

these forges are in use in some establishments, the names of which are familiar to our readers, and are proving entirely satisfactory.

The muffle furnaces are principally used for annealing and heating for tempering, large dies, cutters, springs, small work in boxes, or any steel work requiring a uniformity of heat without flame.

The muffle is enclosed by a fire-clay chamber conforming approximately to the shape of the muffle, which fits snugly into a recess in the front lining, and rests upon a ledge in the back lining. The back of the muffle is covered by a fire-brick slab, which fills out the back entrance, and is secured by an iron plate which presses the slab firmly against the back of the muffle by means of wing nuts.

The burner is similar to that of the melting furnace. Three burners project into a "well-hole" near its bottom horizontally, and at an angle by which a rotary motion is imparted to the flame. From this "well" the heat is forced into the space surrounding the muffle, and its equal distribution is secured by the shape of the lining.

There are many different sizes, and with a variety of shaped muffles, the lining in each case being adapted to secure the best possible results from the muffle used. All that has been said as to efficiency, economy, and perfect control of the other furnaces, applies equally well to this one, of course, and tests which we have witnessed, as well as the statements of those who have them in use, demonstrate their adaptability to the uses for which they were designed. They are so made that the muffle is very easily removed and replaced. A great many other forms of furnaces are made, many of them for special purposes, by the manufacturers, the American Gas Furnace Co., 80 Nassau street, New York city.

Twenty-four Inch Planer.

We illustrate by two views a 24" planer, recently brought out by the Lodge & Davis Machine Tool Co., Cincinnati, Ohio.

The cuts show it to be of heavy and substantial proportions, and it is only necessary to say that it has all the modern features usually found on such machines, including high belt speed; a feed which is released and runs without friction after doing its work, and has a range of $\frac{1}{16}$ " to $\frac{3}{4}$ " at a stroke; all motions of the saddle, head or platen are



GAS MUFFLE FURNACE.—SEE PAGE 1.

work without changing position of dogs. Holes are provided in the pockets, by means of which work of extra length may be fastened to the platen; and on the back side is a rack for keeping bolts, which will be found a convenience. The planers are built in three sizes—24", 32" and 38", and with any length of bed desired.

Cotton Production in Russia.

According to private advices to the *Boston Journal of Commerce*, the cultivation of cotton has been begun in the Trans-Caucasian districts of Russia upon an extensive scale. It has been found that the plant can be grown profitably, and now there are sixty-one villages in the district where the industry is carried on. Seed has been imported in large quantities from the United States, and is distributed freely to the farmers, who are otherwise assisted by the Government in their work. The yield to the acre is about 190 pounds of lint, and it is raised at an average cost of 5.4 cents per pound. The Government has also imported and erected American cotton gins and baling presses

