

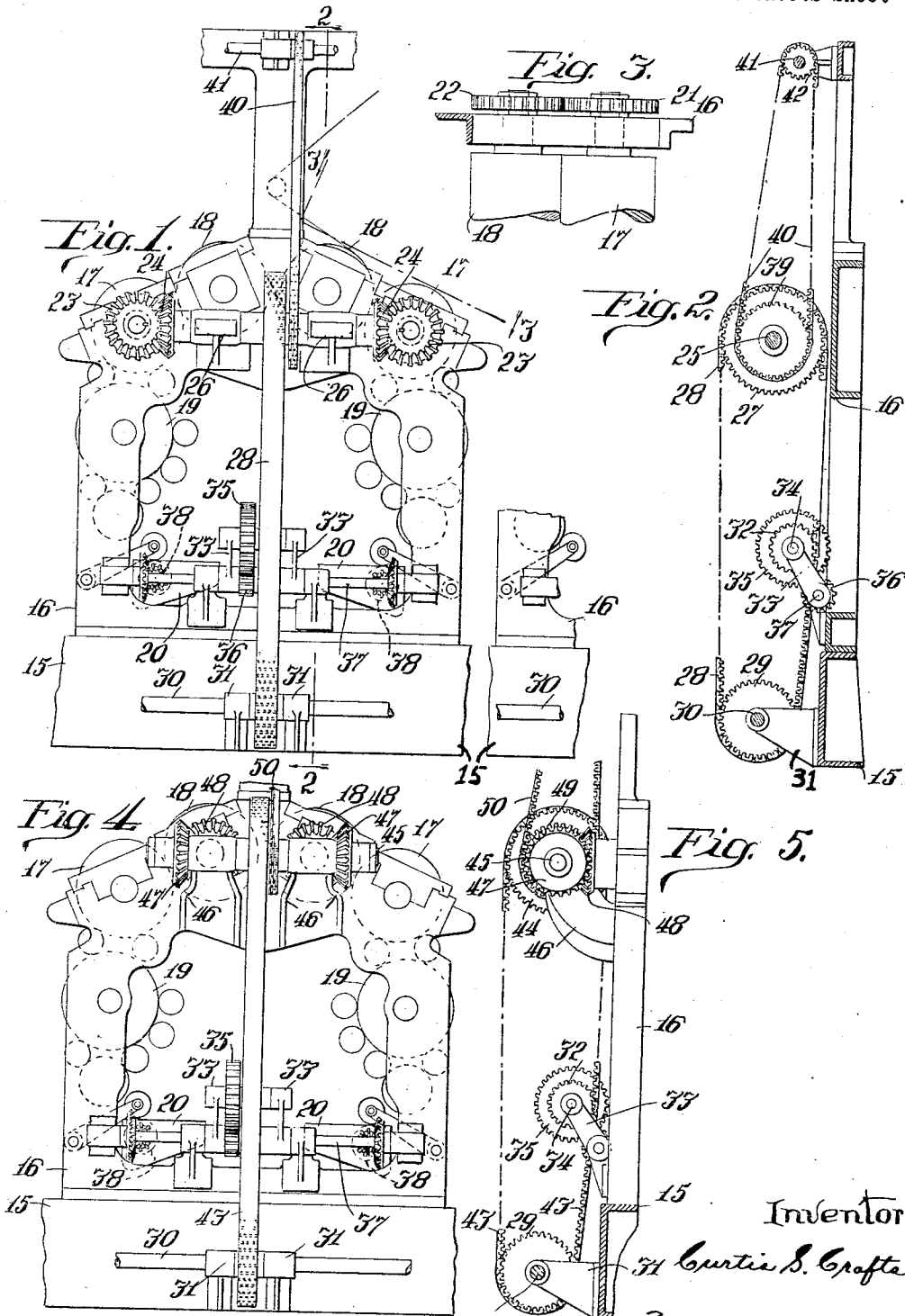
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C. S. CRAFTS  
PRINTING PRESS

