magnet and arch. Hung on the arch is the sounder tongue, and just back of the center of the magnet is a post provided with the contact screw of the sounder. These parts constitute the sounder as ordinarily constructed. In front of the finger key, which is hung on the arch by trunnion screws, is the spring of the key, and in front of this is the front contact point insulated from the base, and the adjusting screw of the base. The rear end of the key extends between the helices of the magnet, and has a stop projection taking on the connecting piece of the magnet, so as to serve as a back point. The two rear binding posts are connected to the sounder magnet by wires. Just forward of these are



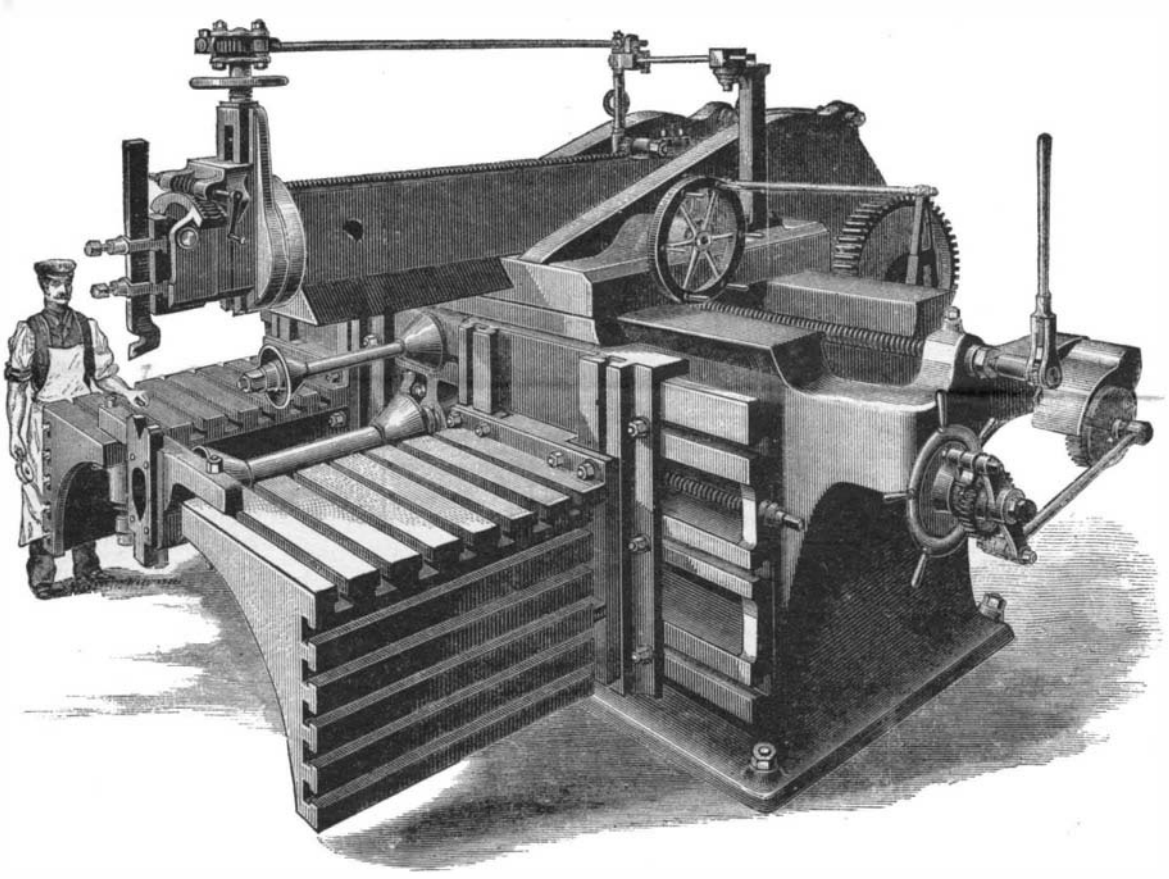
BELT'S TELEGRAPH KEY AND SOUNDER.

the binding posts for the finger key, which are connected by wires to the metal base and the front contact, the latter connection also extending to the switch anvil. These connections are for use when a relay is required, but for a local sounder on short lines only two posts are required. The key may extend out in the opposite direction to that shown in the engraving, or at the back of the instrument.