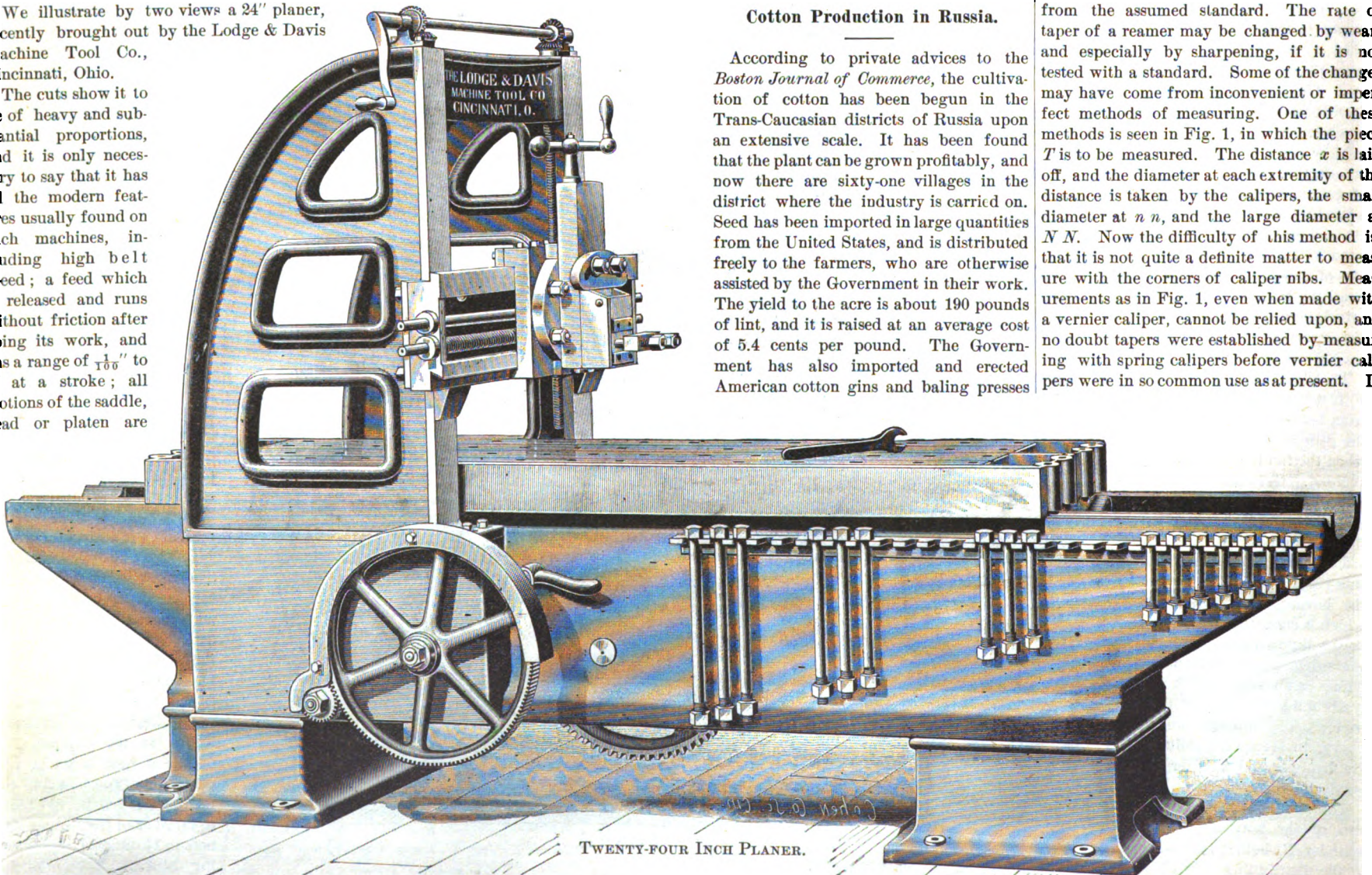
are now organized for the purpose of conducting the cultivation of cotton in this district, and warehouses are in the process of erection, in anticipation of a large business. Is it possible that American planters should have reason to fear a new competitor?

Tapers—Measurement—Soft Centers.

BY JARNO.

Would any lathe maker deliberately put ten different tapers in spindle-holes? We may not be able to tell just how such a thing as having so many tapers really did happen, yet I prefer to call it a happening, and not a purpose. There is a legend to the effect that a maker of harrows, for fear that they might be repaired by a country blacksmith, put in them half-inch bolts having nine threads to the inch. Gascon says that such a disturber, in order to complete his mechanical education, might well go to that mysterious country in which is everlasting summer accompanied by severe droughts. I do not quite understand Gascon's meaning; probably it is that the harrow maker should be pulverized under one of his own harrows. If there be in the world a lathe maker who would purposely add to the confusion of tapers, as did the harrow maker to the confusion of screw threads, I should say that there is at large one of Gulliver's Yahoos by inheritance, intensified by culture, and I would recommend that a missionary convert him in a converter. There are moral taints, as well as physical, that can be eradicated only by an ultimate chemical change like unto that which is made in the retort of nature.

In making the supposition that the great number of tapers came not by intention, we must be expected to show how they might have come by accident. I suppose that the lack of a plug or some other gauge for the taper was one of the first causes of a change from the assumed standard. The rate of taper of a reamer may be changed by wear, and especially by sharpening, if it is not tested with a standard. Some of the changes may have come from inconvenient or imperfect methods of measuring. One of these methods is seen in Fig. 1, in which the piece *T* is to be measured. The distance *x* is laid off, and the diameter at each extremity of the distance is taken by the calipers, the small diameter at *n n*, and the large diameter at *N N*. Now the difficulty of this method is, that it is not quite a definite matter to measure with the corners of caliper nibs. Measurements as in Fig. 1, even when made with a vernier caliper, cannot be relied upon, and no doubt tapers were established by measuring with spring calipers before vernier calipers were in so common use as at present. In



TWENTY-FOUR INCH PLANER.