1,898,034

Filed March 6, 1930

2 Sheets-Sheet 1



Inventor

Curtis S. Crafts

by Fricke & DeBuck

Attorneys

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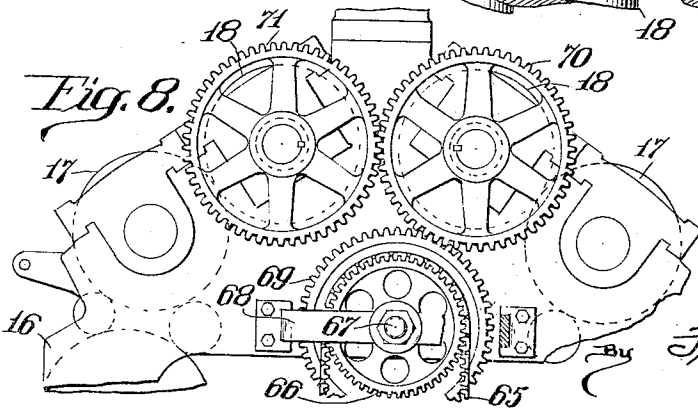
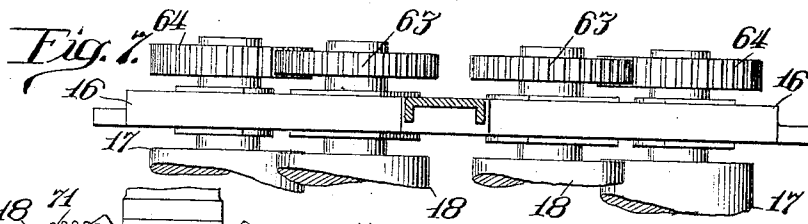
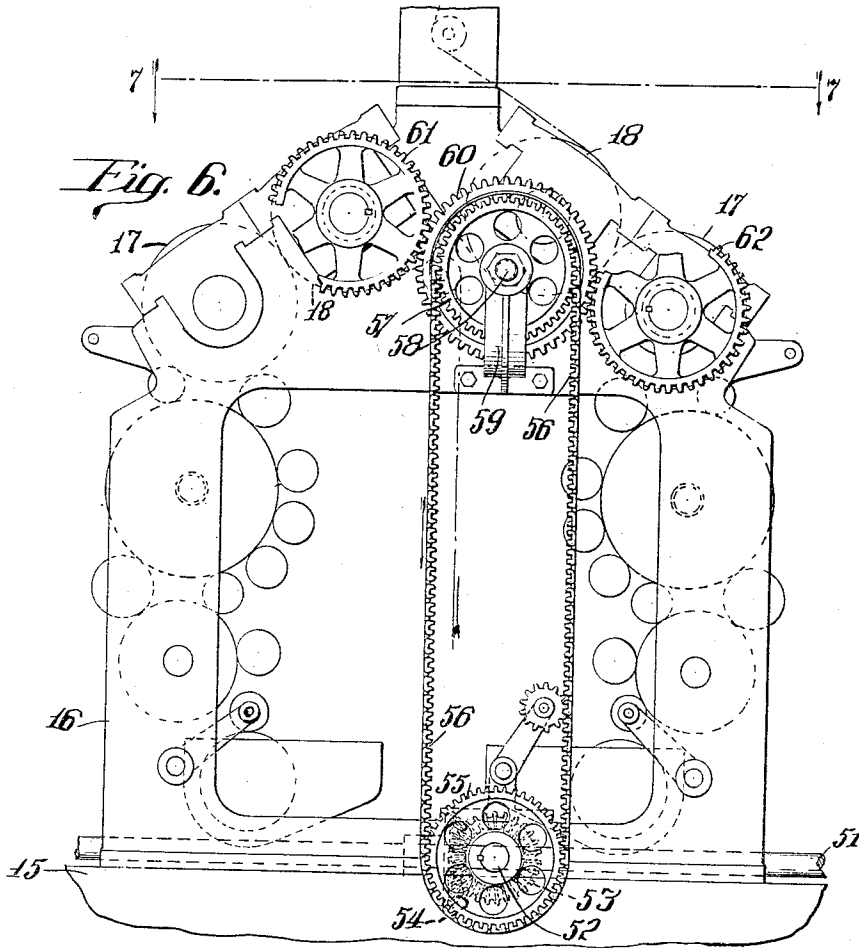
C. S. CRAFTS

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2 Sheets-Sheet 2



Inventor  
Curtis S. Crafts  
By *Trick & DeBuck*  
Attorneys.

# UNITED STATES PATENT OFFICE

CURTIS S. CRAFTS, OF OAK PARK, ILLINOIS, ASSIGNOR TO THE GOSS PRINTING PRESS CO., OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

## PRINTING PRESS

Application filed March 6, 1930. Serial No. 433,749.

