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Heavy Fly Wheels and Grist Mills.

While some correspondents have written to us stating that heavy fly wheels were positively necessary to prevent backlash and to produce equable motion in flouring mills, Messrs. Hatfield & Smith, of Cuyahoga Falls, Ohio, inform us by letter, that after several years' experience, they have formed the opinion that "a heavy fly wheel is but a poor remedy for a badly constructed steam engine." They assert that if a steam engine is properly proportioned, with the valve arranged for the work it has to perform, it will run well with a light fly wheel. The performances of the mill engine described on page 208 (whereby ten bushels of wheat were ground to each bushel of fuel consumed), they consider good. They (H. & S.) have put up an engine of 12-inch bore cylinder, 24-inch stroke, boiler 26 feet long, 42 inches in diameter, with two 16-inch flues, set in brick arch, which turns out sixty barrels of flour in twelve hours running, using thirty bushels of slack or dross coal, which only costs one dollar per tun in that place. This mill belongs to Mr. Thayer, of Akron, Ohio. If we allow four bushels of wheat for each barrel of flour made, no less than eight bushels of wheat are ground to each bushel of slack consumed. This is doing good work certainly. They have also put up quite a number of engines of the same character for other parties, both for grinding grain and sawing wood, in which coal, wood and sawdust are employed for fuel, and with the same satisfaction as to results. They gear their engines for the piston to travel at the rate of five hundred feet per minute; cut off steam at half stroke, and use a single slide valve.

A Good Sign.

The editor of *Hall's Journal of Health*, an excellent monthly, published in this city, says:—

"In passing through the city, or entering houses for the first time, we find ourselves deciding upon the character of the inmates from the newspapers we see at the door, and the periodicals lying about; and we feel a guarantee that there is refinement and elevation within when we see the *Home Journal*, *SCIENTIFIC AMERICAN*, *Musical World*, *Littell's Living Age*, and publications of that stamp. These four might be profitably taken by every family in New York, and ought to be taken in thousands where they are not; for they are always chaste, always instructive; nothing in them to blunt the moral sense, or offend our religious sentiment. In these, and some one good religious newspaper, there is as much reading of this sort as the generality of our households can profitably indulge in."

THE next meeting of the American Association for the Advancement of Science will be held at Baltimore, Md., on the last Wednesday of this month (April).

JAY'S MORTISING AND BORING MACHINE.

