

Oct. 18, 1938.

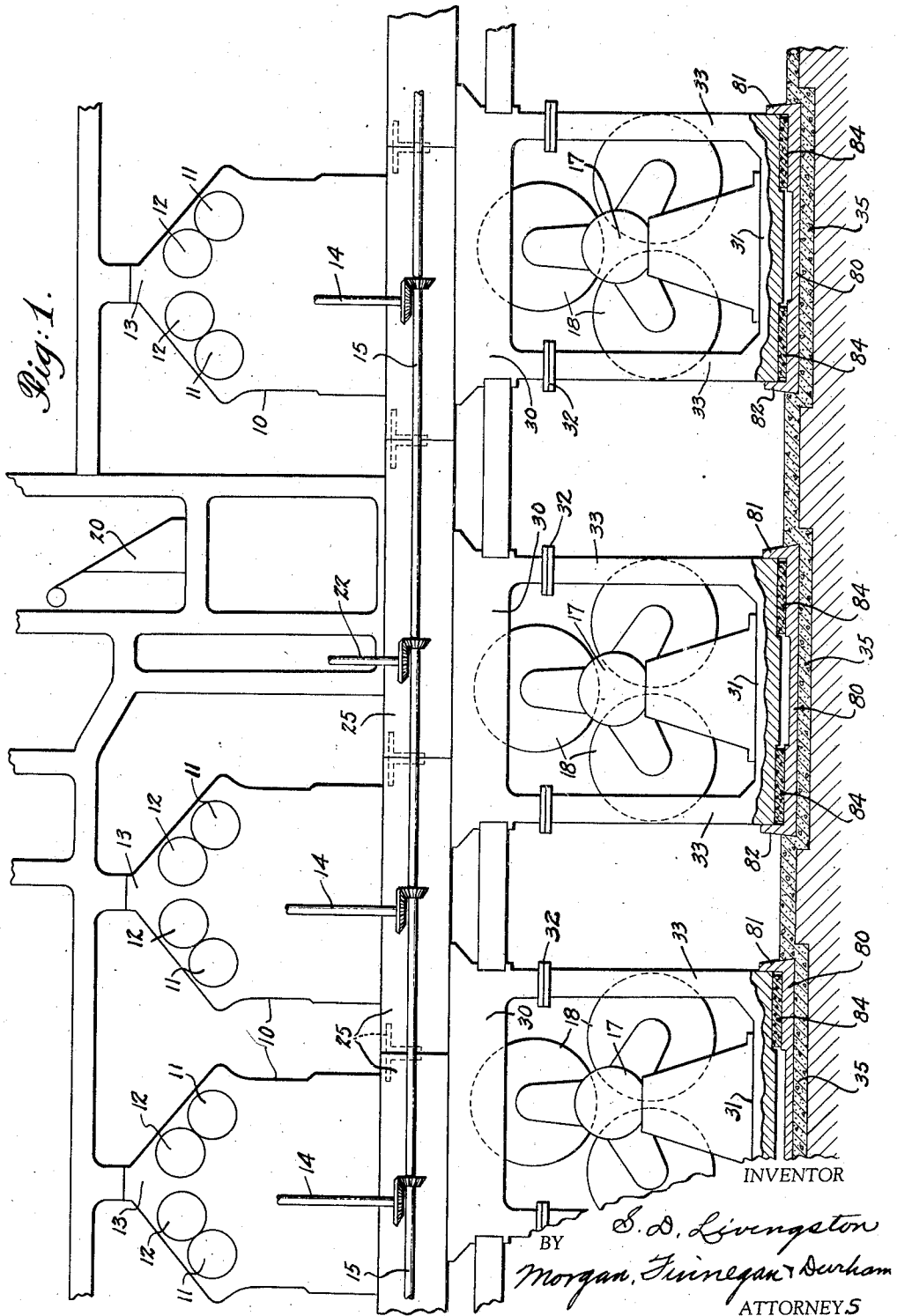
S. D. LIVINGSTON

2,133,459

PRINTING PRESS

Original Filed Aug. 24, 1935

2 Sheets-Sheet 1



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PRINTING PRESS

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2 Sheets-Sheet 2

Fig. 2.