My invention relates to printing presses and has for its object the provision of a new and improved form and arrangement of parts for transmitting the power from the main driving shaft to the form and impression cylinders for driving such cylinders smoothly and evenly with a minimum of friction and so as to provide a maximum of flexibility in the matter of the control of such drive. To this end, it is one of the objects of my invention to provide an arrangement of chain driving means to be used in lieu of the heavy vertically disposed shafting heretofore employed, whereby a lighter construction may be utilized and whereby the vibration incident to driving a press at high speed may be materially decreased.

As is well understood, when a heavy vertically disposed shaft is employed, driven at high speed and in turn driving at high speed a plurality of heavy cylinders arranged horizontally in parallel arrangement, it is impossible to arrange the parts so as to prevent a cooperative tendency to produce vibration, since the vertical shafting has a tendency to vibrate sidewise in the same direction as that in which the cylinders tend to vibrate sidewise. It is one of the objects of my invention to provide an improved arrangement of driving parts in which the normal sidewise vibration of the cylinders is at right angles to the normal sidewise vibration of the driving mechanism whereby the tendency of one part to vibrate in one direction may in part offset and overcome the tendency of the other part to vibrate in a different direction.

It is another object of my invention to provide a construction in which the parts shall be as compact as it is possible to make them, with the driving mechanism extending to a minimum extent beyond the face of the main frame whereby a press as a whole shall occupy a minimum of space. It is another object of my invention to improve mechanisms of this type in sundry details hereinafter pointed out. The preferred means by which I have accomplished my several objects are illustrated in the drawings and are hereinafter specifically de-

scribed. That which I believe to be new and desire to cover by Letters Patent is set forth in the claims.

In the drawings, all of the figures of which are more or less diagrammatic for better illustrating the novel features of my construction,—

Fig. 1 is a side view of a portion of a printing press embodying my improved construction, showing one unit of a press together with a fragmentary portion of a second unit;

Fig. 2 is a vertical cross section taken at line 2—2 of Fig. 1, showing the parts only at the outer face of the frame at the near side of the unit as shown in Fig. 1;

Fig. 3 is a cross section taken at line 3—3 of Fig. 1, showing the parts at the far side of the unit as shown in said Fig. 1;

Fig. 4 is a view similar to Fig. 1 but partially broken away, showing a modified form of construction.

Fig. 5 is a view of the parts shown in Fig. 4 as seen from the right in said figure, showing the parts at the near side of the machine as shown in said Fig. 4;

Fig. 6 is another view similar to the lower portion of Fig. 1 and showing another modified form of construction;

Fig. 7 is a horizontal sectional view taken at line 7—7 of Fig. 6, showing the parts at the far side of the unit; and

Fig. 8 is a view similar to the upper portion of Fig. 6 but showing still another modified form of construction.

Referring now particularly to Figs. 1, 2 and 3, in which corresponding parts are indicated by the same reference characters, 15 indicates a heavy frame-work extending lengthwise of a printing press, having unit press frames 16 mounted thereon at spaced intervals therealong. Each of the frames 16 is provided with the operating parts comprising a press unit, such parts in the unit shown in Fig. 1 comprising form cylinders 17, impression cylinders 18 cooperating with said plate cylinders, and ink drums 19 and cooperating parts for delivering the required amount of ink from the fountains 20 to the form cylinders 17. At the far side of the

unit as shown in Fig. 1, the cylinders 17 and 18 are provided with intermeshing gears 21 and 22, as is clearly shown in Fig. 3 for causing such cylinders to rotate in cooperative relation.

In the arrangement shown in Fig. 1, each of the form cylinders 17 is provided with a bevel gear 23 fixedly connected therewith on the outer face of the adjacent standard of the frame 16, such bevel gears being in mesh with bevel gears 24 fixedly mounted upon opposite ends of a shaft 25 (see Fig. 2) mounted by means of brackets 26 on the outer face of the frame standard. The shaft 25 is provided at substantially its middle point with a gear 27 by which the shaft and connected parts are driven through the medium of a driving chain 28 passing around the gear 27 at its upper end and around a gear 29 at its lower end, the gear 29 being mounted upon a longitudinally extending shaft 30 mounted in bearing brackets 31 on the outer face of the frame bar 15. The endless chain 28 is adapted to be tightened by means of a gear 32 mounted upon the end of an adjustable arm 33 which is adapted to be adjusted by any suitable means not shown for providing proper tension of the chain 28. In the construction shown, the gear 32 is fixedly mounted upon a shaft 34 which carries a gear 35 fixedly mounted thereon, which gear 35 meshes with a smaller gear 36 carried by a shaft 37 which constitutes the pivotal mounting for the arms 33, the arrangement being such that the gear 36 and shaft 37 are driven by the chain 28. The shaft 37 in turn is connected by suitable gearing with the fountain rollers 38 for driving such rollers in the desired timed relation.

