(No Model.) 2 Sheets—Sheet 1.

J. W. OSBORNE.

PRINTER'S CHASE.

No. 516,106. Patented Mar. 6, 1894.

Fig. 1.

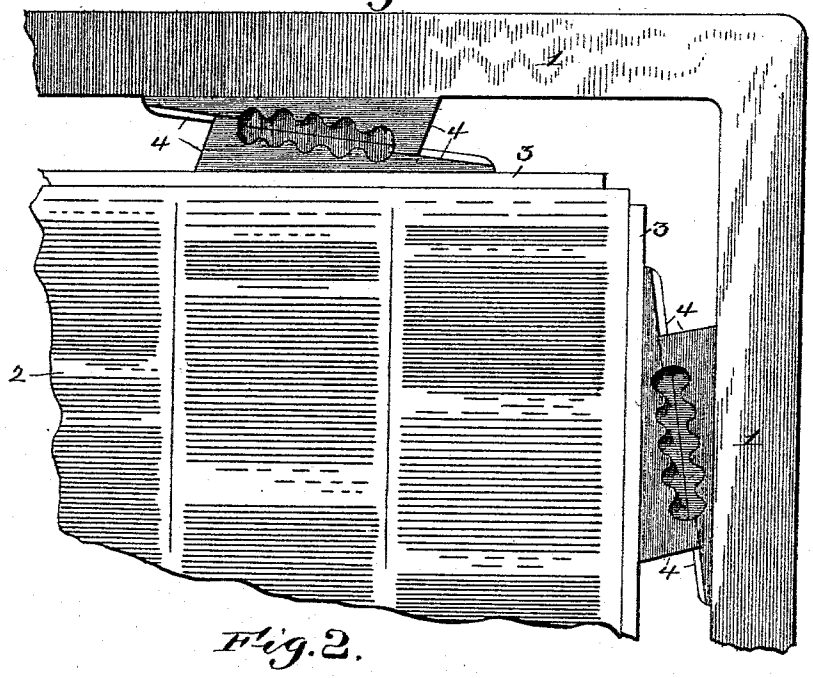
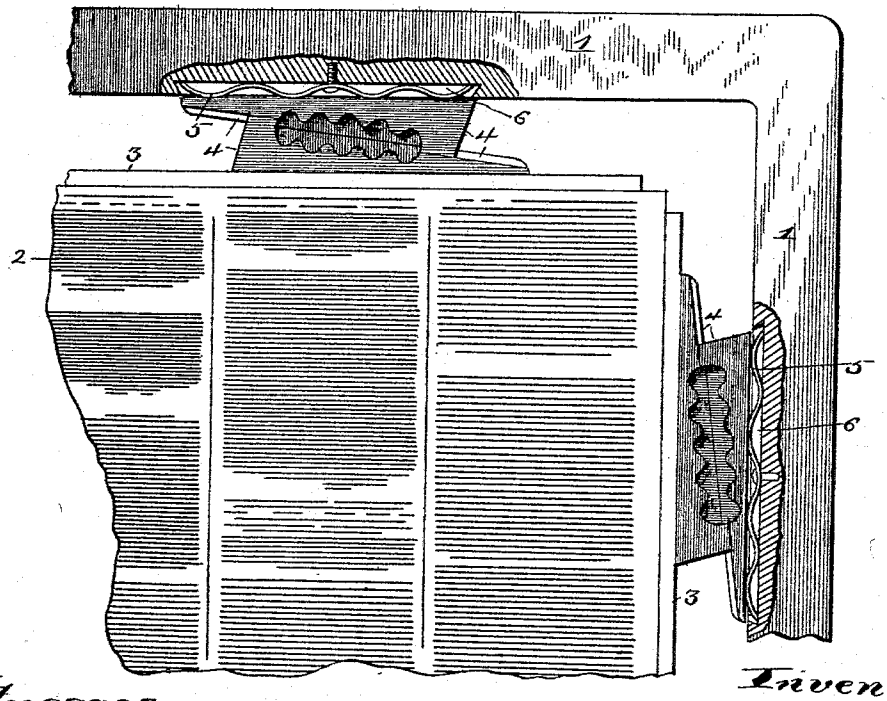


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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PRINTER'S CHASE.

No. 516,106. Patented Mar. 6, 1894.

Fig. 3.