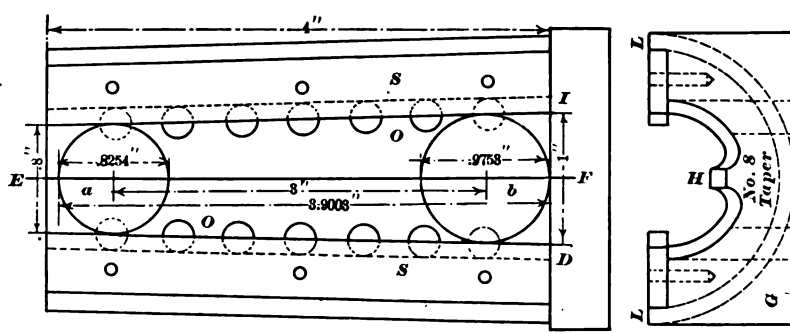
controlled from either side of the machine, the bed their entire length. Each shaft, with an arrangement of dogs by which the all its appurtenances, can be taken out intact table can be run forward for examination of in case it is desired to take the planer apart. for the use of the planters, who, it is said, have agreed to deliver the cotton when harvested at a fixed price. Thirteen companies order to know that we are measuring accurately, at the extremities of *x*, it is not enough that we be guided by marks upon *T*; a bet-

ter way is to put a caliper guide in the tool post of a lathe, hold *T* on the centers and move the carriage the distance *x* between two measurements. I have seen the distance between measurements laid off along one side, as at *y*, instead of along the center line *x*; this is not quite exact. A variation may have come from changes of the reamer in hardening. It is not many years since reamers were put to use almost directly from the hardening, the only sharpening being that given by a few strokes of an oil stone. Nowadays, reamers are ground, and inaccuracies from hardening need no longer exist.

An excellent gauge and an accurate method of making it may be understood from Fig. 2. The accuracy of this gauge rests upon a principle by which we can measure an angle as accurately as we can measure a diameter. Two disks *a* and *b* are made of such diameters and are placed at such a distance apart, that two straight edges, *SS*, touching each disk in two places at the same time, shall make with each other the required angle. No dependence is placed upon measuring with sharp corners, as in Fig. 1, and there is the same certainty that the disks are just touched by the straight edges as there is that the disks, when being measured, are touched by the nibs of the caliper. A gauge for an angle is also a gauge for a taper. Fig. 2 is of the angle that makes the taper one in twenty, or six-tenths inch to one foot. The straight edges should be not only of the correct angle with each other, but they should also be of the right distance apart. Let us have them one inch apart at the ends *DI*. The circle *b* is of such a diameter that a straight edge *DI* that touches *b*, and is square with the center line *EF*, will also just touch the ends *DI* of the straight edges *SS* when *DI* are one inch apart. The diameters of the disks and their distance apart is shown in the figure. The gauge is for No. 8 Jarno taper, .8" at the small end, 1" at the large end, and 4" deep. The body *G* has shoulders *LL*, against which the straight edges are held. The rib *H* along the middle of the gauge forms a rest for pieces that are being tested. Holes *OO* are through the body of the gauge to let in light, so that we can tell whether a piece fits. For any other size, or number of taper, the diameters of disks and their distance apart can be figured from those given in the cut, by direct proportion; that is, multiply by the number of the required taper and divide the product by eight.

In closing, I quote from Gascon, who, when he speaks, shows considerable spirit and gives some facts. One that has other qualities mingled with spirit we may like; but one that does nothing but show spirit we like to avoid. Much eagerness and little vigor may not make a good combination.

"After years of trial, I abandoned soft centers; if I were to go back to them, I should have the nightmare. While I was using them, they were trued up in their own live spindles, nearly every time that pieces were



TAPER S.
Fig. 2.

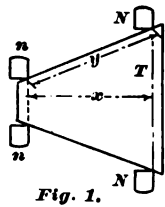


Fig. 1.

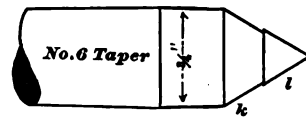


Fig. 3.