The shaft 25 is also provided with a gear 39 about which passes an endless chain 40 for driving a shaft 41 at the top of the frame, such driving being effected through the medium of a gear 42 carried by said shaft as is clearly shown in Fig. 2.

By the use of my construction as illustrated, power is applied to the printing couples comprising the cylinders 17 and 18 by the use of the positively acting endless belt 28, and further by the use of the endless belt 40 to the shaft 41. By reason of the positioning of the belt 28 in the arrangement as shown, any tendency for vibration of the power means from the shaft 30 to the shaft 25 is applied longitudinally of the cylinders 17 and 18 rather than transversely thereof. The tendency for the driving means to vibrate is accordingly not cooperative with the tendency for the cylinders to vibrate, and any tendency for the belt 28 and its immediately cooperative parts to vibrate longitudinally of the cylinders has a tendency to offset and overcome to at least a slight extent the tendency for the cylinders of the

unit to vibrate laterally. As a result of this construction, a smoother and more even operation at high speeds is attained.

By the use of the endless belt driving means, the loss in power between the main driving shaft and the cylinders is kept to a minimum. By this arrangement, the lost motion or back-lash effect is also very materially reduced, the driving chains being normally kept taut so as to prevent lost motion. Inasmuch as the cylinders are very heavy and have a very considerable momentum when rotating at high speeds, it will be appreciated that the reduction in back-lash is of very considerable importance. By the use of my improved arrangement, the likelihood of one or another of the cylinders running at any time by its inertia at a greater speed momentarily than that of the other cylinders so as to throw the cylinders temporarily out of timed relation is very materially cut down, and the danger of sudden strains applied from the cylinders to the web is substantially eliminated.

In the form of mechanism as shown in Figs. 4 and 5, the arrangement is the same as that above described, except that a longer belt 43 is used in lieu of the belt 28, the belt 43 extending at its upper end about a gear 44 fixedly mounted upon a shaft 45 revolvably mounted in brackets 46 opposite the ends of the impression cylinders 18 rather than opposite the ends of the form cylinders 17 as in Fig. 1. Power is applied from the shaft 45 to the cylinders 18 through the medium of bevel gears 47 and 48, the cylinders 17 and 18 being connected by intermeshing gears at their far ends in Fig. 4 in the same way as is shown in Fig. 3 in connection with the construction of Fig. 1. A gear 49 carried by the shaft 45 serves to drive an endless belt 50 corresponding with the belt 40 of the construction of Fig. 1. Since the operation and effect of the apparatus as shown in Fig. 4 are the same as the operation and effect in connection with the mechanism of Fig. 1, it is believed to be unnecessary to describe the same further in detail herein.

In Figs. 6 and 7, which show a unit corresponding to that illustrated in Fig. 1 but provided with a differently arranged driving mechanism, the same reference characters are employed as are used in Fig. 1, so far as the parts correspond. In said Figs. 6 and 7, a longitudinally extending drive shaft 51 is provided at the far side of the machine serving to drive a transversely extending shaft 52, said shafts being connected together by means of bevel gears 53 and 54. Upon the near end of the shaft 52, there is mounted a gear 55 about which extends the lower end of an endless chain 56, the other end of which extends about a gear 57 mounted upon a short shaft 58 extending

between the frame-work 16 and the end of a bracket 59. A second gear 60 is fixedly mounted upon the shaft 58 so as to rotate therewith, such gear 60 being in mesh with  
 5 gears 61 and 62 carried by the impression cylinder 18 at the left in said Fig. 6 and the plate cylinder 17 at the right, such gearing serving to drive said cylinders 17 and  
 10 18 in proper timed relation. At their opposite ends, the cylinders 17 and 18 are connected together by means of intermeshing gears 63 and 64, whereby all of said cylinders are driven in unison.