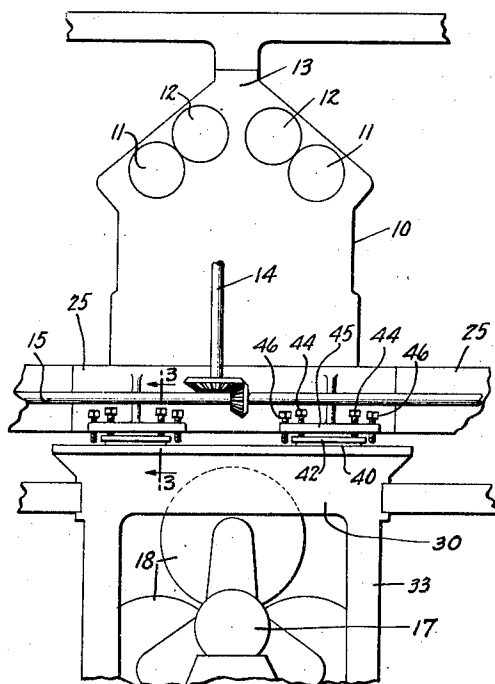
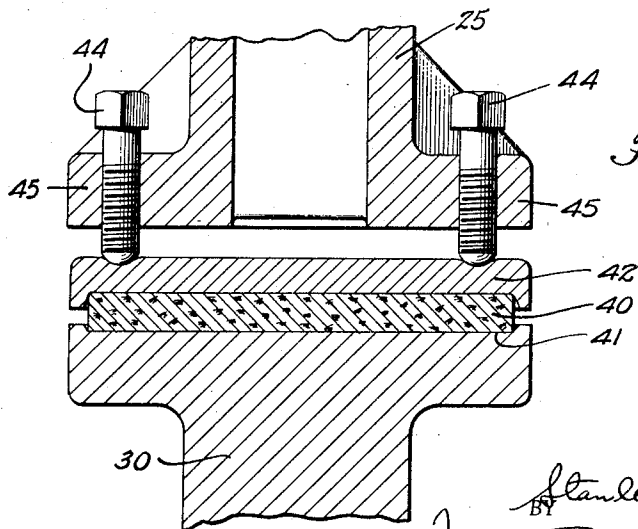


Fig. 3.

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PRINTING PRESS

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14 Claims. (Cl. 101—1)

The present invention relates to high speed rotary printing presses and more particularly to a novel and improved vibration-isolated rotary printing press particularly adapted for installation and use in steel frame and other buildings.

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, constructions, arrangements, combinations and improvements herein shown and described.

Of the drawings:—

Fig. 1 is a side elevation, largely diagrammatic, of a typical and illustrative embodiment of the present invention;

Fig. 2 is a fragmentary side elevation of a modified embodiment of the invention; and

Fig. 3 is a vertical section taken on the line 3—3 of Fig. 2.

The present invention has for an object the provision of a novel and improved high speed rotary printing press adapted for installation and use in buildings in which vibration is objectionable, such as in sky-scrapers. Another object is the provision of a means of isolating press created vibrations so that they will not be communicated annoyingly or detrimentally to the building, also one form of novel and improved vibration isolated rotary newspaper printing press and a mounting or support therefor wherein my invention is embodied. The invention further provides a highly resilient mounting for high speed, rotary, unit-type newspaper printing presses permitting unimpeded resilient movement of the several units as an entirety and which reduces the damaging effect of the vibrations on the press itself.

In accordance with one embodiment of the invention a plurality of high-speed, rotary, perfecting, newspaper units are arranged in straight line formation, with rotary folding units interposed between certain of the printing units and a foundation is provided beneath all of the units. In said embodiment, the various perfecting printing units, and folder units also, have their frames mounted spaced apart and fixed on a bed plate or frame extending the full length of the press. The bed frame carrying the perfecting and folding units fixed thereto, is carried upon a plurality of separate, spaced-apart frames, and the vibra-

tion producing parts are carried upon the vibration isolating supports.

With the construction above described, the entire press is permitted vertical movement as a whole, while at the same time the vibrational movement is damped and is isolated from the foundation and building, and this is done with an exceedingly small vibrational movement of the respective unit frames.

So far as concerns many features of the invention, the perfecting and folding units could be mounted directly on the vibration isolating means. In said present preferred embodiment, the perfecting printing units and folding units are all driven in unison, or such of the units are driven as may be needed for the particular product to be printed, and preferably a main drive shaft is provided, extending horizontally of the line of units and to one side thereof.

My invention includes a means for isolating press vibrations which takes into account and deals with press created vibrations of different frequencies, controlling at least those of relatively high frequency and high energy so as to prevent transmission of those of lower frequency, and for this purpose, the press is supported upon resilient supports having a natural vibration period in definite relation to certain vibrational frequencies created by or arising out of the operation of the press.

