checked by glycerin. The addition of ⅛ glycerin at a temperature of 60° to 68° prevented the milk from souring for 8 or 10 days; even 2 to 2½ per cent retarded it essentially at 60° to 70°. A larger addition of glycerin, ½ or ⅛, had retarded it 6 or 7 weeks. The higher the temperature the more glycerin is required for the same effects.

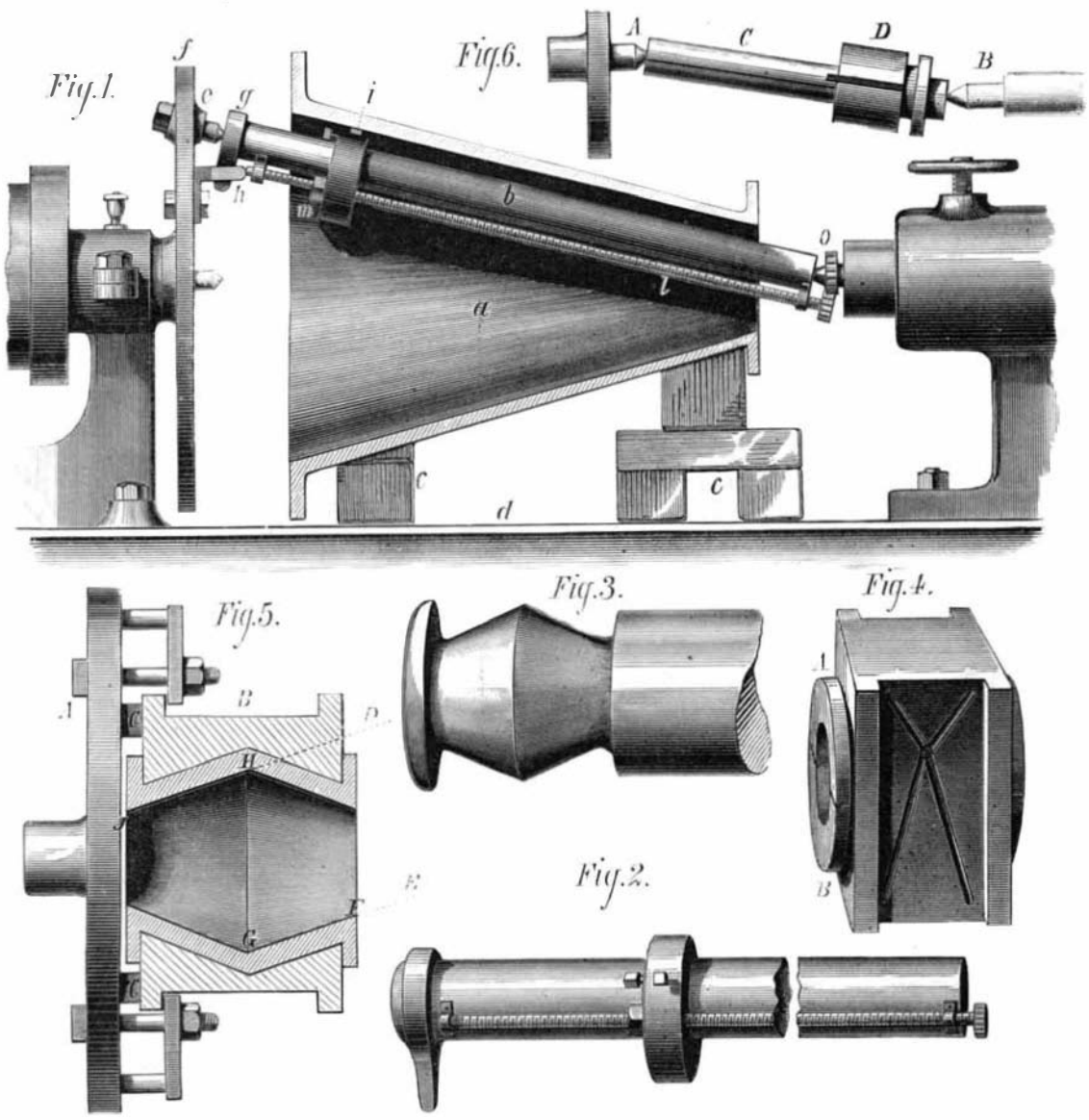
The alcoholic fermentation of the carbo-hydrate is also retarded by glycerin. A sugar solution containing fresh beer yeast and an equal quantity of glycerin had not given off any carbonic acid at the end of 48 hours.

Munk has also studied the effect of glycerin upon the decomposition of amygdalin by emulsion. This action being much more energetic requires more glycerin to stop it. By adding 2 volumes of glycerin to a mixture of emulsion and amygdalin, in which prussic acid would otherwise form in a few minutes, its formation was delayed 7 hours, and was slower afterwards than otherwise.

