Dec. 30, 1930. M. W. BRUESHABER 1,787,187

PRINTING PRESS CYLINDER

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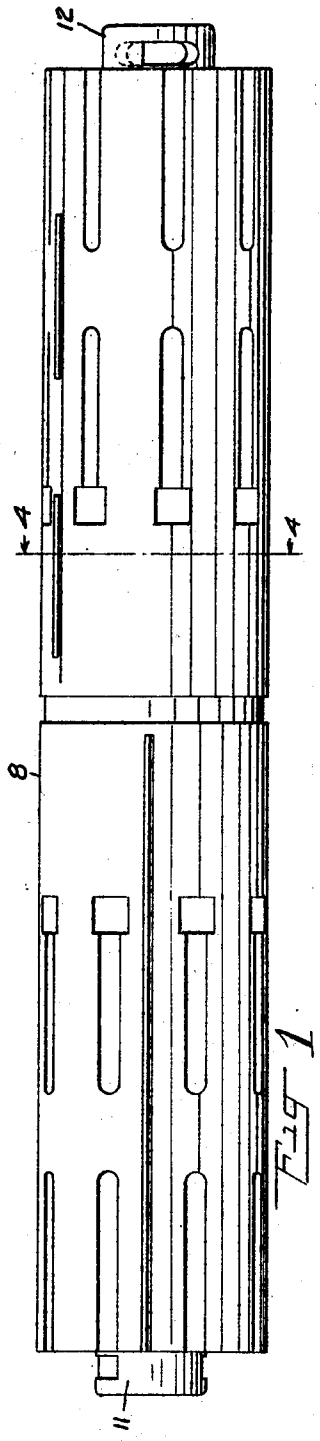