In the running of a high speed rotary printing press and its folders, vibrations of several definite frequencies are produced and in steel-frame buildings, even high buildings having thirty or more stories, these vibrations are often transmitted even to the most remote parts of the building, seriously annoying the occupants and eventually impairing the safety of the structure. The annoying vibration is generally the relatively low frequency vibration having a frequency of from 1000 to 2000 per minute, but this is accompanied by apparently less disturbing vibrations of frequencies ranging as high as five, six and seven thousand per minute.

The structure of most buildings is such that vibrations of low frequency alone are not readily transmitted, but when combined with vibrations of higher frequency are transmitted and produce annoyance and damage. I have discovered that if the transmission of the higher frequency vibrations is prevented, the transmission of the low frequency vibrations is concomitantly greatly reduced. These vibrations are readily transmitted through the usual rigid press supports and are also transmitted readily and even amplified

by certain possible forms of resilient mounting between the press and its foundation. In general, the vibration-isolating mounting for a press should have a natural period of vibration less than one-half of the dominant high-frequency vibration of the press. In order to obtain such a relatively low natural period, it is necessary therefore to utilize a highly resilient medium to support the side frames and interposed between them and the foundation, and to so proportion or design this medium to the weight of the press supported by it that it is subjected to a relatively large deflection as compared to the vibrational movement of the press.

Various resilient media may be employed, as for example, rubber, sheet cork, steel springs and the like. The highly resilient absorption medium also serves to eliminate the sharp wave front of the transmitted vibration unless highly elastic material is employed, thereby rendering the vibration less annoying and deleterious, while with highly elastic material, the isolation is even more effective. For modern rotary newspaper presses operating at substantially 400 or 500 cylinder revolutions per minute a period of 600 per minute is generally satisfactory, corresponding to a spring deflection under dead weight of approximately one-tenth of one inch.

The vibration isolating mounting of the printing press also tends to prevent damage of the press from the vibrations set up by the running of the press, as these vibrations are absorbed in the isolating mounting and tend to neutralize each other, thereby preventing the building up or reinforcement of the vibrations which otherwise would result in eventual serious damage to the press bearings.

Where the newspaper press is of the "unit" type, and is provided with a horizontal main drive shaft interconnecting the several units, the resilient, vibration insulating medium is preferably provided between each side frame, or frame leg, and the foundation, or it may be between the bed plate and the supporting frames, and is so proportioned or designed relatively to the load carried by it as to provide substantially the same natural period for each of the resiliently mounted systems.

Referring now in detail to the illustrative embodiment of the invention as shown in Figure 1 of the accompanying drawings, the invention is shown as embodied in a rotary printing press for printing newspapers, this press being of the unit type in which each of the rotary perfecting units is mounted in individual side frames, as are the folding units.

As embodied each of the rotary perfecting units 10 comprises two plate cylinders 11 and two co-operating impression cylinders 12 rotatably mounted in unit side frames 13 and adapted to be driven by means of a unit drive shaft 14, the several unit drive shafts, in turn, being driven from a main drive shaft 15 extending horizontally and to one side of the line of units 10. As many units as are needed may be provided, three only being shown, but in actual practice the number usually varies from 6 to 18 or even more. Beneath each of the units 10 is mounted the web supply means for the individual units and one magazine reel 17 is provided for each of the units, each reel supporting a plurality of web rolls 18 to be brought sequentially into operative position for feeding the paper web to its proper perfecting unit and from thence to the folder where the webs are associated, longitudinally

folded, slit, cut into sheets, folded transversely and finally delivered as finished products.

The folding unit 20 comprises side frames 21 in which are mounted formers and folding cylinders (not shown) and the folder parts are driven from the main drive shaft 15 through the folder drive shaft 22. Only one folding unit is shown, but as many as needed are provided and are interposed in the line of perfecting units in accordance with the various production requirements. In practice, one folding unit 20 is generally provided for each three, four or five perfecting units.

The several perfecting and folding units are all fixed in spaced apart and aligned relation on bed frames 25, extending longitudinally of the press and bolted together, the bed frame units comprising longitudinal side members and cross connecting members between the side members, the side frames of the perfecting units resting upon and being bolted to the side members of the bed frames. Suitable motor driving means are provided for driving the main drive shaft 15.