Finally, it was established that the diastatic action of pancreatic juice upon starch paste was retorted by glycerin.—*Industrie Blätter.*

SOME CURIOUS METHODS OF BORING TAPERS.

With the old-time method of setting a lathe to bore a taper by setting the upper slide of the slide rest out of parallel with the bed of the lathe, every machinist is of course familiar. That method has been superseded in lathes where many tapers require to be bored or turned by fixing the head and tail stocks upon a bed, which in turn swings by means of a vertical pin pivoted in a closely fitting hole provided in the lathe bed proper, so that from that center the bed or plate upon which the head and tail stock stand will swing out of parallel with the lower bed upon which the carriage slides. The advantage of this device, which is coming largely into use in the Eastern States, is that the center line of the lathe centers stands parallel with the work instead of at an angle to the same, as is the case when the upper part of the tail stock sets over, as is so common in ordinary lathes. The advantage of the new plan is that the centers do not wear large or get out of true, and therefore the truth of the taper with the parallel parts of a piece of work may be depended upon, no matter which part of the work was finished first or last. It sometimes happens, however, that a job will present itself which is not provided for in the construction of any ordinary lathe or machine; and here it is that the inventiveness of the workman is called upon to devise some means of doing the job without an undue expenditure for machines, tools, or appliances; and two noteworthy instances of such examples are presented in our engravings.



That shown in Fig. 1 is a case in which it was required to bore a taper casting for a cylinder for grinding pulp. It was about 8 feet long, the bore being 40 inches diameter at one end and 12 inches at the other. The small end necessitated the use of comparatively a very small boring bar and head, while the length demanded a strong stiff bar so as to bore the cone true and smooth throughout. The workman took a 6 inch iron shaft, see *b*, Fig. 1, its length being 9 feet 6 inches, turned it true and parallel, and cut in it a keyway from end to end for the feather preventing the head from revolving upon the bar from the pressure of the cut and relieving the feed screw of pressure. For a boring bar head an old eccentric was employed, a gib key being used so that it could not slide out from the eccentric while sliding freely in the keyway of the bar. The feed screw was made of a piece of 1⅛ round iron, the thread being cut by a common die of a bolt machine, and the screw was straightened after being cut. A common square nut was attached to the side of eccentric head (see Figs. 1 and 2) by a small machine screw, the nut being placed so as to push and not pull the eccentric when at work. A hole about 1¼ inch diameter was drilled through the eccentric for the feed screw to pass freely through, so that the irregularities of the feed screw were not felt on the bar, the nut being left able to slide a little freely in any direction to also accommodate defects in the feed screw, the machine screw before mentioned merely serving to prevent the nut from turning around upon the eccentric head, or the head from moving forward in case the tool lost the cut in any part of the bore of the cone; and in this way was a suitable boring bar improvised. The conical cylinder, *a*, in Fig. 1, to be bored throughout its whole length, was then laid upon the suitable wooden blocks *c*, *c*, and secured with bolts and nuts to the lathe bed, *d*, the center of its bore being set parallel with the lathe bed by placing a piece of iron in the lathe centers and setting the bore of the casting true with it by means of a piece of iron wire used as a gauge. Then a lathe center, *e*, was fastened in one of the radial slots of the lathe face plate, the center line of this lathe center being made to stand parallel with the surface line of the bore of the casting or cylinder The bar, *b*, was secured, the center was screwed by a nut on its end firmly to the lathe face plate, and the boring bar was secured firmly by a lathe dog, G, to the driver in the latter, also being bolted firm to the lathe face plate so as to prevent the bar, *b*, from turning upon its own centers. A feed motion or gearing was provided to the bar as follows: The feed screw, *l*, was provided with bearings affixed to the boring bar at each end, and on the dead center end which protruded through its bearing a small gear wheel was keyed. Another and suitably sized gear wheel was fastened on the dead center of the lathe so that the revolutions of the bar caused the feed screw to revolve in the usual manner, thus feeding the tool as the lathe revolved. The result was that a cone of unusual proportions was bored true and smooth at a slight expense, and throughout the whole operation no special care was needed, except to have the lathe center fastened to the face plate of the lathe pointing dead true to the center in the lathe tail stock, because any deviation from the center of motion in the dead center, O, would cause the boring bar to be too tight in one and too loose (between the lathe centers) in another portion of each revolution.