Fig 1

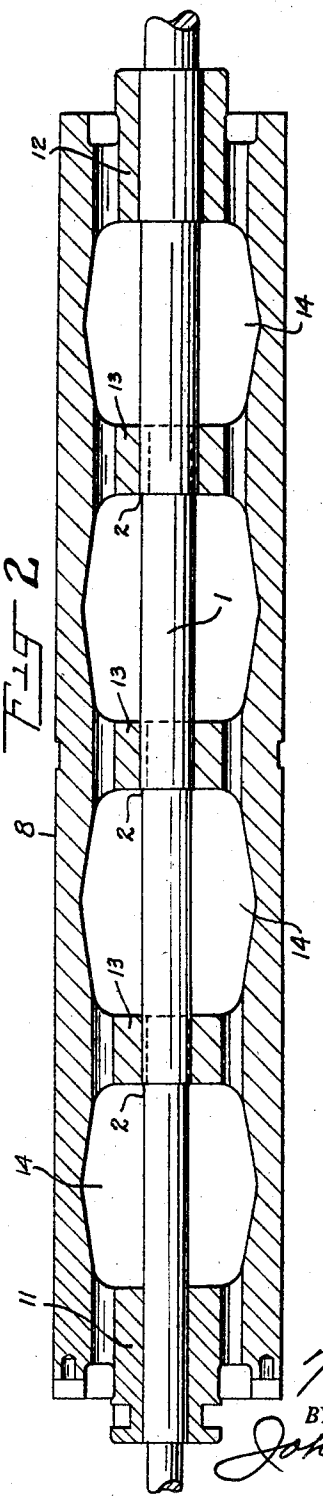


Fig 2

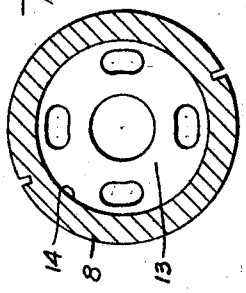


Fig 4

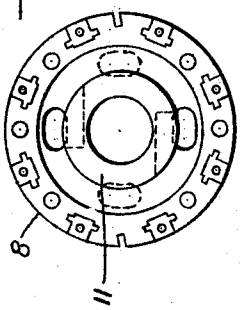


Fig 3

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PRINTING PRESS CYLINDER

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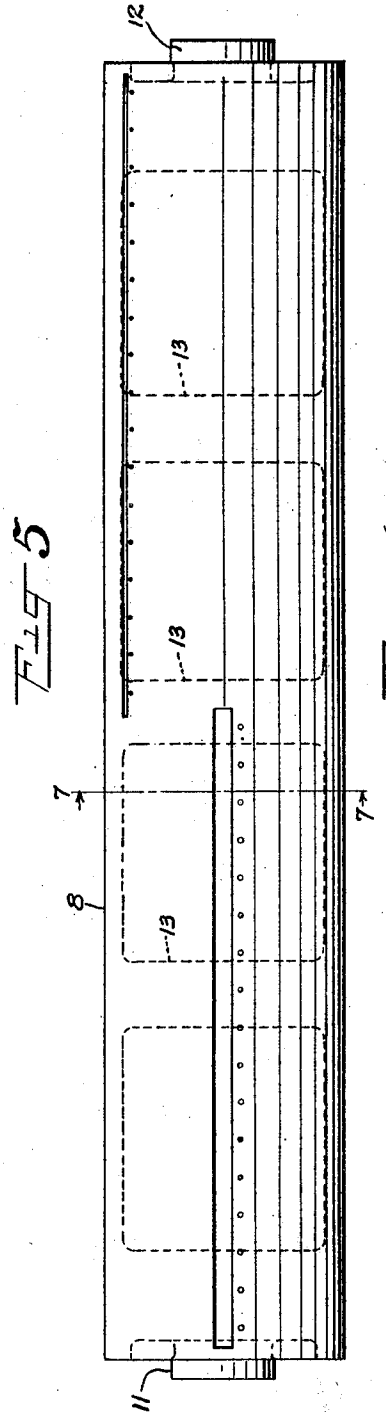


Fig 5

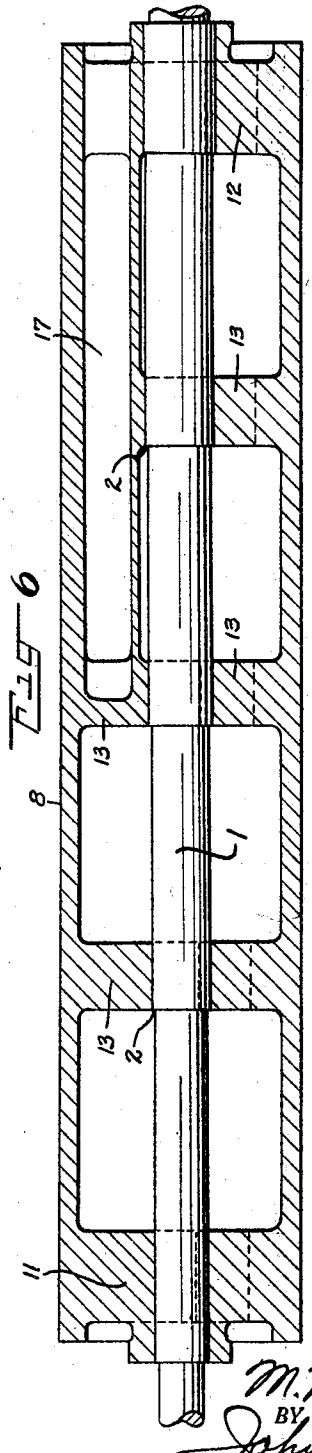


Fig 6

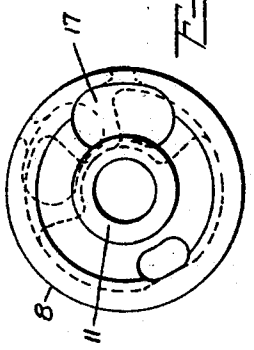


Fig 8

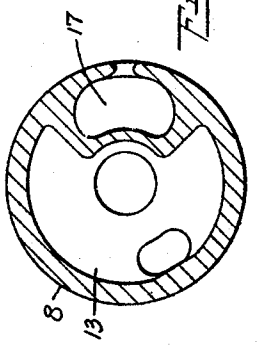


Fig 7

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UNITED STATES PATENT OFFICE

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PRINTING-PRESS CYLINDER

Application filed February 15, 1928. Serial No. 254,471.