Fixed to and extending downwardly from the bed frames 25 are provided the supporting frame work by which the press is supported on its foundation, and preferably a pair of supporting columns is provided on each side of the press for each perfecting unit 10, the supporting columns for each unit being positioned around the magazine reel for that unit. As embodied, the supporting frame-work on each side of the press comprises a pair of opposed U-shaped frames 30 and 31, these frames being securely bolted together at their end flanges 32 to form a closed frame-work, the vertical columns 33 of the frame members 31 being positioned so that the magazine reels 17 are centrally disposed with respect to them. The side frames are generally spaced substantially evenly so that the loads carried by them are not greatly different.

The magazine reels 17 are preferably, but need not be, supported on the lower horizontal reaches of frames 31.

The press foundation may be constructed in the usual manner and is preferably independent of the foundation for the building in which the press is installed, but any suitably firm foundation is satisfactory. This foundation is finished to provide wells 35 on its upper surface, these wells being positioned immediately below the supporting frames 31, and is finished with concrete or other suitable material.

Intermediate the floor or wells 35 and the horizontal reach of frames 31 are positioned the resilient, vibration-isolating mountings for the press in accordance with the present invention and these mountings serve to support the several units of the press in aligned, substantially unchanging relation to each other thereby insuring proper operation of the driving mechanism, web feeding and web guiding devices.

In the form exemplarily shown in the drawings the unit side frames 31 of the press are supported in chairs 80 fitted into the wells or depressions 35, these chairs 80 having upwardly extending flanges 81 and 82 within which the press frames have a close sliding fit, which permits free vertical movement of the press frames while holding them accurately in lateral alinement. Interposed between the unit press frame and the chair 80, to resiliently support the frame unit and itself supported upon the chair, is a resilient member, or a plurality of members 84.

These vibration isolating members may be of

various materials and forms, but the material and form should be selected so that when under the dead weight of the machine, the system will have a natural period of vibration at least less than and preferably less than one-half of the lowest frequency vibration of the press, which vibration has a sufficient amount of energy to be transmitted to the building and the vibration isolating members should be of highly resilient and preferably highly elastic material and be designed so as to be subjected to a relatively large and substantially uniform deflection under the dead weight of the press.

Where a highly elastic medium is employed as the vibration isolating means, the natural period of the system can be reduced with reference to the frequency of the vibration which it is desired to isolate, due to the fact that the vibration transmission characteristics of such a material falls off so rapidly as the resonant frequency is exceeded, whereas with a less elastic material, such as cork, it is often necessary to so proportion the parts that the natural period of the resiliently supported system is less than one-half the frequency of the lowest vibration which is substantially transmitted through the foundations and to the building.

In accordance with the modified embodiment shown in Figures 2 and 3, the vibration-isolating means are positioned between the bed frame 25 and the U-shaped supporting frame 30 and carry the weight of the bed-frame and press units. As there shown, each of the printing units 10 is securely fastened to the bed frame on which a plurality of units may be supported in alinement. A plurality of vibration-isolating means are provided beneath each of the side frames 13 and are preferably positioned between the bed frame and supporting frame in substantial vertical alinement with the side edges of the unit frames 13. These resilient, vibration-isolating means may comprise a slab 40 of rubber, cork or other resilient material received within a recess 41 formed on the upper surface of the supporting frame 30, and covered by means of a recessed steel plate 42 on which the side frame 13 is supported by means of jack screws 44 threaded into brackets 45 formed on the sides of the bed plate 25.

The slabs of resilient material are so constructed and proportioned that, taking into account the load carried by each, the deflection of each of the slabs 40 under the dead load carried by it is substantially uniform, and produces a system having a natural period of vibration less than substantially one-half that of the principal vibration produced during the normal operation of the press.

For facilitating replacement of the slabs 40, in case they become permanently deformed and lose their elasticity, means are provided for holding the bed frame 25 in its normal position while the slabs 40 are replaced. As embodied, jack screws 46 are threaded in the brackets 45 and are adapted to be lowered into contact with the upper surface of supporting frame 30. When in this position, the other screws 44 may be raised, relieving the weight of the units and bed plate from the slabs 40, and permitting easy endwise removal and replacement of the slabs. When replaced, the jack screws 44 may be lowered sufficiently to place all of the press load on the slabs 40, or until the screws 46 have been just lifted from the frame 30. In this way, ac-

curate realinement of the press is insured after the replacement of the slabs 40.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:

1. A printing press installation including in combination a plurality of high speed rotary printing couples mounted in press side frames, a press foundation and means for vibrationally isolating the press from its foundation and for supporting the press on said foundation, said means comprising a plurality of spaced-apart resilient supports positioned between the press and foundation.

