Communications.

Our Washington Correspondence.

To the Editor of the Scientific American:

Besides the bills for amending the patent laws, referred to in my previous letters, many others are being introduced into Congress for the

EXTENSION OF PATENTS,

and for the reviving of old rejected cases. Among these, I notice that the application of Aikin and Felthousen, for an extension of their patent on sewing machines, has again made its appearance, as it has done every session for many years past. This patent, if extended, would lay the whole sewing machine interest under tribute, as no sewing machine can be made that people would now buy without infringing it. There does not, however, seem any probability of the success of this case, as neither Senators or Representatives are willing to grant any more extensions of sewing machine patents.

Rollin White is also on hand again with an application for an extension of his patent on repeating fire-arms, dated April 3, 1855, which, if granted, would give him the monopoly of the manufacture of all revolvers using metallic cartridges. A bill for its extension was once passed by Congress, but it was vetoed by President Grant, acting, it is said, under the advice of General Dyer.

Roxana Rice, as the widow of B. T. Rice, makes application for an act to authorize the Commissioner of Patents to extend the patent of said B. T. Rice for a paper bag machine, dated April 28, 1857, already once extended by the Patent Office.

Another bill authorizes the Commissioner to extend, for the benefit of Olivia C. Reed, also the widow of an inventor, the patent granted to her late husband for handcuffs. dated June 14, 1862.

The heirs of C. H. Davidson, the inventor of an enema syringe, have had a bill brought in authorizing the extension of his patent of March 31, 1857, which was once extended by the Commissioner of Patents.

C. Shunk has also applied for an extension of his patent on manufacturing iron and steel, which, I believe, covers the Bessemer process.

The heirs of the late W. A. Graham, who filed an application in 1837—*only* forty years ago—for a patent on a fire extinguisher, are again before Congress with a bill authorizing the Commissioner to grant a patent for his apparatus. This, if allowed, would cover every chemical fire extinguisher manufactured.

Another bill, similar to this, authorizes the granting of patents to W. W. Hubbell, for a "self-loading and self-firing gun," "a gun to load with great rapidity and effect," and "ammunition for the same," for which Mr. Hubbell alleges that he filed applications in 1853 and 1865.

A third similar bill has been introduced in favor of Stephen V. Benet, authorizing the issue of a patent to him for an improvement in cartridges, for which he made application April 14, 1866.

Another bill introduced into the House continues in force, for the full term of seventeen years, the patent of T. A. Weston, granted in 1867, for the well known differential pulley, as otherwise it expires with his English patent granted several years earlier.

THE AGRICULTURAL DEPARTMENT.

General Le Duc some time since opened a correspondence with many of the leading agriculturists in all parts of the land, and their ideas thus obtained are now being classified and digested, and the results will from time to time be published for the benefit of farmers generally. The Commissioner believes, from what he has seen in several trips made to different parts of the South, that the people of that region are fairly started on the road to prosperity, that public opinion is adapting itself to the new order of things, and that hands formerly soft and delicate showed, by their hardened condition, a familiarity with the handles of the plow and other similar implements that gave good evidence that the old ideas as to labor had undergone a great change.

The Commissioner has also devoted considerable attention to what he thinks may be a new industry in this country—the cultivation of the tea plant. He has been collecting data respecting it from various sources and finds that, so far as climatic conditions are concerned, a strip of country lying in the latitude of the northern part of South Carolina, and running from the Atlantic coast to the Mississippi, seems very favorable for the purpose, and the results of some few attempts in the cultivation of the tea plant that have been made in that neighborhood have been so encouraging, he thinks, as to remove all doubt as to the success of future efforts to produce it here. The Commissioner will, however, most probably find that the successful cultivation of the plant is not all that is necessary to the production of tea, but that the picking, curing, and preparing of the leaves for market is one of the essential points. I am under the impression that one of the most promising attempts to introduce the cultivation of tea, made some years since in California, failed from this reason. But it is possible, and indeed very probable, that our inventors may be able to overcome this difficulty by devising machines for picking, rolling, and curing the leaves, thus removing one of the main difficulties in the way to the practical cultivation of tea in this country; but if we have to perform these operations by hand, it is useless for us to try to compete with the cheap labor of China, even if we import Chinese laborers used to the business.