In the construction shown in Fig. 8, the  
 15 arrangement of the press elements is the same as that shown in Fig. 6, the arrangement of the driving means only being varied. In this construction, a driving chain 65 of decreased length is provided in lieu of the  
 20 chain 56, such chain 65 extending about a gear 66 carried by a short shaft 67 extending from the frame-work 16 to a bracket 68. A second gear 69 is mounted on said shaft 67 so as to rotate therewith, said gear 69  
 25 meshing with a gear 70 carried by the impression cylinder 18 at the right in said Fig. 8, said gear 70 in turn meshing with a gear 71 carried by the impression cylinder 18 at the left in said figure. The impression cylinders 18 and the form cylinders 17 as shown  
 30 in Fig. 8 are connected at their far ends by means of intermeshing gears in the manner shown in Fig. 7, the arrangement being such that the cylinders 17 and 18 are driven in  
 35 cooperative relation.

By the use of my improved construction, in which positively acting endless chains are employed for applying the power to the  
 40 printing couples, the weight of the driving means is quite materially decreased and the tendency for vibration is correspondingly cut down. By my arrangement, I am enabled to drive the press at the high speeds  
 45 now demanded by pressmen without danger of the vibration developing to such a point as to interfere with the proper operation of the machine.

While I prefer to employ substantially the construction as illustrated in my drawings  
 50 and as above described, it is to be understood that I do not limit my invention thereto except so far as the claims may be so limited by the prior art.

I claim:—

55 1. In a printing press, the combination of a frame, a press unit mounted thereon comprising a plurality of cooperating form and impression cylinders, a shaft journaled on said frame beneath said unit, a gear  
 60 mounted on said shaft in parallel position with respect to the face of the frame, a second gear revolubly mounted on the press unit at right angles with respect to said cylinders, positively acting endless belt  
 65 driving connections between said two gears,

a third gear rotatable with said second gear in parallel position with respect thereto, and additional gears carried by the form cylinder of one printing couple and by the  
 70 impression cylinder of the other printing couple and meshing with said third gear for driving said cylinders in cooperative relation.

2. In a printing press, the combination of a frame, a press unit mounted thereon  
 75 comprising a plurality of cooperating form and impression cylinders, a drive shaft extending longitudinally of said frame below said unit, a second shaft extending in transverse position beneath said unit, driving  
 80 connections between said shafts, a gear mounted on said second shaft in parallel position with respect to the frame, a second gear revolubly mounted on the press unit at right angles with respect to said cylinders,  
 85 positively acting endless belt driving connections between said two gears, and a plurality of additional gears at right angles with respect to said cylinders serving to connect said cylinders with said second gear.

3. In a printing press, the combination of a longitudinally extending main frame-work, a plurality of press unit frames rising from said frame-work in a row there-  
 90 along, cooperating form and impression cylinders comprising two printing couples mounted on each of said unit frames, a drive shaft journaled on said main frame-work longitudinally thereof below said cylinders, a short shaft journaled on each of  
 95 said unit frames at one side of the press substantially opposite the ends of the form and impression cylinders on an axis parallel with the axes of the cylinders, intermeshing gears connecting the short shaft of each  
 100 of said units with at least one of the cylinders of said unit, other intermeshing gears connecting said driven parts of each unit with the remaining cylinders of said units, and positively-acting endless belt driving  
 105 means for each of said units having operative connections for driving the short shaft of said unit from said first named shaft.

4. In a printing press, the combination of a longitudinally extending main frame-  
 110 work, a plurality of press unit frames rising from said frame-work in a row therealong, cooperating form and impression cylinders comprising two printing couples  
 115 mounted on each of said unit frames, a drive shaft journaled on said main frame-work longitudinally thereof below said cylinders, a short shaft journaled on each of said unit frames at one side of the press substantially opposite the ends of the form  
 120 and impression cylinders on an axis parallel with the axes of the cylinders, intermeshing gears connecting the short shaft of each of said units with at least one of the cylinders of said unit, other intermeshing gears con-  
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necting said driven parts of each unit with the remaining cylinders of said units, a second short shaft mounted below each of said units in parallel position with respect to the first named short shaft of said unit, intermeshing gears connecting the second short shaft of each unit with said drive shaft, and positively-acting endless belt driving means operatively connecting the two short shafts of each unit together for driving the cylinders of the several units from said drive shaft.