Fig. 1

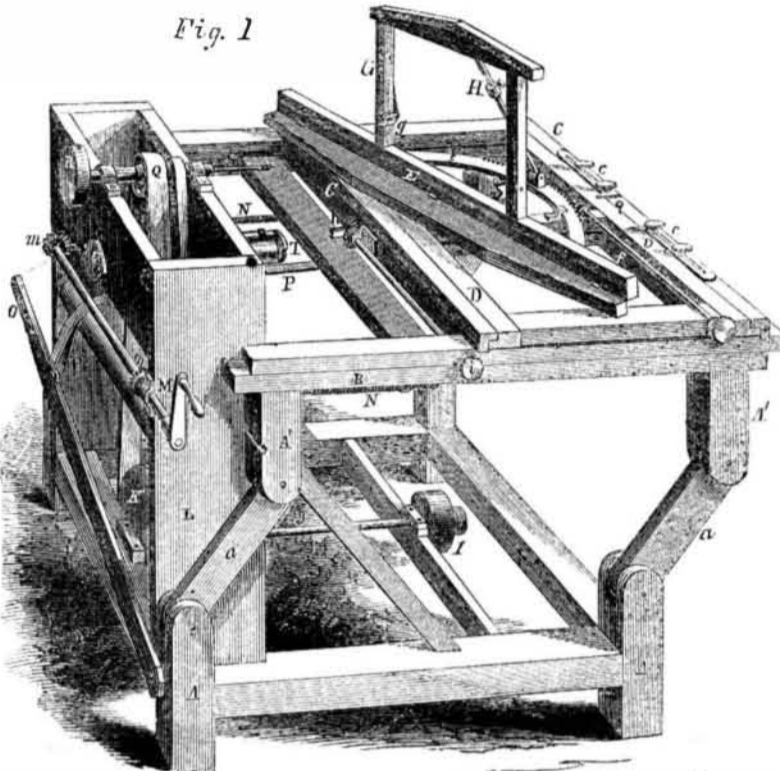


Fig. 2

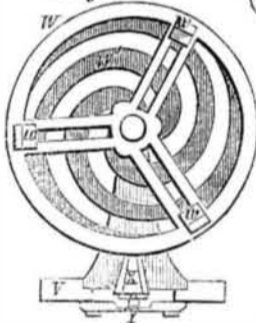


Fig. 6



Fig. 3

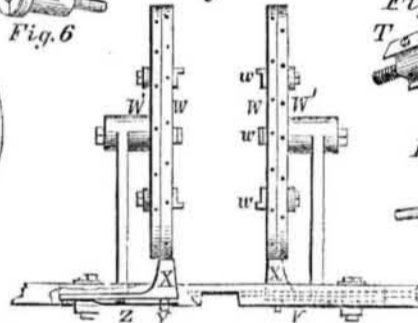


Fig. 5



Fig. 4



The number of machines which will perform many operations, and combine within the limits of a compact frame, appliances which render them useful for a multitude of purposes, are daily becoming more numerous. Amongst the most prominent of these is the machine we are about to describe, which is the invention of J. M. Jay, of Canton, Ohio, and was patented by him July 28, 1857.

Of our engravings we will describe first the perspective view, Fig. 1. A are four legs bound together in a frame, and having hinged to them links, a, which are again hinged to the legs, A', of a supplemental frame. To B are secured cross slides, C, one of them having two small sliding stops, c, upon it. In these slides there moves the frame, D, carrying a frame, E, provided with a cogged arc, F, so that it can be set at any angle by the rod and worm wheel, f. G is an upright stand for holding stuff, and being provided with two spring-fastened angular catches, g, and so arranged that it can be placed at any angle by means of the sliding bar and screw, H. There is a small stop screw which regulates the depth of the mortise, seen at h, and operated by the milled head, i. The frame, B, can slide to and from the tool on A', and it is generally held back by two spiral springs, not shown in the engraving.

I is a band wheel on a shaft, J, that receives

the power, and gives motion to K placed in a vertical frame, L; this frame, L, also carrying a shaft, M, that has two bevel wheels, m, upon it, by turning which, the screws, N, are rotated, and the frame, A', raised or lowered to the tool. O is a lever, having a band, P, attached to it, the other end of which is connected with the back of B, so that by depressing O, the frame and contained stuff is brought against the tool. Q is a band, which passes over one tool arbor that has a wheel, R, on one end, so that the machine can be driven by hand, and a tool, S, in a recess in its other end. The belt, Q, communicates with K, and derives its motion from it. T is a tool in an arbor below, that is operated by Q and also rotated by it. This lower arbor is placed in a sliding frame, U, so that it can be lifted up or down, and adjusted in the most desirable position. The stuff to be mortised is placed on the frame, E, at any desired angle, and by means of a pin in D, catching against the stops, c, the length of the mortise is determined. The two notched plates, g, are used in boring round stuff, and in fastening a chair pillar, when you wish to mortise one; the extra arbor cuts tenons of any thickness, by simply raising or lowering it.

Fig. 6 is a hollow auger for cutting round tenons. Fig. 4 is a tool for turning chair backs, and Fig. 5 smoothens or cuts any stuff.

There is an almost endless variety to the tools that can be employed in this machine, for the various purposes to which it can be applied. For the purpose of turning carriage hubs, the frame, D, has to be removed, and the face plates, W, (of which Fig. 2 is a front, and Fig. 3 a side view,) on the pieces, V, put in its place. These face plates are each composed of two pieces, W and W'; W having three slots, direct from the center to the edge, and straight, and W' having spiral slots, from the center to the edge; in these slots work slides or catches, w, so that by turning W' they will firmly grasp the hub, and a spring catch, X, fitting into the holes on the rim of the face plates, holds it secure while being shaped. Z is the spring of one of these catches, part of V being broken away.

This is a most convenient and compact machine. Any more information concerning it can be obtained by addressing the inventor as above.

Steam Squirrel Hunting.