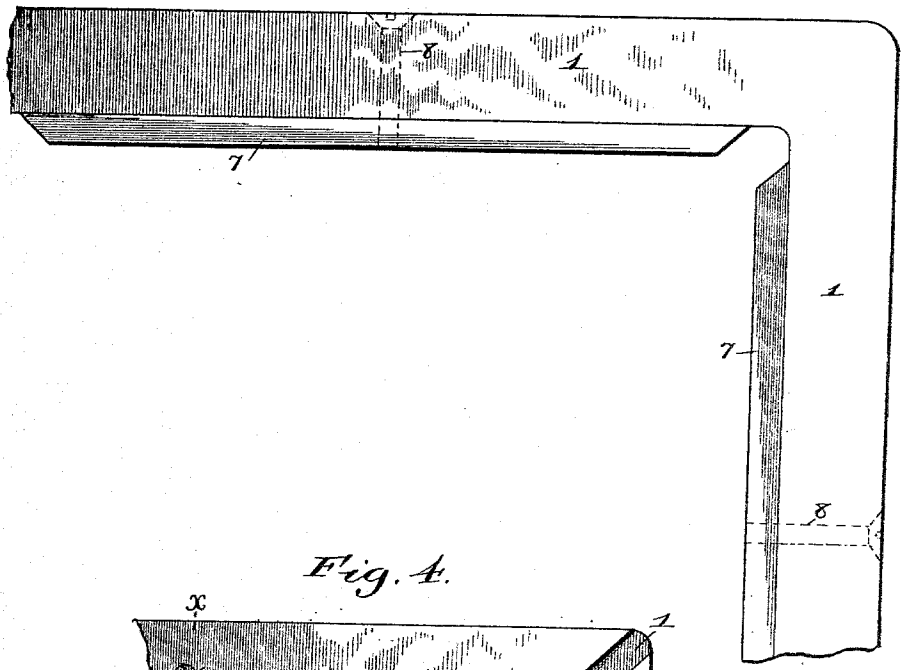


Fig. 4.

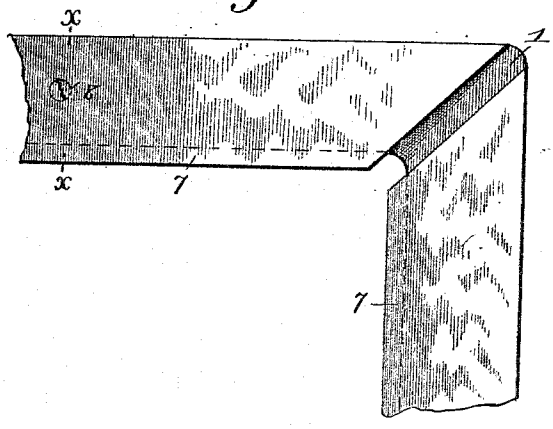
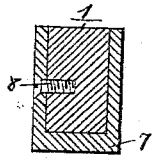


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN W. OSBORNE, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR OF ONE-THIRD TO CARL EDELHEIM, OF PHILADELPHIA, PENNSYLVANIA.

PRINTER'S CHASE.

SPECIFICATION forming part of Letters Patent No. 516,106, dated March 6, 1894.

Application filed October 13, 1890. Serial No. 367,988. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. OSBORNE, a subject of the Queen of Great Britain, and a resident of Washington, in the District of Columbia, have invented certain new and useful Improvements in Printers' Chases, of which the following is a specification.