TAPERS.—SEE PAGE 2.

the point of the center would be thrown off to the floor. Seldom if ever did the angle of the center come right, after taking off the first chip, then one or more chips followed, at each the center becoming shorter. Often a file finish succeeded the turning—the sensation in seeing a workman file a center is very like that caused by a dentist that is filing one's tooth. After a soft center is turned, there is no certainty that it will remain true; for fear that it may be out of true, a too careful workman may turn it when it does not need to be turned. Too often have I seen a workman anxiously look at his lathe-center and then at his foreman; he was anxious because his turning tool had caught or because the dog had struck the tool-post. A soft center too easily springs out of true, being hardly stiff enough to stand the pressure of the dog in driving for a heavy chip. At last I changed to hard centers. If anything happens to a hard center, the hap is a break, which leaves no doubt in the workman's thoughts, as to what is to be done. A live center breaks no oftener than a dead center, which very seldom breaks. My live centers are now ground in their spindles by a device that is held in the tool-post, the grinding wheel being driven by a rubber roll that bears on the cone. The cone is put on its quickest speed and the back gears are in, so that the emery wheel shall turn fast and the center slowly. The centers are shaped like Fig. 3, the part *k* being turned below *l*, before hardening. Only the part *l* need be ground in the lathe spindle."

Classes for Practical Instruction at Boston.

Something less than a year since, we received a letter from James Duncan, Secretary of No. 1, of Boston, N. A. S. E., in regard to a night school for engineers, started in that city under the auspices of the Wells

Memorial Institute. We have recently received another letter from Mr. Duncan, and as this letter tells its own story, we publish as much of it as directly relates to the subject we wish to notice. It is always a pleasure to hear of or from men who are trying to pull themselves upward in the way indicated in this letter. In these times a man who does not progress is sure to go, relatively, backward. We advise every stationary engineer who finds it possible to connect himself with a school of this kind to do so; the value of systematic study in the line of one's work cannot be overestimated. Our correspondent writes:

Last December I wrote to you giving an account of the starting of a class in steam engineering by Massachusetts Association Stationary Engineers No. 1, of Boston, with the generous assistance of the Wells Memorial Institute, who gave us the services of Professor Peabody, and whose report of the success of the experiment you will find on page 18 of the annual report of the Wells Memorial Institute which I forward to you. I recognize that a good deal of the success in regard to the number attending was due to the notice in the AMERICAN MACHINIST. Robert Treat Paine, Esq., brought the report of Professor Peabody to the notice of the trustees of the Lowell fund, and so interested them that they donated money enough to pay the professors for the classes in the en-

matters will prompt you to help us now as you did then.

The circular relating to the school shows that there will be a class for carpenters, one for machinists and engineers, one for electricians and one for stationary engineers. These classes will meet on different evenings, so it appears that students may join more than one class. The circular concludes as follows:

Tickets may be obtained (free of charge) on application, on and after Nov. 4th, to Superintendent, to whom all inquiries should be addressed, at office, 987 Washington st., between 9 A. M. and 10 P. M.

Professor Peabody's report, to which reference is made, is on the whole very satisfactory as to the class of stationary engineers last winter.

It is always hard work to get ahead against popular sentiment. The managers of the proposed World's Fair in New York have, no doubt, found that out before this. With great persistency, the Site Committee stuck to their determination to use part of Central Park. The popular feeling was strongly against this; hence the work of raising the five million dollar guarantee fund has languished miserably. This is a fact that cannot be covered up by any amount of newspaper talk.

This fund ought to have been raised within forty-eight hours after the opening of the subscription books.

