ROOM FOR INVENTION.

We frequently hear the remark that the time will soon come when the course of invention will be run; when, like Alexander, inventive genius will weep, because there are no more worlds to conquer. The fact that iron fingers have in so many branches of industry been made to perform tasks once done by bone and sinew; that electric throbbings have outstripped the fleet messenger in business affairs, and the iron horse with food of burning coals carries the love-letter and the meal-sack, where once the out-fed country steed galloped along the hard-beaten road. These facts are impressive and suggestive, but not convincing on the subject of an ultimate limit to inventive usefulness or inventive power. The ball of progress in rolling along has wrapped about it many a layer of ideas formed into tangible facts; but the periphery grows, and the capacity for enlargement grows with it. As the circle of knowledge widens, the illimitable space beyond still more increases, and there is both more to learn and greater ability to learn it. If the *needs* of man were the sole gauge of his demands, there might well be a point at which invention, satisfied with granting all needful things, would be compelled to rest. But "to want" means both "to lack" and "to desire;" the food and shelter and clothing absolutely requisite develop into luxuries of palate and æsthetic taste. The rude needle of bone that sewed with sinew the boar-skin cloak and made of it a definite garment, was an invention that might have sufficed in its line, had the skin-garment satisfied; but demand and supply are commensurately progressive; each surpasses each, onward in the march of progress; and now we have that household companion, the sewing machine, purring like a kitten, while basting, sewing, hemming, gathering, tidily at high speed; this modern sewing machine being as legitimately the development of the bone needle, as the fashionable garment of to-day is the outgrowth of the fig leaf of Eve and the skin covering of her son.

Our wants have become artificial. With successive generations, luxuries develop into customary grants and eventually become necessities. Our condition is ameliorated, and hence our appreciation sharpened, while certain faculties have become dulled and invention must supply their places or their deficiencies. Where invention has produced an effect, it is for invention to extend and perfect it. Thus, in every walk of life it is for cunning brain and deft fingers to effect new combinations or perfect the old, fearless of thwart or limit. In proof that with improvement criticism becomes more keen, and demands more imperative, we have only to look about us for promising fields to engage the inventor. While the harvest of golden grain no longer falls before the classic sickle, and the hay maker has ceased to be a picturesque inspiration for the poet—the root-crops still demand personal delving and grubbing, and the ripened fruits still call for human pickers to pluck them one by one. For the inventors who would devise a mode removing half the blossoms from a peach tree, without injuring the buds which form the next year's bearing stems, there awaits a magnificent prize. Ramie and other fibers still defy the textile art; and the gorgeous aniline dyes fade with a summer's sun. Household fires, once synonyms of health and cheerfulness, are now gloomy and noxious monuments of our heedlessness of things sanitary. Those domestic conveniences that should minister to our comfort and well-being, poison us insidiously but surely. Our vaunted gaslights blacken our paint and kill our window plants, while in the street, the pipes which lead the gas destroy our shade trees. Our sewers and our drains are confounded in name and in use, and both of them are poisonous. Our chimneys breathe forth smoke which is unconsumed fuel, and hence wasteful. Our steam-boilers, with partly consumed fuel, supply our engines with wet steam, and the engines (whose cylinders have to be supplied with oil, through faulty design and workmanship) waste part of the remainder. Our horses, shod with no regard to humanity or for tractive effect, draw wagons or cars which rattle our teeth out, on roads or rails which rattle the vehicle to pieces. The explosives which long ago were constrained to throw hurtful missiles, have but in one instance—blasting—been employed in peaceful work; if we may except the gunpowder pile driver, the precursor of a long line of explosive motors yet to come.

For these and hundreds of other evils, inventive genius must provide the remedy; and as new and artificial wants arise and develop into necessities, upon the inventor, ever in the vanguard, devolves the duty of exploring the land of the possible and providing for the legions of the actual.

It might be said that as science falls into the ranks of knowledge, and art after art is added to the forces of man, the field of true invention would narrow, and that of improvement, combination and application correspondingly widen. And this distinction may not perhaps be improper to draw, nor inappropriate to apply. Certain it is, that as observation and experience lay down the facts, and reason deduces therefrom the theories and evolves from these again the laws which govern things tangible and forces intangible, the plane of the inventer will rise higher and higher, and his usefulness will never diminish. It is to him that races unborn, nations unformed, countries unexplored, look to for their betterment and the achievement of their substantial welfare. Through him the antagonism between man and man—the foul distinctions of caste and class—will be swept away; and better men, under better lives and higher pleasures and comforts, achieve the destiny written for them in the days when the rocky ribs of this earth were formed.—*Polytechnic Review.*

A PLANING MACHINE GRANITE.