This combined key and sounder—recently patented by Mr. Perley P. Belt, of Columbus, Kansas—is very compact, occupying no more space than the ordinary sounder, besides being less expensive than separate instruments.

IMPROVED SHAPING MACHINE.

Our engraving illustrates an unusually large shaping machine manufactured by James Archdale & Co., Birmingham. The length of stroke of this fine machine is 3 feet, the longitudinal traverse of the saddle 9 feet, the length of bed 12 feet; the total length of the bed over the bracket at end is 18 feet, the tables project 4 feet 3 inches, the vertical movement of the tables is 18 inches, the power of the gearing is 12 to 1 and 20 to 1; there is a quick return stroke. There are cast steel link connecting rods and feed wheels. The tables are constructed to sustain a weight of 12 tons to 15 tons. The machine is self-acting in all cuts, and has two circular motions for large and small work. The total weight is 24 tons, the ground space taken up is 20 feet by 18 feet. The main frame of the machine is cast in one piece and strongly ribbed inside to give necessary strength. The foot of the frame is extended to the left to support the driving gear. The weight of this frame or body is 11 tons. The driving gear, etc., consists of a five speed cone pulley, 20 inches to 36 inches in diameter, and two changes of spur gear. The changes are effected by a screw on the pulley shaft, the boss of the hand wheel being cut as a nut internally and split, and provided on its outer diameter with a split grip for locking. By moving this hand wheel the pinions can be brought in and out of gear with heir respective wheels, and locked in position on the shaft. These wheels give motion to a strong back shaft having a key bed and sliding pinion carried in a bracket at the back of the traveling head or saddle. This bracket and saddle are all one casting. This pinion works into a powerful spur wheel keyed fast on the main crank shaft, also carried in a bearing at back of saddle. The saddle or traveling head weighs 3 tons, and has carried from it at the back and hanging downward two strong brackets for the support of the main gear. The crank is variable, and the sliding block is moved in the crank plate by a rack and pinion, and is fastened in the desired place by two lock nuts. This crank actuates a cast steel link and connecting rod, and gives a quick return stroke, the connecting rod being inside the ram, thus giving a central thrust. The saddle is self-acted either way along the bed by a slotted disk, connecting rod catch, and cast steel wheels, the screw being locked and stationary, the nut —having a spur wheel on a friction cone—turning in a bearing cast on the saddle underneath, and thus moving the saddle. When it is desired to move the saddle along more quickly, the screw is unlocked at each end of the bed, and a ratchet or handle applied at one end and moved direct. The ram is 13 feet 6 inches long and two tons weight, and has a quadrant tool box for shaping internal or external curves. It also has a noiseless and improved self-acting down-cutting motion. The ram is moved forward or back when being adjusted to the requisite stroke by a pinion working into a rack. There are, as we have said, two circular motions, with minimum feeds of $\frac{1}{1020}$ and $\frac{1}{2400}$ of a revolution respectively. The smaller one will take about 24 inches diameter, and the larger one about 48 inches. It is supplied with suitable mandrels and cones, and also a steady bracket supported on both tables. The two tables weigh about 3 tons each, and project 4 feet 3 inches from the bed of the machine, and are moved longitudinally by means of screws, and vertically by powerful worm wheels and worm and screw.—*The Engineer.*