The invention relates to new and useful improvements in printing press cylinders and more especially to novel and useful combinations and arrangements of constituent materials to provide cylinders having superior operating and wearing properties.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, construction, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:

Fig. 1 is an elevation of a plate cylinder embodying my invention;

Fig. 2 is a longitudinal central section through Fig. 1;

Fig. 3 is an end elevation of the cylinder of Fig. 1;

Fig. 4 is a transverse section on line 4—4 of Fig. 1;

Fig. 5 is an elevation of an impression cylinder embodying the invention;

Fig. 6 is a central longitudinal section through Fig. 5;

Fig. 7 is a transverse section on line 7—7 of Fig. 5; and

Fig. 8 is an end elevation of the cylinder of Fig. 5.

The invention is directed primarily to providing printing cylinders, both plate and impression, possessing very great rigidity or resistance to both static and rotational deflection as compared to the printing cylinders now in use. A further and related object of the invention is to provide cylinders, especially plate cylinders, which are unusually capacitated and adapted to rotate at very high speeds with a minimum of deflection of the cylinder and with a minimum of wear and strain on the cylinder shaft bearings. A further object of my invention is to provide printing cylinders with the parts thereof constructed of a plurality of metals, whereby a shaft is provided having the requisite hardness and other properties to provide the best bearings and the best coaction with the press journals, and a cylinder body is provided having an unusual degree of rigidity or resistance to deflection proportionately to total weight of the cylinder body, and adapted to carry the printing plates at high speeds with a minimum of deflection in the cylinder and of strain and wear on the bearings.

In the construction and operation of printing presses, the sizes of the plate and impression cylinders are substantially fixed and predetermined, as in four page wide newspaper presses the plate cylinders carry eight full page stereotype plates, arranged four along the cylinder and two around the cylinder. The cylinders must be sufficiently strong in construction not only to have sufficient rigidity under operating pressure, but must also stand their own rotational strains at high speeds, and the plate cylinders must also withstand the strains of the unbalanced load of the stereotype plates at the required high rotational speeds. The usual cast iron or cast steel cylinders in order to have sufficient resistance to operating pressures, and to the rotational and unbalanced load strains, are necessarily made exceedingly heavy. As consequences of this, the deflection of such a cylinder under ordinary static conditions is very great, reaching its maximum centrally between the bearings, and this deformation is exceedingly detrimental to good results in printing and also in general operation of the machine, the great weight and resultant deformation both creating and increasing these conditions. Furthermore, both by reason of the great weight and the resultant deformation, the rotational strains on a cylinder are greatly increased, especially at high press speeds. The excessive strain and wear on the press bearings resulting from these conditions are also very detri-

mental, and there is furthermore an excessive requirement of power to run the presses.

In carrying out my invention, I provide a cylinder having a shaft of hard and dense metal capable of withstanding great wear at the bearings and of relatively great tensile strength, and sufficiently highly resistant to flexing and torsional strains. For this purpose I preferably employ a shaft 1 of forged steel, and this is preferably also provided with a plurality of successive portions 2 of successively decreasing diameters along the shaft, to provide suitable fitted bearings for the successive internal and external hubs of the cylinder internal heads or discs.

For the cylinder 8 I employ a metal the relative deflection of which with respect to steel is small for a given shape or section. In selecting a metal for the cylinder casting I prefer an aluminum alloy. The cylinder is of given length (fixed by the press structure), and assuming the same moment of inertia as in a cast steel cylinder (which might be varied, but need not be), the relative deflections are as the specific gravity of the material divided by its modulus of elasticity, as the other factors in the equation of maximum deflection

$$\frac{5WL^3}{384EI}$$

cancel out. For a selected cast aluminum alloy cylinder and a standard cast steel cylinder of the same dimensions, the static deflection of the aluminum cylinder is .0256 as against .049 for the cast steel cylinder.