The commission sent by this Department to Southern New Jersey, to examine into the possibilities of beet culture in that section for the manufacture of sugar, have returned, and report that, while the experiments made last year were not pecuniarily successful, yet it is decided that the climate is favorable, and that the soil can be made so. At present, a large amount of the sugar used in this country is imported in the crude state, and therefore considerable interest should be taken in this matter, so as to avoid the loss of the large amounts of money annually sent out of the country to pay for the imported article. Under the efforts of the first Napoleon the manufacture of beet sugar became thoroughly established in France, and there seems no reason why it should not be as successful in this country.

THE GEOLOGICAL AND GEOGRAPHICAL SURVEY.

Dr. Hayden, the director of the above important work, has prepared his annual report to the Secretary of the Interior, of his operations during the past year. The most important of those in the field have been referred to from time to time in my previous letters. Of the office work, not so much has been said, although equally important, as but for it the world at large would remain ignorant of the results of the investigations carried on in the field. The publications of the survey during the past year have been quite numerous, consisting of more than 10,000 pages quarto, profusely illustrated. The reports, which are in an advanced stage of preparation, are two quarto volumes on the vertebrate fossils of the West, one on the fossil insects, and another on the rhizopods. The atlas of Colorado will be completed about February, 1878. The tenth and eleventh annual reports of the survey are well advanced, and will be printed and ready for distribution before the close of the regular session of Congress. The work of publication has been much delayed by the cutting off for the last two years of the amount heretofore appropriated for engraving.

THE SIGNAL SERVICE.

From General Myer's report, it appears that 159 stations have been maintained during the year to fill the system of stations of observation from which reports are deemed necessary to enable proper warning to be given of the approach and force of storms, and other meteoric changes, for the benefit of the agricultural and commercial interests. From the data thus obtained, 1,095 tri-daily reports, known as the "Synopsis and Indication," have been furnished for publication. These are based on the observations telegraphed in cypher from the different stations to the headquarters, where they are spread upon seven charts for study, from the result of which the "Synopsis and Indications" are sent out. The average time, elapsing between the moment at which the instruments are read at the outlying stations to that at which the reports are telegraphed to the press, has been one hour and forty minutes. Notwithstanding the little time thus consumed, but a small portion of which is given to considering the reports and making ready the "Indications," their truth has been verified to be on an average at the rate of 86·19 per cent, and it is hoped to bring the average as high as 90 per cent. Cautionary signals are now displayed at 47 different ports and cities, and of these, 78·91 per cent have been reported as justified. In addition to these reports and cautionary signals, by an arrangement with the Post Office Department 6,264 "Farmers' Bulletins" are distributed and displayed daily in as many different post offices, for the benefit of our agricultural population. The service has now in its care, and operated by its force, no less than 3,200 miles of telegraph lines.

From these figures some idea of the amount of work that has to be done by the signal service may be had. The importance and usefulness of it is now well known by every one, and it is hoped that our rulers, with their economical notions, will not decrease the facilities now possessed by it, but rather increase them, as General Myer requests. The late fearful calamity of the loss of the Huron might have been avoided had proper attention been given to the cautionary signals; and there is no knowing how many lives nor how much money has been saved by those who have heeded their warnings, nor what losses may be caused by limiting the operations and usefulness of the service.

THE LIFE-SAVING STATION.

The disadvantages of too close economy may also be seen in this service. From a desire to save money, the stations on the coast where the Huron was wrecked are not manned until the 1st of December, and the stations are not about half the number actually required. It is believed by the head of this service that if the stations had been manned, although it is probable no boat could have reached the vessel, that by the aid of the shot line, which would reach double the distance the vessel lies from the shore, many, if not all, of the lives of the crew could have been saved. If the stations had been manned, as they would have been but for the false economic ideas now prevailing, the discovery of the wreck would have been made shortly after the vessel struck, as a constant patrol is kept up along the beach every night, and immediate attempts to help the crew could have been made. Instead of this immediate discovery and relief, seven and a half hours elapsed between the striking of the vessel and the discovery of the wreck, during which time there is no doubt but that a resolute crew trained to the service could have rendered such efficient help as would probably have saved a majority, if not all, the lives lost on the ill-fated vessel.

MORTALITY OF THE NEGRO.