2. A printing press installation including in combination a plurality of high speed rotary printing couples mounted in press side frames, a press foundation and means for vibrationally isolating the press from its foundation and for supporting the press on said foundation, said means comprising a plurality of spaced-apart resilient supports positioned between the press and foundation, said supports being compressed by the loads carried by them and compressed substantially uniformly by their individual loads.

3. A printing press installation including in combination a plurality of high speed rotary printing couples mounted in press side frames, a press foundation and means for vibrationally isolating the press from its foundation and for supporting the press on said foundation, said means comprising a plurality of resilient supports supporting the press on said foundation, said supports being deflected substantially uniformly from their unloaded condition by the dead weight carried by them.

4. A printing press installation including in combination a plurality of high speed rotary printing couples mounted in press side frames, a press foundation and means for vibrationally isolating the press from its foundation and for supporting the press on said foundation, said means comprising a plurality of resilient supports supporting the press on said foundation, said supports being so proportioned to the load carried by them that their natural periods of vibration are substantially equal.

5. A printing press installation including in combination a plurality of high speed rotary printing couples mounted in press side frames, a press foundation and means for vibrationally isolating the press from its foundation and for supporting the press on said foundation, said means comprising a plurality of resilient supports supporting the press on said foundation, each of said supports and the load carried by it forming a system having a natural period of vibration less than one-half the frequency of the principal vibration produced during the normal operation of the printing couples.

6. A printing press installation including in combination a rotary printing couple mounted in press side frames, a press foundation and means for vibrationally isolating the press and foundation from each other and for supporting the press on its foundation, said means including a plurality of resilient supports supporting the press on said foundation, each of said supports and the load carried by it forming a system having a natural period of vibration less than one-

half the frequency of the lowest frequency vibration which is substantially transmitted to the building in which the installation is housed.

7. A high speed rotary newspaper printing press unit installation including in combination a rotary perfecting newspaper couple, side frames in which the cylinders of the couple are rotatably mounted, a press foundation, and resilient mountings supporting the side frame on the foundation for vibrationally-isolating the press from the foundation.

8. A high speed rotary newspaper press installation including in combination a plurality of rotary perfecting printing units, a plurality of folding units interposed between the printing units, said units being arranged in line-formation and having supporting frames by which the unit parts are mounted, a press foundation and a resilient mounting between each supporting frame and the foundation, the natural periods of the resilient mountings being approximately half the lowest frequency produced by the normal running of the press.

9. A high speed rotary printing press installation including in combination rotary printing couples, press frames in which the parts are mounted, said frames having spaced supporting columns by which the frames are supported, a foundation, a resilient mounting between each column and the foundation, each resilient mounting having a natural period of vibration less than twice the normal speed of rotation of the cylinders of the printing couples.

10. A high speed rotary printing press installation including in combination rotary printing couples, press frames in which the parts are mounted, said frames having spaced supporting columns by which the frames are supported, a foundation, a resilient mounting between each column and the foundation, each resilient mounting having a natural period of vibration less than half the frequency of the dominant high-frequency vibration produced in the normal running of the press.

11. A high speed rotary printing press installation including in combination press frames in which a printing couple and other moving press parts are mounted, a foundation, and resilient, vibration isolating means for mounting the press frames on the foundation, said means having a natural period of vibration less than twice that of the normal speed of rotation of the cylinders of the printing couple.

12. A printing press installation including in combination a rotary printing couple mounted in press side frames, a press foundation and means for vibrationally isolating the press and foundation from each other and for supporting the press on its foundation, said means including a plurality of spaced apart resilient members positioned between the press frames and foundation, and supporting the press on said foundation, each of said members being deflected by the dead weight of the press a substantially equal amount.

13. A printing press installation including in combination a rotary printing couple mounted in press side frames, a press foundation and means for vibrationally isolating the press and foundation from each other and for supporting the press on its foundation, said means including a plurality of resilient members positioned between the press frames and foundation, each of said members carrying substantially the same load as the others and subjected to substantially the same dead load deflection as the others.

14. A printing press installation including in combination a rotary printing couple mounted in press side frames, a press foundation and means for vibrationally isolating the press and foundation from each other and for supporting the press on its foundation, said means including a plurality of resilient pads positioned between the bed frame and press substructure and spaced apart along the bed frame.

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