A correspondent writing from Stockton, Cal., informs us that ground squirrels are so numerous in that region that they are a perfect pest to the farmers, as they destroy a very large portion of their crops. As much as \$100,000 are expended annually in California in purchasing strychnine, arsenic, and phosphorus, to destroy them, but these poisons seem to produce no useful result in diminishing their numbers. Our correspondent, however, has, we think, hit upon a plan, which, when he carries it out, will put them to route most effectually. He proposes to get a steam boiler of about four-horse power, mount it on a wagon, draw it out to the fields, get up steam, and conduct it into their holes by a pipe, and thus steam the "varmints" in their dens. These squirrels live in what are called "towns;" their holes are very numerous, and in clusters, and the passages underneath are all connected. By taking the steam pipe, therefore, and inserting it in a hole, then closing all the others in the vicinity, and letting on the steam, a whole community will thus be steamed at one operation. When this is accomplished, he will proceed to the next township, and extinguish its subterranean inhabitants in the same manner, and so on until the whole of squirreldom in that region is subdued by the all-conquering power of steam.

Discovery in Electricity.

Dr. C. G. Page, of Washington, D. C., has discovered that positive electricity will extinguish the flame of a lamp, and negative electricity will increase it. When the flame of about two inches high is charged positively, from a powerful machine, it is rapidly shortened to total extinction. When the flame is charged negatively, it is immediately enlarged, a portion of it being impelled down around the wick tube for the distance of an inch, and a portion also elongated above. This discovery, it is thought, may serve to throw some light upon the many unsolved caprices of lightning.

[The above is taken from the *New York Evening Post*, but we have also seen it in several other papers. Supposing the discovery to be true, we would really like to know what light it can throw upon "the many unsolved caprices of lightning."—Eds.]

The blasting necessary to obtain material for the construction of the harbor of refuge at Holyhead, North Wales, still continues; and on one occasion 200,000 tons of rock were blasted at once by 21,500 lbs. of gunpowder.

BELT COUPLING—Samuel Green, of Grand Rapids, Mich., (assignor to Silas B. Green, of Rochester, N. Y.): I claim the plate or stock, C, slotted and provided with tongues, D, one or more, corrugated at one edge, and provided with spurs, G, the whole being constructed, arranged, and applied to the ends, A B, of the belt, so as to act substantially as and for the purpose set forth.

[This invention consists of a metal plate or stock of oblong form, equal in length to the width of the belt to which it is applied, and firmly riveted to one end of the belt parallel with its edge. This plate or stock has one or more slots in it, in which slots tongues corrugated or grooved at one edge, and provided with spurs, are fitted. The opposite end of the belt is passed through the slot or slots in the plate or stocks, and, owing to its relative position with the tongues and plate, is firmly secured therein by the tension of the belt, and the two ends of the same are, consequently, firmly connected.]

TRACKS FOR CITY RAILWAYS—E. S. Gardner, (assignor to himself and John H. Gould,) of Philadelphia, Pa.: Disclaiming the exclusive use of a continuous tube with a slot on the top, as a device employed in atmospheric railways.

I claim forming between the rails of a city railroad track, an underground tunnel, and hanging a series of pulleys within the same, said tunnel having a longitudinal slot near the level of the ground, and being otherwise so arranged that a rope may be used for drawing the cars along the track, without impeding the passage of the vehicles across the same.

SHIP'S BULKHEAD—Charles Maliphant, (assignor to Thomas West,) of New York City: I claim the arrangement of two or more thicknesses of crossed planking, the interposed felt, or other equivalent material, and the stanchions with each other, substantially as specified, and for the purpose set forth.

EGG-BEATER—Patrick Mihan, (assignor to himself and G. Davis,) of Boston, Mass.: I claim the beating apparatus, constructed and operating substantially as described, in combination with the portable plate or cover A, so that it may be either held in the operator's hand, or placed on the top of a vessel.

REVOLVING FIREARM—F. D. Newbury, (assignor to R. V. DeWitt, Jr.,) of Albany, N. Y.: I claim the lever, L, formed and fitted as described, for the purpose of cocking the hammer, holding the same when it has been cocked by hand, rotating the cylinder, and holding the cylinder firmly in the act of firing.

I also claim the hammer, with its pin, b, in combination with lever, I, for cocking by hand. The combination of hammer, lever, ratchet wheel, and trigger, arranged substantially and for the purposes set forth.

RAILROAD CAR AXLE BOXES—R. N. Allen, of Cleveland, Ohio: I claim, first, The self-adjusting collar or washer, F, in combination with the slide partition, G, and packing, C, operating in the manner and for the purpose specified.