I preferably employ a heat treated cast aluminum alloy, such as is known commercially as 195 H. T. T. 16, and having an ultimate tensile strength of between 30,000 and 40,000 pounds, with from 3 per cent to 8 per cent elongation and a minimum Brinell hardness of 70. It will be understood, however, that the nature and properties of the selected metal may be very widely varied. The aluminum alloy now preferred by me, and referred to as "195 H. T. T. 16", has a composition of aluminum 96%, copper 4%, which is heat treated by soaking for approximately 12 hours at 960° F. followed by steam ageing at 310° F. for four to six hours. The relative tendency to flexure under given load or rotational strain conditions is dependent principally on the specific gravity of the materials divided by the modulus of elasticity. A cylinder constructed in accordance with my invention will have a relative deflection of only about one half that of a semi-steel cylinder of usual construction. In particular tests, a cast steel cylinder was shown to have 91½ per cent more deflection than a similar cylinder of the heat treated aluminum alloy described.

In cylinders equipped with a full set of stereotype plates, a test cylinder embodying my invention, that is, with the body of the heat treated aluminum alloy at 400 R. P. M. showed a deflection at the center of the cylinder of only .00075 inch. This is less than the deflection of a standard semi-steel cylinder due to its own weight alone. The weight reduction effected by the use of my new heat treated aluminum alloy cylinder will reduce the pressure velocity values at the bearings, when running at 400 R. P. M. to an amount which is lower than that of the standard semi-steel cylinder when running at 300 R. P. M.

The cylinder of my invention while possessing the superior characteristics set forth, weighs nearly two-thirds less than the ordinary cast steel cylinders such as are now in universal use.

The preferred form of the plate cylinder is shown in Figs. 1 to 4 inclusive, the external cylindrical shell of the cylinder being formed with external bearing hubs 11 and 12 at either end, and with a series of internal hubs 13, these being apertured to fit respectively on the successive shoulders or diametral dimensional changes 2 in the shaft 1. Between the interior hubs 13 are internal apertures 14, the parts being positioned, proportioned and shaped to provide the maximum of uniform rigidity throughout the cylinder for the amount of material used. The plate cylinder fittings may be of usual or other suitable form, and the plate clamp grooves are indicated by 15.

The general construction of the blanket cylinder is shown in Figs. 5 to 8, and is generally similar to that of the plate cylinder, and the same reference numerals are applied thereto in the same general sense. The blanket holding and tension devices are mounted in chambers 17, which may be of usual or other suitable construction.

From all the foregoing it will be understood that a novel printing press cylinder has been provided which realizes the objects and advantages hereinbefore set forth, together with other objects and advantages; and that changes may be made from the exact structure and exact character of materials hereinbefore specified as a preferred embodiment, without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:—

1. A high speed rotary relief printing press cylinder including in combination a dense wear resisting metal shaft and a metal cylinder thereon of relatively low specific gravity with respect to the metal of the shaft.

2. A cylinder for a high speed rotary printing press including in combination a steel shaft and fixed thereon a cylinder body of heat treated aluminium alloy, and internal hubs supporting said cylinder body on the

shaft intermediate the ends of the cylinder body.

3. A cylinder for a high speed rotary printing press including in combination a steel shaft and fixed thereon a relatively long, narrow cylinder body of relatively low specific gravity with respect to the steel shaft.

4. A plate cylinder for a high speed rotary printing press including in combination a steel shaft having fixed thereon a relatively long narrow cylindrical body of heat treated aluminium alloy adapted to have relief plates secured thereto.

In testimony whereof, I have signed my name to this specification.

MARTIN W. BRUESHABER.