My invention has reference to improvements in printers' chases designed for holding the type-matter or "form" during the process of stereotyping, and the object of my invention is to overcome certain defects inherent in existing chases, which will presently be pointed out. Ordinary type is made of a composition of lead and antimony with additions of tin or bismuth, or both, and the alloys ordinarily used have a coefficient of expansion under heat which is very nearly twice as great as the coefficient of expansion of iron, which is the material of which printers' chases have heretofore been universally made. If a "form" locked in a chase of this character is used for making papier-maché matrices, the form and chase are raised to temperatures as high as 300° Fahrenheit, and long before this temperature is reached the form expands laterally against the inclosing chase, which latter, by reason of its low degree of expansion, acts as an unyielding, inelastic inclosure. In consequence thereof, the type composing the form is forced to expand longitudinally, and thus receives a permanent elongation, by which it becomes unfit for use in connection with other type which has not been likewise elongated. This permanent elongation of the type is, therefore, caused by the lack of thermo-elasticity of the iron chase, and it is the object of my invention to prevent such permanent elongation of the type by using it in a chase made of a metal having such coefficient of expansion, that the form, when heated in the chase, will be free to expand laterally, so that it will not be subjected to injurious pressure; or in other words, I make the chase of a metal which in contradistinction to iron, is thermo-elastic. Any metal having a coefficient of expansion sufficiently great to permit the type inclosed thereby to expand laterally without being subjected to injurious pressure, may be used in whole or in part in the construction of my improved chase, since all such metals, or alloys of metals will give the chase the quality of accommodating itself automatically to the expansions and contractions of the form under variations of temperature; and I shall hereinafter speak of such metals as "thermo-elastic metals," and I call a chase made of such metals a "thermo-elastic chase." Since each side of the chase is necessarily always longer than the corresponding side of the form, it will be understood that in accordance with my invention the best metal for the chase would be one which has a coefficient of expansion which is exactly the same as that of type-metal. If, therefore, the chase is made of type-metal itself, it will under heat expand slightly more than is necessary to accommodate itself exactly to the expansion of the form, so that the pressure upon the latter will not only not be increased, but will be perceptibly diminished; and the same result is obtained if the chase is made of a metal having a slightly higher coefficient of expansion than type-metal. Such result is very desirable, for it is not sufficient that the pressure upon the type remain the same under all temperatures, but it is necessary in order to secure the best results, that the type be under a reduced pressure when heated, for the pressure which is harmless when the type is cold, will act injuriously when the type is hot, giving to the same a permanent elongation; if, however, the coefficient of expansion of the metal of the chase is considerably greater than that of type-metal, as for instance, if the chase is made of zinc, the expansion of the chase under heat would be too great, and would loosen the form in the chase, which would render the handling of the chase and form awkward, and in such cases provision must be made for compensating for the too great thermo-elasticity of the chase. If, on the other hand, the chase is made of a metal, the thermo-elasticity of which is nearly but not quite sufficient to accommodate itself to the expansion of the form, provision must be made for compensating for this slight deficiency, all of which is easily done, so long as the excess or deficiency of thermo-elasticity is small.

My invention, therefore, comprises not only

a chase made of metal which expands under heat at such a rate as to relieve the type from injurious lateral pressure which would otherwise be caused by its own expansion, but it also comprises a chase made of such thermo-elastic metal and provided with means for compensating for the excess or deficiency of its thermo-elasticity. All this will more fully appear from the following detailed description, with reference to the accompanying drawings, which form a part of this specification, and in which I have illustrated several forms which my improved chase may assume.

Figure 1, represents a plan view of a portion of a chase made of thermo-elastic metal, in accordance with my invention, with the form locked therein in the ordinary manner. Fig. 2, represents a like view, partly in section, showing the means for compensating for excesses and deficiencies of thermo-elasticity. Fig. 3, is a plan view of a portion of a chase made of thermo-elastic metal, and provided with steel bearing-faces. Fig. 4, is a like view of a thermo-elastic chase provided with another form of bearing-face; and Fig. 5, is a section on line *x*—*x*, of Fig. 4.

Like numerals of reference indicate like parts all throughout the drawings.

Referring now more particularly to Fig. 1, the chase 1, is there shown as a rectangular frame, as usual, but in accordance with my invention, this frame is made of a metal having a coefficient of expansion very nearly equal to the coefficient of expansion of type-metal. The coefficient of expansion of ordinary type-metal for each degree of the centigrade scale of temperature is equal to 0.00002, and I have also found that a bronze consisting of an alloy of three parts of copper and one part of tin, has a coefficient of expansion very nearly like that of type-metal, it being approximately 0.0000198, and that by a slight variation of the amount of tin, the coefficient of expansion of the bronze may be made greater or smaller; an excess of tin giving an increased coefficient of expansion, and a smaller amount of tin reducing the coefficient of expansion of the bronze. I, therefore, by preference use a bronze made of the proportions of copper and tin which give to the chase the required thermo-elasticity, so that no compensating devices need be used in connection therewith. Other alloys, made of copper and zinc, may be made, which have the same coefficient of expansion as bronze, and in these cases, the coefficient of expansion may be increased and reduced by increasing or reducing the amount of zinc. The chase shown in Fig. 1, is supposed to be made of such alloy, bronze or brass, which expands under heat very nearly as much as type-metal, and in a chase of this character the form 2, is locked in the ordinary manner by means of sticks 3, quoins 4, and other "furniture," without the use of compensating devices. In other words, the chase is made and used exactly in the manner of ordinary chases, except that the metal of which the chase is made has the same thermo-elasticity as type-metal. If a form is locked in a chase of this character, and is heated when used for making papier-maché matrices, the chase will expand in such proportion to the expansion of the form, that the pressure upon the latter will be perceptibly reduced to such a degree that notwithstanding the softening of the type by the increased temperature, there will be no permanent elongation of the same.