Second, I claim the box, B, and key, C, provided with articulating surfaces, G, in combination with the key, B, for the purpose of relieving the axle from strain, and of conveniently removing and replacing the box, B, and collar, F, by simply relieving the axle from strain, without removing it, the whole being constructed and arranged substantially as specified.

RE-ISSUES.

MACHINE FOR MAKING HAT BODIES—William Fasket, of Meriden, Conn. Patented January 23, 1846: I am aware that mechanical pickers of various constructions have been used in connection with pervious surfaces and exhausting fans, in the manufacture of hat bodies, and therefore do not claim such devices separately, or in their pre-existing combinations, as my inventions.

But I claim the described automatic method of forming hat bodies, having the required variation in thickness at their different parts, by supplying picked fibers to an exhausted former of the size and shape required, in such manner that a larger portion of picked fibers is supplied to that part of the former which corresponds with the thickest portion of the hat body, and a less portion to the other parts of the former, substantially as set forth.

I also claim the combination of a picking apparatus, a hat body former, an air-exhausting apparatus, and a conductor, the whole combined substantially as set forth.

I also claim a bow-string picking apparatus, constructed and operating substantially as set forth, to pick fur presented to it by a suitable feeding and nipping apparatus.

METHOD OF EMPLOYING CENTRIFUGAL FORCE IN CASTING IRON PIPES—Thomas J. Lovegrove, of Baltimore, Md. Patented November 30, 1852: I claim forming pipes, or other castings, by centrifugal force, by causing the mold into which the liquid material is poured, to revolve.

GRAIN SEPARATORS—John R. Moffit, of St. Louis, Mo. Patented November 30, 1852: I claim, first, The endless chains, d, composed of metallic links provided with protuberances or depressions, when used in combination with suitable driving pinions, to impart a positive motion to the straw-carrier of a thrashing or separating machine, as explained.

Second, in combination with a receptacle in which the tailings are deposited by the winnowing apparatus, I claim the arrangement of the screw elevator, a, in relation to the thrashing cylinder, for the purpose of returning the tailing to be re-thrashed, as set forth.

DESIGNS.

COPYING PRESS STAND—Charles H. Clayton, of New York City.

LEGS AND POSTS OF IRON BEDSTEDS—John P. Koch, of New York City.

ADDITIONAL IMPROVEMENT.

CLASPS FOR METALLIC HOOPS—James R. Speer, of Pittsburgh, Pa. Patented December 1, 1853: I claim bending the ends of the clasp across the apertures, b and c, so as to present an opening in the clasp for the insertion of the bent ends of the bands, at right angles, or nearly so, to the direction in which the bands are inserted in the clasp, in the manner and for the purposes described.

Lake Superior Iron.

Some very successful experiments have been made with Lake Superior iron ore, and marble as a flux, by which very excellent iron has been made by S. R. Gay, as we learn by the *Lake Superior Journal*. The experiments were made at Marquette, 411 charges being tried in a small furnace to test the flux, as it was supposed by many that it would not answer, but the iron was of a superior quality, and as the ore is plenty in that region, a great increase in the manufacture of the metal is anticipated. As marble is a carbonate of lime, there can be no doubt but it may be used for a flux in smelting where the common limestone cannot be obtained. For this purpose it should be reduced to very small pieces or to powder.

Ventilating Mines.

The thorough ventilation of our coal and other deep mines is a question of much importance, and is becoming more so every day, as our mining operations are extending very rapidly. In older countries, especially England, where deep mining has been carried on for a great number of years, on a very extensive scale, it would naturally be inferred that the utmost perfection in ventilating agencies would have been reached long before this period, but such has not been the case. It is only within the past two or three years that the greatest improvement yet suggested in ventilating mines has been carried out in that country. This consists in the employment of positive machinery for the purpose, which has been erected at the Abercarn collieries. It consists of a rotary fan driven by a small non-condensing steam engine; and it has been constantly at work, day and night, for more than two years, without once being stopped for repairs. The common method of ventilating fiery mines heretofore practiced, has been by a large fire kept burning at the bottom of an up-shaft, at such a distance from the main shaft that the air rushing down the latter to feed the fire, passed through all the workings, and then escaped in a rarified column through the up-shaft. This method is rude and inefficient, affording no remedy for an increase of air, except by enlarging the fire, and it is rendered useless by being extinguished when an explosion takes place—just at the very time when a greater quantity of fresh air is most urgently required.