The second instance referred to was as follows: In cases where it is of great importance to prevent the end play of journals in bearings, it is not unusual to have the journals either ball-shaped or else V-crowned. In the instance under consideration the journal was of this latter form, as shown in Fig. 3, and the journal box was of the form shown in Fig. 4, in which it will be noted that the brasses, A and B, have flanges fitting outside the bore as shown. Now the ordinary method of doing such a job would be to chuck the box on the face plate of the lathe, setting it true by the circle (marked for the purpose of setting) upon the face of the brasses and by placing a scribing point tool in the lathe tool post and, revolving the box, making the circle run true to the point which would set the box one way, and then setting the flanges of the box parallel with the face plate of the lathe to set the box true the other way: to then bore the box half way through from one side and then turn it round upon the face plate, reset it and bore the other half; thus the taper of the slide rest would not require altering. This plan however is a tedious and troublesome one because, as the flanges protrude, parallel pieces have to be placed between them and the lathe face plate to keep them from touching; and as the surfaces of the casting parallel with the face plate were not trued up, packing pieces of paper or tin as the case might require had to be placed between the box and the parallel strips in the necessary places; and under these circumstances, ordinary ones as they are, to set the box and to unset it afterboring one side and reset it quite true to bore the other side becomes a tedious and difficult job. While several of the men were studying how to obviate the difficulty, one of the workmen offered to take the job contract for a price that was thought ridiculously low; but when he had the front end of the first box bored, the secret was found to be that he had discovered a way to avoid the second chucking, which was as shown in Fig. 5, in which A represents the lathe chuck and B is a sectional view of the bearing chucked thereon, *c*, *c* being the parallel pieces. Now it will be observed that the plane of the cone on the front end and on one side stands parallel with the plane of the cone on the back end at an exactly opposite diameter, as shown by the dotted lines, D and E. If then the top slide of the lathe rest be set parallel with those lines, we may bore the front end by feeding the tool from the front of the bore to the middle as marked from F to G, and then, by turning the turning tool upside down, we may traverse or feed it along the line from H to *g*, and bore out the back half of the double cone without either shifting the set of the lathe rest or chucking the box after it was once set; and this was the workman's secret and very successful it proved to be. Another workman in a different shop adopted for a similar job the plan of boring the front end as usual, and then, crossing the lathe belt, he ran the lathe backwards, used a tool with the face up as usual, to bore the back half of the box. This plan had the advantage that he could see the tool cut and perhaps work to a little better advantage in that respect; but this was more than counterbalanced by the trouble entailed in lacing and unlacing the belt to cross it (for the lathe had no reverse motion), and the liability of the chuck to unscrew, unless indeed it be provisionally fastened.

In lathes not having a compound slide rest, the device shown in Fig. 6 is almost invaluable for boring small conical holes or indeed for parallel ones if no reamer or standard bit is at hand. A is the running lathe center, and B the dead center. C is a mandrel placed between the two centers and having a keyway running along it as shown, the end at A is made square to prevent it from revolving with the lathe head and to hold it against the pressure of the cut by applying a wrench there. D is a sleeve, a neat working fit upon the mandrel, *c*, and is provided with a feather, a good sliding fit in the keyway of *c*, the duty of the feather being to prevent the sleeve, D, from revolving from the pressure due to the cut. Along D is cut upon its circumference a slot to receive a boring tool; to feed the sleeve, D, a piece of steel is fastened in the tool post and the end of it projects in the annular groove shown at one end of D. The amount of taper is of course regulated by the set over of the lathe tail stock. This device is so much stiffer than a boring tool that it produces a much better job and will take a heavier cut, nor is it so liable to spring away from the cut.

Population of the World.

According to recent careful computations, the population of the world is 1,423,917,000, or 28 persons for every square mile. The following table shows the populations of the great divisions of the earth:

Europe	309,178,300	Australia	4,748,600
Asia	824,548,500	America	85,519,800
Africa	199,921,600		

The combined populations of 1876 exceed those of 1875 about 27,000,000. The inhabitants of different States of Europe are divided as follows:

Germany	42,723,000	France	36,102,921
Austro-Hungary	37,700,000	Great Britain	35,450,000
Switzerland	2,699,147	Spain	16,551,647
Holland	3,809,527	Portugal	4,298,881
Belgium	5,336,634	Italy	27,482,174
Luxemburg	205,153	Turkey in Europe	8,500,000
Russia	71,730,980	Roumania	5,073,000
Sweden	4,383,291	Servia	1,377,078
Norway	1,802,882	Montenegro	190,000
Denmark	1,903,000	Greece	1,457,894

The population of Turkey in Europe, Asia, and Africa reaches 47,600,000 souls, of whom 20,500,000 are divided between Egypt, Tripoli, and Tunis, Asia having 13,000. The population of the Russian Empire is estimated at 85,586,000, or 900,000 over the population of 1875. The population of the British Indies numbers 289,000,000, that of China 405,000,000, and that of Japan 33,299,015. London has 3,489,428 souls, Paris 1,851,792, New York and Brooklyn 1,535,622, and Berlin 1,045,000.