A recent report of the Board of Health of this city calls attention to the alarming death rate of the negro population. From the statistics, which are kept with great care, it appears that, while the death rate of the white population is only 18·27 per cent, that of the colored is as high as 44·50. Of 119 still birth investigations by the sanitary inspector, 107 were colored, while, reckoning according to population, the still births would be as 23·77 of the black to 31·04 of the white. This heavy death rate is not confined to this city, but is equally well known in other parts of the country to those who take an interest in the wellfare of the colored people. Mr. Redfield, the well known correspondent of the Cincinnati *Commercial*, contends that the race is doomed to extinction, and, to sustain his view, states that from 1850 to 1860 the rate of increase of our colored population was 25 per cent, but that in the succeeding ten years the rate fell to 10 per cent; and as many reports concur in showing that there are more deaths than births among these people, it seems probable that our next census will show an actual decrease in this class of our population. This excessive mortality among them in this city is, no doubt, owing mainly to their great ignorance of sanitary laws; the overcrowding of their houses, ten or a dozen frequently occupying one small room; their living, as a majority of them do, in filthy back alleys, and in huts utterly unfit for human habitation: their irregular mode of living, half starving frequently, and then, as soon as a little money is procured, as the result of some chance job, spending every cent in a feast for the day, without a thought of the morrow; and, lastly, to their radicall weak constitution, which causes them, as soon as any serious sickness touches them, to give right up and die off like rotten sheep. Outside of the cities they do not probably suffer so much from overcrowding as they do in them, but other causes step in and overbalance the point.

Washington, D. C. OCCASIONAL.

Locomotive Economy.

To the Editor of the Scientific American:

The query is often made as to what can be done to render the locomotive more efficient. Letters are frequently received asking for an opinion upon some detail pertaining to the improvement of this machine.

As to its general arrangement, with its horizontal cylinders and outside connections, the modern locomotive cannot be much improved probably. But while it requires some 120 lbs. pressure to the square inch in the boiler to realize an average maximum of 70 or 80 lbs. to the square inch against the pistons, it is quite clear that there is a chance for some improvement in its supply apparatus between the steam chamber of the boiler and the pistons. It is of course well known that the nearer the initial or maximum pressure in the cylinders can be made to approach the boiler pressure the greater the economy and efficiency of an engine. As the supply apparatus is now proportioned and arranged, there is a steam pipe some ten feet long and five inches in diameter (more or less according to the size of the engine) between the throttle valve and the cylinders, which must be filled with steam every time the throttle valve is opened before the steam can act upon the pistons; all of this steam (some two or more cubic feet) must of course be discharged at the exhaust nozzle with that in the cylinders as often as the throttle valve is closed.

The amount of steam directly lost here, in addition to the loss from low effective pressure, must depend upon the frequency of starts and stops and upon the degree of expansion the steam has attained when discharged; but the chief loss is in the low percentage of the boiler pressure utilized. If an auxiliary throttle valve for common use were placed near the cylinders, and the steam pipe enlarged and kept fully open to the steam chamber of the boiler during working hours, as high as 90 per cent of the boiler pressure could doubtless be made effective, instead of 60 per cent as now. In other words, from 20 to 30 per cent less boiler pressure would suffice for doing the work of the engine. The saving of fuel would, of course, be in like proportion.

F. G. WOODWARD.

The Keely Motor Deception.

To the Editor of the Scientific American:

I notice in some of my exchanges that "even the SCIENTIFIC AMERICAN was deceived by the Keely Motor." Now as I have never seen where you have even ventured a suggestion of the possibility of the success of a machine so wholly at variance with the known laws of natural philosophy, I would be pleased to see your position from first to last clearly proclaimed. S. H. H.

Our correspondent cannot be a very attentive reader of the SCIENTIFIC AMERICAN if he supposes that we have endorsed or supported so gross and palpable a deception as the Keely Motor. He will find our views sufficiently expressed if he glances over some of our back numbers.

Effect of Glycerin upon Fermentation.

Munk has observed that if cheese be added to a solution of milk sugar, and enough carbonate of soda added to give a distinctly alkaline reaction, and then mixed with an equal volume of pure glycerin, neither lactic nor butyric fermentation results for three weeks, even at a temperature of 104° C., whereas without the glycerin the formation of lactic acid can be recognized in 11 or 12 hours. Small quantities of glycerin merely postpone fermentation.