The rotary fan at the Abercarn colliery was put up by the ingenious James Nasmyth, the inventor of the steam hammer; it is 13½ feet in diameter, has eight vanes, made of plate iron, each 3 feet 6 inches wide, and 3 feet long, fitted on a horizontal shaft. It is enclosed in a plate iron case, with large openings at the center, and trunks for discharging, something like our blowers for furnaces; but it exhausts from the mine, thus causing the fresh air to rush down the main shaft, and pass through the workings to the up-shaft. The mine is 300 yards deep, has seven miles of railroad in it, and fourteen miles of working courses. About 3,000 tons of materials—coal, iron ore, and fire clay—are raised from it weekly. The fan is driven at the rate of 60 revolutions per minute, and draws 45,000 cubic feet of air through the mine in that period. This quantity supplies an abundance of air for the miners; their health has been greatly improved, and they can now labor during a greater number of hours daily.

When an explosion takes place in a coal mine, the greatest danger of immediate suffocation to the workmen, arises, not so much by inhaling carbonic acid gas, as some have supposed, as by the lungs becoming clogged by inhaling fine flaky soot, which generally saturates the atmosphere. To avoid this danger, the miners who are not burned, generally cover their mouths and noses with their handkerchiefs, and lie down, but unless they receive a supply of fresh air very soon, they must perish. An explosion of some extent took place at the Abercarn colliery, since the above ventilating machinery was erected, but the flaky soot and foul air were abstracted, and the fresh air rushed in so rapidly that none of the miners lost their lives. It is believed that but for the rapid and effective action of the ventilating fan on the occasion, every person in the mine would have perished. The velocity of the fan can be augmented or diminished at pleasure; and as the mine is very dangerous, this is necessary, in order to supply an increased quantity of fresh air on a sudden emergency. Our mining companies would do well to pay much attention to this subject.

Laboratory—No. 1.

Atoms.—It is not derogatory to the human mind to say that it can neither comprehend great things nor small. It is a fact, that no man knows what an atom is; that is, an atom of any material in its smallest state of exist-

ence. Very few can comprehend the size of the earth we inhabit, or of the sun, or of the planet Jupiter, which immense orbs are but a collection of atoms, and which, after all, are only a few of the countless worlds of the universe. We can conceive the existence of a small particle of marble, or of wood, or of sugar, or paper; but when the mind endeavors to form a conception of the smallest particle of any of these materials, it falters. When again it considers that what appears to be the smallest particle of sugar or of marble can be further divided, and that, in reality, these materials consist of three other atoms of matter united to form one particle or atom of sugar, marble, &c., the idea is perplexing. It is an ascertained fact, that sugar consists of carbon, oxygen, and hydrogen; but the ultimate size of the atoms of any of these elements is beyond the mind's comprehension. Nevertheless, chemists give to atoms of all the elements an ultimatum, and assign to them a definite weight—that is, a weight by comparison of one to another. It is found that when one substance unites with another, it does so always in a definite regular proportion; thus one hundred parts of oxygen always unite with double their weight of sulphur, four times their weight of selenium, and eight times their weight of tellurium, and so on with every other element, sometimes higher in weight, and at others lower, as the case may be; but it never varies for each specific element. Hence, after numerous experiments performed with the greatest care, chemists have fixed an atomic weight to all the elements, which is the proportion with which they combine with each other; though of different weight, yet they are atom to atom.

SEPTIMUS PRESSE.

Difference of Sight and Hearing.

MESSERS. EDITORS—I am rather fond of trying experiments on myself, and in consequence make observations that would, perhaps, occur to few others. I have just made one on which I should like your opinion, and at the same time communicate the fact to your readers. My sight is very good, never by any chance do I use spectacles, and yet for the last fifteen years I have observed that I am long-sighted with my left eye, and short-sighted with my right eye; and I can hear the ticking of a watch at a greater distance with my right ear than with my left. I should like to know if this is a common occurrence.