The Boston *Advertiser* for January 2d, contains, under the head of "Granite Planed Like Wood," an article on a new machine for planing stone rapidly, built on the principle of the wood-planing machine. The article begins by saying that when swiftly revolving knives were first made to do the work of horizontal planes upon plank and board, great wonder was expressed, and the planing machine came at once to be the talk of town and country. We have all become used to that and see no impracticability in the use of steel vs. wood in the rapid displacement of the rough surface of the latter.

Next in order one might reasonably expect that some ingenious man would devise a method for the cutting of soft stone, such as freestone, sandstone, and the like, but that chisels or tools of any sort that could be made, would, when driven, dull quickly, and render the operation practically of little value. Such a plan for the cutting of marble could not be entertained, for the hard material must be removed by well directed strokes from a powerful arm. The inventor of the above mentioned machine has now shown what may be accomplished. Disdaining, as it were, to meddle with softer substances, he selects for the test of his invention the hardest of all—granite, and the hardest granite at that—Hollowell. Easily and simply as the surface is removed from a pine board and caused to fly off in chips, the flinty roughness is made to leave the face of the great block, and only a fine powder remains to prove that a strange work has been done by the ingenious application of steel. "If there could be made a tool that would not require constant watching and very frequent sharpening, you might plane granite," said a practical granite cutter. The inventor showed him that for 45 minutes his machine could run continuously and the tools be uninjured, and he was not a little surprised to note the amount of work done by the machine in that short space of time. The tools can be changed in a few minutes, and the whole machine at once put into operation.

INSTANTANEOUS PHOTOGRAPHY.

The remarkable success attained by Mr. E. J. Muybridge, of San Francisco, in the production of accurate pictures of horses in rapid motion, has stimulated other persons in a similar direction. The process has recently been applied by Gen. Abbott, of the United States Engineering Corps, for recording the effects of the most sudden and violent explosions by gunpowder and dynamite. The General has shown that however instantaneous an explosion appears to take place, it occupies, notwithstanding, a measurable amount of time, which can be readily measured and the accompanying effects accurately recorded by this new application of the camera.

Among other experiments, Gen. Abbott employed that instrument to make a series of pictures of the different stages of the explosions of submarine torpedoes. In order to accomplish this, according to the *Manufacturer and Builder*, and in order to make six pictures, he had a key-board constructed like that of a piano, consisting of seven keys. The pressure of each of the keys closed a circuit; that of the first key went to the torpedo and exploded it; the remaining six keys were each connected with a fuse, which sustained by a thread the screens of six cameras, prepared to take pictures of the explosion. Any of these keys, when touched, ignited the fuse, which disrupted the thread and dropped the screen; in the latter was a hole, passing before the objective of the camera, giving, during that passage, an exposure of which the time was estimated to be at most the one-twentieth of a second. If, now, the keys of this key-board were rapidly played, all the seven keys could be touched in succession, in any previously determined velocity, always giving first the explosion itself, and then the exposure of its effects in the cameras in successive periods of tenths of seconds, or more or less, as desired.

The first experiment was with the explosion of 500 pounds of dynamite, estimated equal to 5,000 pounds of gunpowder, and the pictures taken at intervals of one-tenth of a second, so that all the successive pictures were taken in not much more than half a second. This is not even a very rapid succession, as almost any pianist can easily play twice as many successive keys in that time. The result was an explosion in the pictures of all the successive results, analyzed and in order. Among other curious effects, the photographs showed that a plane horizontal force was developed by the explosion.

Other experiments showed that depth was an important factor. The torpedoes were exploded near together, one three and the other six feet deep; the first threw up a column of water twice as high as the latter. To ascertain how a torpedo affected a hull, or broke up a ship, two charges of 50 pounds each were placed three feet under the bottom of a hull. The eye saw nothing but a confused outburst of water, by reason of the persistence of images on the retina; but the photographic camera was very much quicker than the eye, as proved by the series of photographs, which showed the whole manner in which the hull yielded to the shock, the shape and position of the different fragments while flying up in the air and coming down again. All this was distinctly pictured in the series of photographs; still, from the time the torpedo was fired until the pieces had come down, only about two seconds elapsed, while in four and one-half seconds the water where the vessel floated was quiet again.

Behm & Wagner's tables have lately been published, and show a total increase in the population of the earth of 15,000,000, partly arising from natural growth and partly from the showings of new and more exact censuses.