The spontaneous fermentation of milk is very energetically

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.

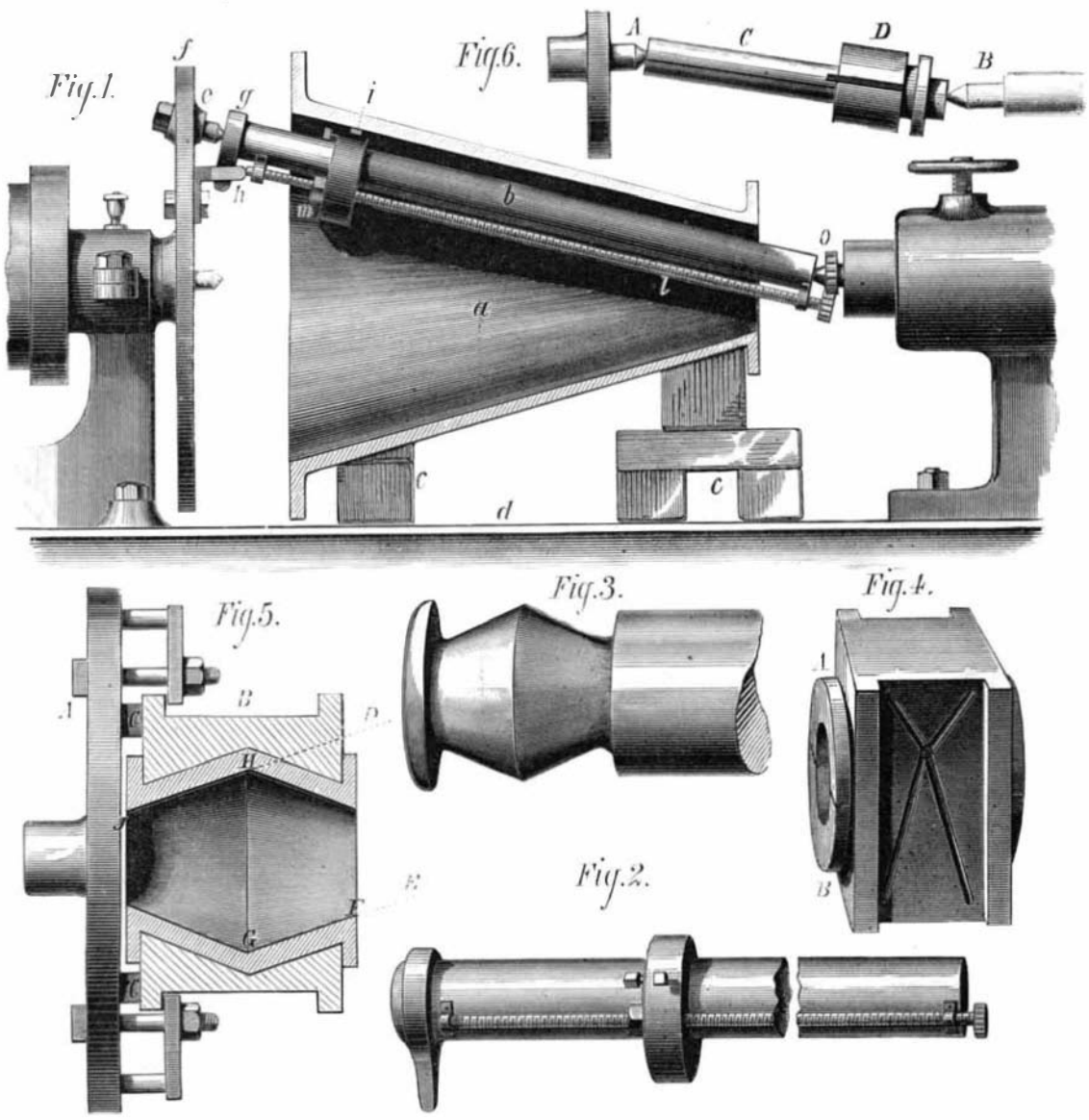
The alcoholic fermentation of the carbo-hydrate is also retarded by glycerin. A sugar solution containing fresh beer yeast and an equal quantity of glycerin had not given off any carbonic acid at the end of 48 hours.

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 after boring 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.