5. In a printing press, the combination of a longitudinally extending main framework, a plurality of press unit frames rising from said frame-work in a row therealong, cooperating form and impression cylinders comprising two printing couples mounted on each of said unit frames, a drive shaft journaled on said main framework longitudinally thereof below said cylinders, a short shaft journaled on each of said unit frames at one side of the press substantially opposite the ends of the form and impression cylinders, intermeshing gears connecting said short shaft with at least one of said cylinders, other intermeshing gears connecting said driven parts with the remaining cylinders of said printing couples, and positively acting endless belt driving means having operative connection with said shafts for driving the short shaft from said first named shaft.

6. In a printing press, the combination of a longitudinally extending main framework, a plurality of press unit frames rising from said frame-work in a row therealong, cooperating form and impression cylinders comprising two printing couples mounted on each of said unit frames, a drive shaft journaled on said main framework longitudinally thereof below said cylinders, a short shaft journaled on each of said unit frames at one side of the press substantially opposite the ends of the form and impression cylinders, driving means positively connecting said short shaft in each unit with two of said cylinders, driving means at the opposite side of the press positively connecting said two cylinders in operative relationship with the other two of said cylinders, and positively acting endless belt driving means having operative connection with said shafts for driving the short shaft from said first named shaft.

7. In a printing press, the combination of a frame-work comprising a plurality of press unit frames arranged side by side at the same level, cooperating form and impression cylinders making up two printing couples mounted on each of said unit frames, means comprising a drive shaft extending longitudinally of said frame-work below said press units for driving the several units in timed relation to each other, a sprocket

gear revolubly mounted on each of said unit frames at one side of the press substantially opposite the ends of the form and impression cylinders of said unit, means for driving the cylinders of each unit from the sprocket gear on said unit, a positively-acting endless belt about each of said sprocket gears, and operative connections between each of said belts and said drive shaft means.

8. In a printing press, the combination of a frame-work comprising a plurality of press unit frames, cooperating form and impression cylinders making up two printing couples mounted on each of said unit frames, driving means extending longitudinally of said frame-work below said press units comprising drive shaft means for operating said units in timed relation, a sprocket gear revolubly mounted on each of said unit frames at one side of the press substantially opposite the ends of the form and impression cylinders of said unit, positively acting means for each of said units operatively connecting said sprocket gear with at least one of the cylinders of said unit, intermeshing gears connecting such driven cylinder of each unit with the remaining cylinders of said unit, a second sprocket gear for each unit revolubly mounted below said first named sprocket gear and having operative connection with said drive shaft means, and positively acting endless belt driving means for each of said press units connecting the first named sprocket gear of said unit with the second sprocket gear of said unit.

9. In a printing press, the combination of a frame-work comprising a plurality of press unit frames, cooperating form and impression cylinders making up two printing couples mounted on each of said unit frames, drive shaft means extending longitudinally of said frame-work below said units for operating said units in timed relation, a short shaft extending across the ends of the cylinders of each unit, a sprocket gear fixedly mounted on said short shaft in each unit in a plane parallel with said cylinders, means for driving said cylinders from said short shaft in each unit, a second sprocket gear for each unit revolubly mounted below said first named sprocket gear and having operative connection with said drive shaft means, and positively acting endless belt driving means connecting the first named sprocket gear of each unit with the second sprocket gear of said unit.

10. In a printing press, the combination of a frame, a press unit mounted thereon comprising a plurality of cooperating form and impression cylinders, a drive shaft journaled on said frame below said cylinders, and positively acting endless belt driving connections between said shaft and said cylinders arranged with its rotary parts rotating on horizontal axes at an angle with re-

spect to the axes about which said cylinders rotate for cutting down the vibration at high speeds.

5 11. In a printing press, the combination comprising a plurality of cooperating form and impression cylinders, a drive shaft journaled on said frame below said cylinders, and positively acting endless belt driving  
10 connections between said shaft and said cylinders arranged with its rotary parts rotating on horizontal axes at right angles with respect to the axes about which said cylinders rotate.

15 12. In a printing press, the combination of a frame, a press unit mounted thereon comprising a plurality of cooperating form and impression cylinders, a drive shaft journaled on said frame below said cylinders, a  
20 short shaft journaled on the press unit parallel with said first named shaft at right angles with respect to the impression cylinders, bevel gearing connecting said short shaft with said impression cylinders for  
25 driving the cylinders, and positively acting endless belt driving connections between said two shafts.

CURTIS S. CRAFTS.

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