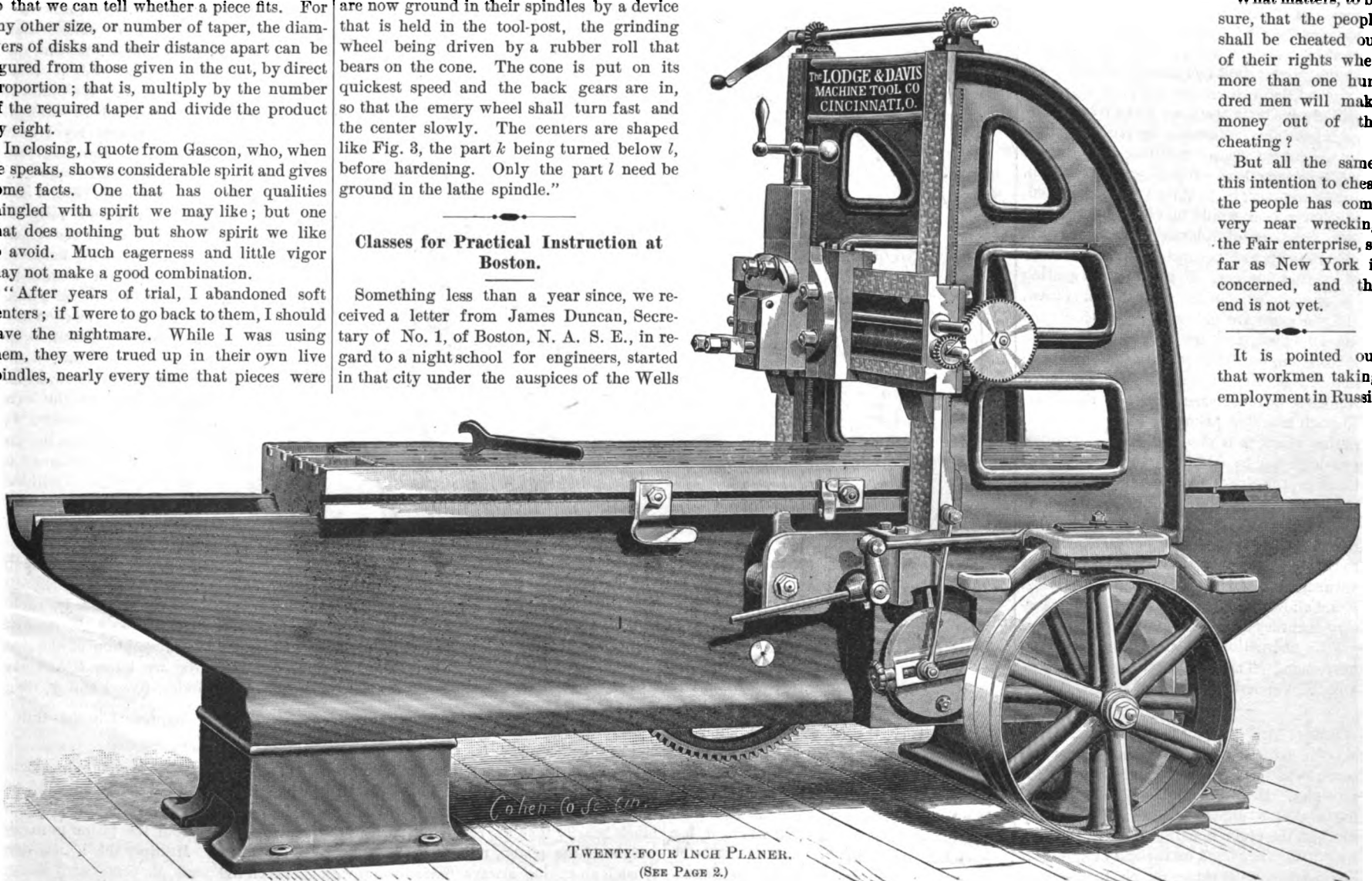
What a humiliating spectacle the frantic appeals for one-dollar subscriptions from poor working men and women to guarantee that first five millions present. And, as if this were not enough, it is plainly intimated by some of the daily papers who present this appeal, that the subscribers may never be called upon to pay their subscriptions, and that, in any event, only one-quarter of the amount will be called for at one time. All this for the first five million dollars required.

A few business men declared in favor of confiscating the people's playground. What matters, they say, a few acres of the park? Business will be increased from twenty-five to thirty-three per cent.

What matters, to be sure, that the people shall be cheated out of their rights when more than one hundred men will make money out of the cheating?

But all the same, this intention to cheat the people has come very near wrecking the Fair enterprise, so far as New York is concerned, and the end is not yet.

It is pointed out that workmen taking employment in Russia



TWENTY-FOUR INCH PLANER.
(SEE PAGE 2.)

to be accurately turned. It was a close job to adjust the turning tool so as to cut at the point of the center. Oftentimes the center would try to ride on the top of the tool, and

Memorial Institute. We have recently received another letter from Mr. Duncan, and as this letter tells its own story, we publish as much of it as directly relates to the sub-

closed circular. I must say that it was a fortunate day for us when the notice in the AMERICAN MACHINIST, of the New York class, appeared; and I am sure your interest in such educational

should insist on a written contract, otherwise they are likely to be unfairly dealt with, in case legal proceedings become necessary.