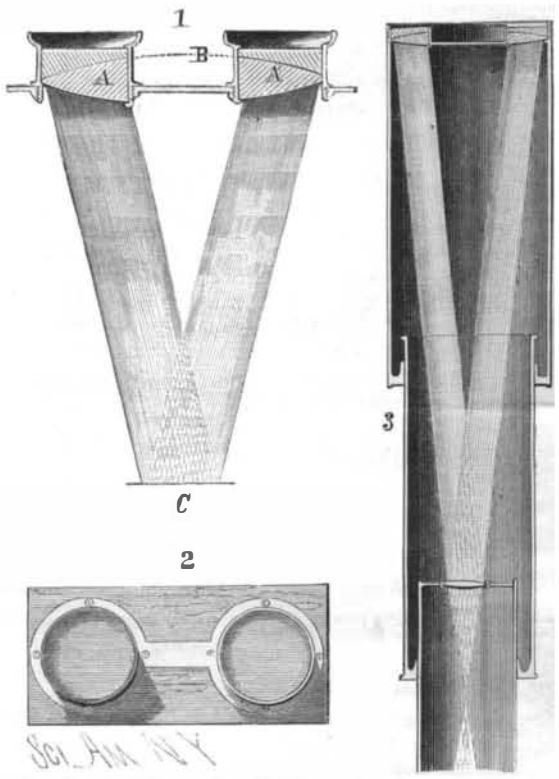
IMPROVED SHAPING MACHINE.

Better Pyrometers Needed.

At a recent general meeting of the German Union of Manufacturers of Refractory Products, the subject of pyrometers was discussed. Herr Seger, an authority on the subject, stated that so far no pyrometer of any kind had given satisfaction to a sufficient degree to establish it in use and favor. For temperatures over 500 deg. Cent. they are not reliable, and cannot be used for such purposes as regulating the temperature of ovens in porcelain manufacture, etc. The electric pyrometer of Siemens is not safe, even with careful handling, as after being used several times different pyrometers hardly ever give corresponding readings. This apparatus also requires very frequent repairs. In many works so called "pyroscopes" are employed with advantage to approximately regulate and judge of the temperature of ovens and furnaces. Alloys of gold and silver, and of gold and platinum, of varying proportions, are used, but such alloys are only recommended up to temperatures of about 1,200 deg. Cent. In firebrick and porcelain works use is made of a graduated series of mixtures of fireclay and ground feldspar, also of feldspar, quartz, and fireclay. These mixtures are made into cubes of 2 to 3 centimeters in height, and are placed so that they can be seen through little spy holes left for the purpose in the side of the furnaces. They give way at first, by the rounding off of the corners, when the fusion temperature has been reached.

OBJECT LENS FOR TELESCOPES AND CAMERAS.

This invention has a twofold object: to obtain the effect of a lens of large diameter without the labor and expense required for the production of large lenses; and to improve photographic pictures by the use of lenses, which serve to intensify the image and



OBJECT LENS FOR TELESCOPES AND CAMERAS.

produce a stereoscopic effect in the picture. The lens is of compound or double form, each portion being ground to the curvature of a solid lens of the required diameter, and the two parts being held in their support so as to be retained in the same relative position with regard to each other that they would sustain in a solid lens of the same diameter and curvature. The lens is composed of the two parts, A, which are constructed by securing two disks of glass in the same plane and then grinding them to the curvature of a solid lens of like diameter. These are then secured or set in a frame made of any suitable material. For telescopes the setting may be of some inferior glass, or it may be, as shown in Fig. 2, similar to those used in opera glasses. The same effect may be obtained by taking an ordinary lens and by diaphragms or other means, rendering it opaque except at diametrically opposite portions. It will be understood that in cameras this construction applies to the front or object lens, the condensing lens, C, being applied as usual.

This invention has been patented by Messrs. J. A. Smith and A. J. Athay; further particulars can be had by addressing the latter at Sparland, Ill.

Starch.

The principal grain from which starch is manufactured at the present time is Indian corn—wheat and potatoes being used in limited quantities.

There are twenty-four factories in the United States manufacturing starch from corn. Fifteen of these are working under the new method, or chemical process, and producing about two-thirds of the total amount made per annum. The balance work by the old method, or fermentation process.

Indiana is the leading State of the Union in the production of starch from corn, having eight factories and producing more than one-third of the total amount made.

The total capacity of the mills manufacturing starch from corn is about 250,000,000 pounds per annum. The total number of pounds of starch of all kinds exported from the United States in the twelve months ending July 1, 1883, was 7,033,715.

The consumption of starch for all purposes in the United States is about 160,000,000 million pounds per annum, or an average of three pounds for each person.