In Fig. 2, the chase frame is supposed to be made of a metal or alloy of metals having either a greater or smaller degree of thermo-elasticity than is required. An excess of thermo-elasticity is obtained by making the chase frame of zinc or of a brass containing an excess of zinc. Zinc alone has a coefficient of expansion very nearly equal to 0.00003; brass containing one-half of zinc has a coefficient of expansion 0.0000214, both of which would give a chase the thermo-elasticity of which is too great, so that when the form and chase are heated, the form would become loose in the chase, and with such chases I use the compensating device shown in Fig. 2. This compensating device consists of a spring 5, seated in a recess 6, formed in the inner edge of the chase frame.

In the drawings, I show a leaf-spring undulatory or sinusoidal in form, with its convex portions slightly projecting beyond the inner edge of the chase, and the outer quoin bears directly upon these convex portions of the spring. It will, however, be understood that I am not confined to this form of spring, since I may use any other form of elastic cushion between the chase and quoin.

It will now be understood that when a form is locked in a chase provided with this compensating elastic cushion, and if the chase is made of a material having an excess of thermo-elasticity, and the form is heated, it will not become loose within the chase, for while the chase frame will expand more than is necessary, the spring, expanding, will supply the necessary pressure upon the form, so that it will at all times be held together like a solid composite block. The same is true in all cases where the metal of the chase frame has an excess of thermo-elasticity, whether it be made of zinc, or of brass rich in zinc, or of some other metal or alloy, as above suggested. This compensating elastic cushion may also be used with advantage when the chase frame is made of a metal the thermo-elasticity of which is slightly less than required; for in such case, the spring, yielding to the expansive force of the form, will allow the same to expand laterally without undue compression. I may, therefore, use with this compensating elastic cushion a chase frame made of cast brass, poor in zinc, the coefficient of expansion of which is not greater than 0.0000185, and even less.

A slight difference, however, must be made in the construction of the spring, according

to whether it is used to compensate for an excess or for a deficiency of thermo-elasticity of the chase frame. If used for compensating for an excess, the spring should be so made that when the quoins are driven home, the spring shall receive its maximum compression, so that it may expand considerably, and exert the necessary pressure upon the form, when the frame unduly expands. When used to compensate for a deficiency of thermo-elasticity, the springs should be so constructed that when the quoins are driven home they should be only moderately compressed, so that they may be capable of being still further compressed by the expansion of the form.

In Fig. 3, there is shown a chase frame 1, made of some soft metal, like zinc or type-metal, which may be used in accordance with my invention, and which could not conveniently be made of sufficient strength. In such cases, I provide a bearing-face 7, made of iron or steel, which covers the inner edge of the chase frame, being secured to the same by a single screw or bolt 8, so that it may expand independently of the body of the chase frame. This steel bearing-face is shown in Fig. 1, as a simple flat strip, and this will be all-sufficient when the body of the frame is made of a metal which although capable of resisting the expansive pressure to which it is subjected, is not sufficiently hard to remain uninjured at the places where the quoins directly impinge against it; but when the frame is made of a metal which is so soft that it could not as a whole resist the expansive pressure to which it is subjected, the bearing-faces are made as shown in Figs. 4 and 5, that is to say, they are made U-shaped so as to cover, not only the inner edges of the chase frame, but also the faces of the same, but they are otherwise secured to the chase frame in the same manner as in the construction shown in Fig. 3, viz., each by a single screw 8. These U-shaped bearing plates give to the otherwise weak chase frame the required rigidity, without in any way or manner affecting the thermo-elasticity of the same.

I do not herein broadly claim the construction of a chase having an elastic cushion interposed between its sides and the form locked therein, since this broad feature of invention forms the subject of another application, Serial No. 367,987, filed October 13, 1890, and in this application I restrict myself with respect to the elastic cushion to its use in connection with a thermo-elastic chase as a compensating device therefor, as hereinbefore set forth.

Having now fully described my invention, I claim and desire to secure by Letters Patent—

1. A printer's chase, the body of which is made of a metal or alloy the coefficient of expansion of which is substantially equal to that of type-metal, substantially as described.

2. A printer's chase, the body of which is made of bronze, substantially as described.

3. A printer's chase, the body of which is made of a metal or alloy, the coefficient of expansion of which is substantially equal to that of type metal, in combination with an elastic compensating cushion on the inner edge of the chase-frame, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN W. OSBORNE.

Witnesses:
JOSEPH LYONS,
F. T. CHAPMAN.