L. R. BREISACH.

[The reason that one eye or ear is more sensitive than the other, is because each has a separate nerve, and one of these may be constitutionally stronger than the other, or one can be weakened by a bad light on one side, or too much exercise of the one member. As to the commonness of the occurrence, we never heard of the fact observed by direct experiment before; but any of our readers can try for themselves, by holding a watch at gradually increasing distance from each ear, until the ticking cannot be heard, and noting distance each side; a small ink-spot on a sheet of white paper will serve to test the eyes.—Eds.]

How to Raise a Fallen Horse.

We have seen it recommended by a gentleman who has had much experience in the matter, that when a horse has fallen from the slippery state of the ground, the readiest method of enabling him to rise is to put an old rug or carpet under his fore feet, and he will be able to get up at once. Many horses are seriously strained by their efforts to rise on slippery ground, and this is most particularly the case with those of high spirit, and frequently those of greatest value are so frightened by the fall that greater injuries to themselves, as well as danger to those in the carriage, ensue from vain efforts to get them up than by the fall. Let the driver leap down at once, and assist the horse to get in position to get up, at the same time placing the rug, carpet, or even an old coat, under his feet.

Recent Patented Improvements.

The following inventions have been patented this week, as will be found by referring to our List of Claims:—

WALKING STICK GUN.—Robert R. Beckwith, of New York city, has invented a new walking stick gun; and although we cannot explain it so as to give any definite idea of it without the aid of drawings, yet we can say that it is very simple, and the mechanism to effect the cocking and letting-off of the hammer to fire the gun, is also of very simple construction.

DAMPER FOR AIR-HEATING FURNACES.—The object of this damper is to prevent the over-heating of air in the hot air conducting pipes of air-heating furnaces, when the register of the pipes is wholly or partially closed. This over-heating of the air in the closed pipes is attended with dangerous consequences, as adjacent woodwork is frequently ignited, and buildings are burned down, which is a great objection against the use of such furnaces for warming buildings. The invention consists in placing in the lower part of each hot air conducting pipe, a valve or damper, hung on an axis in nearly an equilibrated state, so that when the register of the pipes are closed, and the draft through them consequently stopped, the dampers will close by their gravity, and shut off the pipes from the air-heating chambers, and when the registers are fully, or more or less open, the dampers will be opened to a corresponding degree by the draft. It is the invention of Ebenezer Barrows, Jr., of Brooklyn, N. Y. An engraving of this invention will shortly appear in our columns.

COTTON GIN.—This is an improvement in what is known as the "roller gin," for ginning Sea Island or long staple cotton. The object of the invention is to expedite the process to a very considerable degree, without injuring the staple or fiber. The object is attained by the use of a roller, vibratory stripper, pressure plate, yielding feed-board, and screw, used in connection with doffers. Hiram W. Brown, of Millville, N. J., is the inventor.

CUTTING THE LEAVES FROM SUGAR CANE.—Calvin Dickey, of Mercersburg, Pa., has invented a machine for the above purpose, previous to crushing or grinding the stalks for sugar. The invention consists in having a cutter attached to a tubular flanch, so as to form a hollow cutting cylinder—this cutting device being connected with a grinding or crushing mill in such a way that the stalks of sugar cane will be drawn through it by the rollers of the mill, and the leaves will be cut from the stalks.

MACHINE FOR TURNING TOOL HANDLES.—Hiram Plumb, of Honesdale, Pa., has invented a new machine for the above purpose. It consists in the employment of a series of cutters combined with a pattern and stops, so that the desired articles can be readily turned and cut successively from a bolt or stick, in an expeditious and perfect manner. The invention also consists in a peculiarity of the finishing tool, whereby the articles, as they are finished, are cut off from the bolt, and they present at their ends a smooth and finished appearance.

REVOLVING CYLINDER STEAM ENGINE.—This invention consists principally in two hollow stationary steam heads, applied and arranged to serve as journals for the main drum or fly-wheel of the engine, and bearings for the cylinder journals, while they also serve as valves to effect the eduction and induction of the steam to and from the cylinder. The inventor is Thomas Rogers, of Philadelphia, Pa.

The great iron district of South Wales has suffered from strikes very severely, and at the present time the men are only just coming back to work after a very protracted strike, the cause of which was a reduction of wages. This was a necessary consequence of the late hard times, but we are glad to chronicle the fact that the iron trade throughout the world is again on the improving scale.